A systematic review of intra-articular local anesthesia for postoperative pain relief after arthroscopic knee surgery

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Authors' objectives
To assess the effect of intra-articular local anesthesia in the control of postoperative pain after arthroscopic knee surgery.

Searching
The authors searched the electronic databases MEDLINE (up to May 1998) and the Cochrane Library (1998, issue 2), using the search terms: 'intra-articular', 'knee', 'postoperative pain', 'local anesthesia', 'bupivacaine', 'lidocaine', 'prilocaine', 'arthroscopy', and 'surgery'. Additional reports were identified from reference lists of retrieved papers. There were no language restrictions. Abstracts, correspondences, or unpublished observations were excluded and original authors were not contacted.

Study selection
Study designs of evaluations included in the review
Double-blind, randomised controlled trials (RCTs). Reports or treatment arms of direct comparisons of intra-articular local anesthesia with other treatment modalities or with intra-articular opioids were not considered.

Specific interventions included in the review
Intra-articular local anesthesia (bupivacaine 50-150 mg, and prilocaine 200 mg) compared with placebo (saline) or no treatment for post-operative pain. Studies where incisional local anesthetic infiltration of port sites or nerve blocks or other intra-articular treatment as a part of the treatment were excluded.

Participants included in the review
Patients 15 years of age and older undergoing arthroscopic knee surgery.

Outcomes assessed in the review
Outcome measures were pain scores, supplementary analgesics and time to first analgesic request.

How were decisions on the relevance of primary studies made?
Each study was read independently by each of the authors. Consensus was subsequently achieved.

Assessment of study quality
The authors used the Jadad, 3-item, 1-5 score, quality scale to assess the validity of included studies (see Other Publications of Related Interest no.1). Each study was scored independently by each of the authors. Consensus was subsequently achieved.

Data extraction
The authors do not state how the data were extracted for the review, or how many of the authors performed the data extraction.

Data were extracted for the categories of: study identification, quality score, number of patients (active and control), dosage for intervention, pain score, supplemental analgesic consumption, time to first analgesic request, and comments. Significant difference (p < 0.05, as reported in original investigation) in pain relief assessed by pain scores as also recorded. The authors also noted whether power analysis of statistical tests was performed.

Weighted mean differences (WMD) with 95% confidence intervals (CIs) were calculated for each study.
Methods of synthesis

How were the studies combined?
Weighted mean differences (WMD) with 95% confidence intervals (CIs) of pain scores 1-4 hours postoperatively between treatment groups were calculated using a fixed-effect model.

For the other outcome measures (supplemental analgesic consumption and time to first analgesic request) a qualitative analysis was performed because of the variety of analgesics and doses used and because of the lack of sufficient data for a meta-analysis.

How were differences between studies investigated?
A test for heterogeneity was performed in the quantitative analysis of pain scores and the authors state that sensitivity of evaluated nonsignificant studies (power of statistical tests) was considered.

Results of the review

Twenty RCTs were included in the review with 895 participants of which 458 received local anesthetic.

The median score for quality was 3 (range 2-5). Twelve of twenty studies showed improved pain relief after treatment.

In ten of the 12 positive studies, pain scores were significantly lower in the treatment groups compared with the control groups with visual analog scale (VAS) score reductions of between 10 and 35 mm early (1-4 hours) postoperatively.

WMD for 12 trials confirmed a statistically significant but less clinically important effect on postoperative pain scores, WMD 11 mm (95% CI: 14, 7 mm) in favour of the treatment groups compared with the control groups. Heterogeneity was not significant (p = 0.80).

In nine studies, the consumption of supplementary analgesics was reduced by 10-50% during observation periods of up to 4 hours. However, in most cases, the analgesic requirements were small to moderate.

Only in two of six studies, where time to first analgesic request was evaluated, a significant prolongation of pain relief was observed as lasting between 30 and 50 minutes.

The difference in mean dose between positive and negative studies, was not statistically significant, (P = 0.196, Mann-Whitney U test). In the study where 200 mg of prilocaine was instillated intra-articularly, no effect on postoperative pain was observed.

The influence on immediate recovery and ambulation of intra-articular local anesthesia was examined in 8 studies. One study found a statistically significant improvement where patients in the treatment group regained their ability to walk 30 minutes before patients in the control group. However, in the other 7 studies no effect of intra-articular local anesthesia on the ability to walk, normal activities, home readiness, or duration of ambulatory hospital stay was observed.

No side effects or signs of toxicity attributable to the intra-articular local anesthetic were reported (9 studies). No pattern of a possible influence of the type of surgical procedure on the effect of intra-articular local anesthesia on postoperative pain was observed.

Authors' conclusions

The authors state that there is weak evidence for a reduction of postoperative pain after intra-articular local anesthesia in patients undergoing arthroscopic knee surgery which, although being small to moderate, and of short duration, may be of clinical significance in day-case surgery.

CRD commentary

The authors have clearly stated the research question and some inclusion and exclusion criteria. The literature search
was limited by searching only MEDLINE and the Cochrane Library. There were no language restrictions on the search but there are few foreign language papers found on MEDLINE. Grey literature and unpublished studies were not included. There is no mention of handsearching. It is possible that additional relevant studies may have been missed. The quality of the included studies was formally assessed but the authors have not reported who performed the data extraction.

The data extraction is reported in tables. Statistical pooling was performed for one of the outcomes where there were sufficient data and there was a test for heterogeneity. The remaining studies were combined in a narrative discussion due to heterogeneity between those studies.

The authors’ conclusions appear to follow from the results although the findings show a very small effect from treatment. Further, the authors’ conclusions should be viewed with caution because of some methodological limitations in the process of the review.

Implications of the review for practice and research
Practice: The authors state that their review findings may justify the use of a relatively short-lasting analgesic regimen.

Research: The authors state that, based on the data presented in this review, there does not seem to be an urgent need for further studies focusing exclusively on local anesthetics. Instead, future research in this area possibly should focus on intra-articular multimodal regimens, which may provide enhanced effects on postoperative pain and convalescence.

Bibliographic details

PubMedID
10499755

Other publications of related interest

Indexing Status
Subject indexing assigned by NLM

MeSH
Anesthetics, Local /administration & dosage /adverse effects /therapeutic use; Arthroscopy; Double-Blind Method; Humans; Injections, Intra-Articular; Knee Joint /surgery; Pain Measurement; Pain, Postoperative /drug therapy; Randomized Controlled Trials as Topic

AccessionNumber
11999001864

Date bibliographic record published
28/02/2001

Date abstract record published
28/02/2001

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.