Does regional anesthesia improve outcome after total knee arthroplasty?

Macfarlane AJ, Prasad GA, Chan VW, Brull R

CRD summary
This review compared regional anaesthesia with general anaesthesia for total knee arthroplasty. The authors concluded that insufficient evidence existed to support superiority of either technique for clinical outcomes, although regional anaesthesia may benefit postoperative hypotension and pain, morphine consumption, opioid-related adverse effects, length of hospital stay and rehabilitation. The authors’ conclusions are likely to be reliable.

Authors’ objectives
To compare regional anaesthesia with general anaesthesia in patients who underwent total knee arthroplasty in terms of clinical outcomes, length of hospital stay and rehabilitation.

Searching
MEDLINE, EMBASE and Cochrane Central Register of Controlled Trials (CENTRAL) were searched for English-language studies from January 1990 to October 2008. Search terms were reported. Reference lists of relevant articles were scanned for additional studies.

Study selection
Randomised controlled trials (RCTs) published from 1990 onwards that compared general anaesthesia and/or specific systemic analgesia with specific regional anaesthesia and/or regional analgesia for total knee arthroplasty were eligible for inclusion in the review. RCTs that compared systemic versus regional analgesic interventions postoperatively were eligible for inclusion. Outcomes of interest were: mortality; cardiovascular morbidity; deep venous thrombosis (DVT); pulmonary embolism; blood loss; duration of surgery; pain; opioid-related adverse effects; cognitive defects; length of hospital stay; and rehabilitation outcomes. Trials were excluded if data for total knee arthroplasty could not be distinguished, opioid-only neuraxial techniques were used and if regional analgesia was not given on the day of surgery.

Included trials comprised patients with an average age between 51 and 77 years. Most trials included more women than men. A variety of specific interventions were included (for example: femoral, obturator, sciatic nerve blocks; continuous psoas block; epidural; ropivacaine; and bupivacaine). Comorbidities were listed mostly according to American Society of Anaesthesiologists criteria.

Two reviewers selected studies for inclusion.

Assessment of study quality
Trial quality was assessed with the Jadad scale of randomisation, blinding, allocation concealment, withdrawals and follow-up. A maximum score of 5 was possible. Trials that scored 3 or more were considered to be of satisfactory quality. Two reviewers independently carried out the quality assessment.

Data extraction
Data were extracted on outcomes of interest as follows: mortality (direction of effect); cardiovascular morbidity and adverse effects (percentage of incidence); perioperative DVT and pulmonary embolism (percentage of patients); postoperative pain (scores on visual analogue or numeric rating scales); length of stay (days); and rehabilitation (mean number of degrees knee flexion and extension).

The authors did not state how many reviewers performed data extraction.

Methods of synthesis
Due to the heterogeneity of included trials presented in the tables, a narrative synthesis was carried out.

Results of the review
Twenty-eight trials (n=1,538) were included in the review. Sample sizes ranged from 20 to 262 patients. Three trials scored 5 on the Jadad scale, four trials scored 4 and seven scored 3; the other 14 trials scored 2 or less.
One trial (n=262) assessed mortality. It compared epidural anaesthesia and continuous epidural analgesia with general anaesthesia and intravenous opioid. There were no differences in the number of deaths over an eight-week postoperative period (one death in each group).

For cardiovascular morbidity (nine trials), there was no difference between regional anaesthesia and general anaesthesia in terms of postoperative myocardial infarction and pulmonary embolism (three trials). Postoperative hypotension was higher following epidural analgesia than with systemic or with other methods of regional analgesia (three trials).

No differences were reported between regional anaesthesia and general anaesthesia in terms of incidence of DVT (four trials), perioperative blood loss or transfusion requirements (five trials), duration of surgery (13 trials) and cognitive function (two trials).

Pain scores and/or morphine consumption was reduced in 21 trials; the effects were long-lasting (up to 10 days) in certain cases. Specifically, epidural analgesia, single injection femoral nerve block (FNB) with or without sciatic nerve block, continuous catheter-based femoral nerve block and continuous psoas plexus block were found to be more effective than systemic analgesia (18 trials).

Ten trials reported no differences in adverse effects between general anaesthesia and regional anaesthesia. However, opioid-related adverse effects (postoperative nausea and vomiting) were reduced in the regional anaesthesia groups following FNB plus obturator block, FNB plus sciatic block and continuous FNB (six trials).

Three trials indicated that length of hospital stay could be reduced by between one and 13 days. Six trials reported that rehabilitation could be improved with regional anaesthesia, specifically in terms of range of motion and ambulation following FNB or continuous FNB.

**Authors' conclusions**

There was insufficient evidence to conclude whether regional anaesthesia was superior to general anaesthesia in terms of clinical outcomes, with the exceptions of postoperative hypotension and pain, morphine consumption and opioid-related adverse effects. Length of stay may be reduced and the rehabilitation process may be facilitated by regional anaesthesia and analgesia.

**CRD commentary**

The review question was clear and supported by detailed and potentially reproducible inclusion criteria. The search strategy included some relevant data sources. The restriction to trials conducted after 1990 was justified by the authors. Language bias was a possibility. There was no apparent search for unpublished material, so publication bias could not be ruled out. The processes of study selection and quality assessment were carried out with sufficient attempts to minimise error and bias. It was unclear how data extraction was carried out. A relevant quality assessment tool was applied and the results of this were taken into account in the results. Study details were provided. The chosen method of synthesis appeared appropriate in the presence of clinical heterogeneity. The authors discussed several limitations in the data that culminated in cautious conclusions. This was a largely well-conducted review and the authors' conclusions are likely to be reliable.

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

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

**Funding**

Not stated.

**Bibliographic details**


**PubMedID**

19130163
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.