Epidural analgesia compared with peripheral nerve blockade after major knee surgery: a systematic review and meta-analysis of randomized trials

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CRD summary
This review, which assessed the safety and effectiveness of epidural analgesia and peripheral nerve blockade in adults undergoing major knee surgery, concluded that epidural analgesia should not be used routinely and that peripheral nerve blockade is appropriate for multi-modal analgesia care. The authors' conclusions did not reflect the limited evidence presented and are unlikely to be reliable.

Authors' objectives
To compare the safety and efficacy of epidural analgesia and peripheral nerve blockade (PNB) in adults undergoing major knee surgery.

Searching
The following databases were searched from inception to April 2007: MEDLINE, EMBASE, CINAHL, Bandolier, and the Cochrane Central Register of Controlled Trials. There were no language restrictions. Search terms were reported. Conference abstracts from three societies were also searched from 2000 onwards. In addition, Google was used to search the Internet and researchers in the field were contacted. Reference lists of retrieved papers were scanned for further studies.

Study selection
Randomised trials of continuous lumbar epidural analgesia, with local anaesthetic agent compared with any peripheral nerve block, in patients undergoing major knee surgery were eligible for inclusion. Studies using opioid-only epidural, single-shot epidural and intrathecal-only techniques were excluded.

Of the trials included in the review, most participants had undergone a total knee joint replacement. The most common peripheral nerve block technique used was a femoral sheath catheter alone, with single-shot femoral block and continuous lumbar plexus blockade also being used, sometimes along with sciatic blockade. Bupivacaine and ropivacaine were the most commonly used local anaesthetics for epidural treatment. Most studies also used a general anaesthetic and allowed use of additional analgesics. Outcomes assessed included analgesic efficacy, pain scores, adverse effects and patient satisfaction.

The authors did not state how the papers were selected for the review or how many reviewers performed the selection.

Assessment of study quality
Trial quality was assessed using the (five point) Jadad scale. The authors did not state how the validity assessment was performed.

Data extraction
Outcome data were extracted for the two treatment groups and weighted mean differences (WMD) for continuous data, and odds ratios for binary data, with 95% confidence intervals (CI) were calculated. Visual analogue pain scores were converted to a standardised 0-10 scale. Means and standard deviations (SD) were estimated when necessary (methods were reported). Trial authors were contacted for further information where necessary.

Two reviewers independently extracted data, with disagreements resolved by consensus.

Methods of synthesis
Meta-analyses were performed to pool data (when there was enough data in three or more studies) using a fixed-effect model, or a random-effects model if significant heterogeneity was found. The studies were weighted but the method of
weighting was not stated. A narrative synthesis was used for those outcomes unsuitable for meta-analysis. Subgroup analysis was performed to assess quality of analgesia. Heterogeneity was assessed using the $\chi^2$ and $I^2$ statistics.

**Results of the review**

Eight randomised trials were included in the review (n=510). On the Jadad scale three studies scored 3, three studies scored 2 and two studies scored 1. None of the trials were blinded. Sample sizes ranged from 45 to 108.

There were no statistically significant differences in pain scores between PNB and epidural during 0-12 hours and 12-24 hours after surgery, although there was significant heterogeneity (0-12 hours $I^2=87\%$ and 12-24 hours $I^2=93\%$). The authors reported that significantly lower pain scores were found for 24-48 hours in the epidural group, WMD -0.35 (95% CI: -0.64 (forest plot -0.69), -0.02, p=0.04), with no heterogeneity detected (although a random-effects model was still used). This result was not deemed to be clinically significant. However, the associated forest plot indicated that lower pain scores actually occurred in the PNB group.

Hypotension was significantly more prevalent in the epidural group, OR 0.19 (95% CI: 0.08, 0.45, $p=0.0001$, $I^2=18.7\%$). There was no difference in rates of nausea and vomiting, nor in morphine consumption. Further results were reported.

**Authors' conclusions**

There is sufficient evidence that lumbar epidural analgesia should not be used routinely and that PNB is appropriate for multi-modal analgesia care after routine major knee surgery.

**CRD commentary**

The review addressed a clear question and was supported by appropriate inclusion criteria. A thorough search was conducted for both published and unpublished studies in any language. Although individual study details were provided, they did not include population details, making results more difficult to interpret. Suitable methods were employed to minimise the risks of reviewer error and bias for the data extraction process, although the authors did not report on the methods used to select studies for inclusion and assess study quality. The study quality assessment was made using the Jadad scale, but this was not used in interpreting the results of the review (for example, the pooled hypotension result relied heavily on a trial with a Jadad score of 2, yet this was classed as a principal finding). The authors pooled results despite the presence of very significant heterogeneity (a narrative synthesis may have been more appropriate), in addition they also appeared to incorrectly report a key result. The authors did though discuss clinical heterogeneity issues. Generally the results suggested there was little difference between the treatments in terms of safety and efficacy. The authors' conclusions did not reflect the limited and inconsistent evidence presented and are therefore not likely to be reliable.

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

Practice: The authors stated that there was sufficient evidence that lumbar epidural analgesia should not be used routinely and that PNB is appropriate for multi-modal analgesia care after routine major knee surgery.

Research: The authors stated that a RCT was needed to compare single-shot blocks with perineural catheter techniques and that more research is needed on newer techniques.

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