Local anaesthesia for pain relief after laparoscopic cholecystectomy: a systematic review

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CRD summary
This review examined the effectiveness of local anaesthetics compared with placebo in reducing post-operative pain following laparoscopic cholecystectomy. The author concluded that local anaesthetics appear effective in pain reduction. The poor reporting of review methods and other limitations of the review mean that the reliability of the evidence underpinning these conclusions is unclear.

Authors' objectives
To assess the effectiveness of local anaesthetics (LA) for pain relief following laparoscopic cholecystectomy (LC).

Searching
MEDLINE was searched from 1985 to August 2004; some search terms were given. The website of the PROSPECT group was also searched.

Study selection
Study designs of evaluations included in the review
Placebo-controlled randomised controlled trials (RCTs) were eligible for inclusion in the review.

Specific interventions included in the review
Studies of LA given either intermittently via a catheter or as single-shot injections following LC were eligible for inclusion. Studies where the primary aim was to assess the effect of morphine, ketamine, tenoxicam or other analgesics injected intravenously or intraperitoneally were excluded, as were studies using intrathecal morphine. Comparisons of pre- and post-incisional LA, comparisons of different size trocars, and comparisons of epidural or paravertebral block versus local infiltration were also excluded from the review.

The LA included in the review were ropivacaine, bupivacaine, lignocaine and lidocaine. Injection was at the site of trocar insertion, intraperitoneally, or both, and injections were given from pre-incision to the end of the operation.

Participants included in the review
Studies of adults aged over 19 years undergoing LC were eligible for inclusion in the review.

Outcomes assessed in the review
The primary review outcomes were pain at the site of incision, visceral pain and shoulder pain during the 24 hour post-operative period. Consumption of analgesia and side-effects were also assessed in the review. The included studies assessed pain using visual analogue scales, a verbal analogue scale and numeric rating scales.

How were decisions on the relevance of primary studies made?
The author did not state how the studies were assessed for relevance, or how many reviewers performed the assessment.

Assessment of study quality
The validity of the studies was assessed using the Jadad scale, which assigns a score of between 1 and 5 based on randomisation, allocation concealment, intention-to-treat analysis and the reporting of losses to follow-up. The author stated how the studies were assessed for validity, but did not state how many reviewers performed the validity assessment.
Data extraction
The author stated how the data were extracted for the review, but did not state how many reviewers performed the data extraction. The mean and standard deviations of the outcomes data were extracted, where possible, and used to calculate the weighted mean difference (WMD) and 95% confidence interval (CI).

Methods of synthesis
How were the studies combined?
Pooled WMD with 95% CIs were calculated using a random-effects model where the reported data allowed. All studies were combined in a narrative; this involved the use of a vote-counting method whereby the number of studies reporting positive and negative effects of treatment on outcomes were summarised.

How were differences between studies investigated?
Heterogeneity between the studies included in the meta-analyses was assessed using chi-squared tests. The effect of study quality and site of incision on outcome in all trials was assessed using a form of the vote-counting method. Other differences were explored in the narrative synthesis.

Results of the review
Thirty-one RCTs (n=2,106) were included in the review.

The median study quality score on the Jadad scale was 3.

Most of the studies were not included in the meta-analysis since they did not report adequate data.

Meta-analysis of pain relief (3 RCTs, 148 patients). There was no significant difference between LA and placebo for abdominal pain at 0 to 2 hours postoperatively (WMD -0.99, 95% CI: -2.19, 0.20), abdominal pain at 2 to 6 hours post-operatively (WMD -0.83, 95% CI: -2.45, 0.79), or at 24 hours post-operatively (WMD -0.83, 95% CI: -1.62, 0.12). Significant heterogeneity was found for two of the meta-analyses (P=0.05 and P=0.0028, respectively) but not for the third (P=0.13).

All studies.

Locally injected LA: 5 of 6 studies using locally injected LA found that the injection improved pain relief but not analgesic consumption.

Intraperitoneal LA: 14 of 21 studies found that LA reduced pain. Nine of 21 studies reported that LA reduced analgesic consumption in comparison with placebo but the other 12 studies found no difference between the treatment and placebo groups.

Side-effects.

No major side-effects were reported in any of the studies. Three studies reported some patients with plasma concentrations of LA which would be considered toxic although they were without clinical symptoms of such toxicity.

Authors' conclusions
LA injected at the beginning of surgery at the incision site and intraperitoneally can provide pain relief, although the effect is often short-lasting. The majority of the evidence suggested that post-operative analgesic consumption is not reduced by the use of LA.

CRD commentary
The review question was clear and the inclusion criteria were defined in terms of the participants, intervention and study design. The search was restricted to one database and one website, and it is possible that some relevant studies were not included in the review. The author did not state that attempts were made to locate unpublished studies, which
might have led to the introduction of publication bias into the review. The methods used to select studies, assess validity and extract the data were not described, so it is not known whether any efforts were made to reduce errors and bias.

A minority of studies reported sufficient data to be included in the meta-analyses. The use of meta-analyses accompanied by a narrative synthesis appears appropriate, although the presence of statistical heterogeneity in two of the three meta-analyses should be noted. However, the use of a vote-counting method to assess the effects of study quality and injection site on outcome is not appropriate, as it does not take study size or other characteristics into account. In the light of these methodological issues, it is unclear whether the author's conclusions are reliable. The review's findings should thus be regarded as a precursor to a more rigorous synthesis.

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

**Practice:** The author stated that the dose of LA should be carefully monitored to avoid toxicity.

**Research:** The author stated that future studies should be directed at determining whether the mechanism of the analgesic effects of LA is peripheral or systemic, and at investigating reasons for the wide variation in the pain experienced by patients following LC.

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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.