Bupivacaine versus normal saline for relief of post-adenotonsillectomy pain in children: a meta-analysis

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CRD summary
This review assessed perioperative bupivacaine infiltration for the relief of pain in adenotonsillectomy in children, concluding that it was a safe and effective method for the relief of post-adenotonsillectomy pain. The authors' conclusion clearly followed from the evidence presented, although the reliability of the conclusion may be limited by the small volume and variable quality of this evidence.

Authors' objectives
To assess the safety and clinical effect of perioperative bupivacaine infiltration in the relief of pain in adenotonsillectomy in children.

Searching
MEDLINE, EMBASE and the Cochrane Library databases were searched from 1990 to September 2009 without language restrictions. Search terms were reported.

Study selection
Randomised controlled trials (RCTs) that compared bupivacaine injected into the tonsillar region immediately after removal of the tonsils against saline solution or placebo for local anaesthesia were eligible for inclusion. All trials were required to use general anaesthesia with tracheal intubation.

Where reported, the surgical technique among identified trials was electrocautery, snare dissection, blunt dissection, and sharp dissection with cautery for haemostasis. Most trials used 3mL to 5mL of 0.25% bupivacaine; other trials used 0.25% bupivacaine at 0.5mg/kg up to a maximum of 10mL, 0.5% bupivacaine at 1mg/kg, or 6mL of 0.25% levobupivacaine. All control groups received saline solution. Across trials, participants ranged from two to 18 years of age.

Two reviewers independently selected studies for inclusion.

Assessment of study quality
The included trials were assessed according to the following criteria: randomisation method, blinding, concealment of treatment allocation, use of intention-to-treat analysis, and similarity of groups at baseline. Trials received an overall quality grade of A, B or C (from high to low quality), but the authors did not state how this grade was derived or how many reviewers performed the assessment.

Data extraction
Weighted mean differences (WMD) were calculated for continuous variables with the same unit of measurement; standardised mean differences (SMD) were calculated for continuous variables using different units of measurement. Relative risks (RRs) were calculated for dichotomous outcomes. Associated 95% confidence intervals (CIs) were calculated for each of these outcomes.

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

Methods of synthesis
In the absence of statistical heterogeneity, pooled relative risks, weighted mean differences or standardised mean differences, and 95% confidence intervals, were obtained using a fixed-effect model. In the presence of statistical heterogeneity (p>0.1 using the $\chi^2$ statistic), a random-effects model was used.
Funnel plots were used to examine the potential for publication bias.

**Results of the review**

Seven RCTs were included in the review (n=286 participants). Two trials were rated grade A for quality, two were grade B, and three were grade C. There was no obvious evidence of publication bias.

Pooled data from four RCTs (n=163) suggested that there was significantly less requirement for additional analgesic in patients receiving bupivacaine compared with saline (RR 0.62, 95% CI 0.48 to 0.80). CHEOPS (Children's Hospital Eastern Ontario Pain Score) was significantly lower for bupivacaine at 15 minutes (WMD -1.09, 95% CI -1.93 to -0.25), one hour (WMD -2.04, 95% CI -3.93 to -0.16) and four hours (WMD -2.13, 95% CI -2.77 to -1.48) postoperatively (two RCTs; n = 81 patients). VAS (Visual Analogue Scale) pain score was significantly lower for bupivacaine at 12 to 48 hours postoperatively (SMD -1.34, 95% CI -2.23 to -0.44; five RCTs; n=204 patients) and at time of discharge (SMD -1.02, 95% CI -2.03 to -0.01; three RCTs; n=123 patients); this effect was seen for both bupivacaine alone and in combination with epinephrine.

Where reported, there were no statistically significant differences between bupivacaine and placebo on postoperative nausea and vomiting, abdominal pain, constipation, otalgia, or arrhythmia.

**Authors' conclusions**

Bupivacaine infiltration was a safe and effective method for the relief of paediatric post-adenotonsillectomy pain.

**CRD commentary**

The review question was clearly defined in terms of the patients, intervention, comparators, and study designs of interest. Multiple sources were searched to identify relevant evidence. Attempts were made to minimise errors and bias in the selection of studies, but it was unclear whether such efforts were made at other stages of the review process.

Appropriate methods appeared to have been used to assess the validity of included trials and to statistically pool the findings of those trials.

The authors' conclusion clearly followed from the evidence presented, although the reliability of the conclusion may be limited by the small volume and variable quality of this evidence.

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

**Practice:** The authors stated that the positive results appear to merit more widespread use of bupivacaine in paediatric adenotonsillectomy patients.

**Research:** The authors stated that the identified studies were small and of low quality, necessitating further randomised controlled trials.

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