Corticosteroids reduce postoperative morbidity after third molar surgery: a systematic review and meta-analysis

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CRD summary
This review concluded that perioperative administration of corticosteroids produced a mild to moderate reduction in oedema and an improvement in range of jaw motion after third molar (wisdom tooth) removal. The limited quality of included trials and limited applicability of the data suggest that the authors' conclusions should be interpreted with caution.

Authors' objectives
To assess the efficacy of corticosteroids on oedema, trismus (restricted jaw movement), and pain at early and late postoperative periods after third molar removal.

Searching
PubMed, EMBASE, Cochrane Central Register of Controlled Trials (CENTRAL), and ClinicalTrials.gov were searched from 1966 to March 2007 for studies published in English; search terms were reported. Online databases of numerous relevant journals and conference proceedings of the American Association of Oral and Maxillofacial Surgeons and the International Association for Dental Research were also searched. Bibliographies of relevant articles were searched and authors were contacted for any unpublished data.

Study selection
Prospective clinical trials of corticosteroids following third molar removal were eligible for inclusion. Studies had to report descriptive statistics (or changes) on oedema, trismus, or pain for preoperative, early (one to three days) and late (after three days) post third molar removal for treatment and control groups (or such data had to be extractable from graphs). Pain had to be reported using a visual analogue scale. It appeared that control treatments had to be inactive, for example, studies of corticosteroids versus non-steroidal anti-inflammatory drugs (NSAIDs) were excluded.

In included trials, half the participants were male; the mean age was 24 years. Most third molars were mandibular. The type of molar impaction included full bony, partial bony and mixed. Methylprednisolones and dexamethasone were the most frequently used types of corticosteroid (treatments were normally given intravenously and preoperatively). Methylprednisolone equivalent doses for intravenous agents ranged from 20 to 125mg. Control treatments included saline, sterile water, tube drainage, or were not reported. Half the trials were conducted in Turkey or Scandinavia, with the rest in the USA or England.

The authors did not state how many reviewers selected studies for inclusion.

Assessment of study quality
Study quality was assessed according to the following criteria: randomisation (usage and methods), allocation concealment, blinding, source of funding, use of cross-over design, use of a control group, and presentation of data.

The authors did not state how many reviewers performed the quality assessment.

Data extraction
Change from baseline (preoperative) data were extracted for the individual treatment groups in order to calculate weighted or standardised mean differences (WMD or SMD). Data were extracted from graphs when necessary. Visual analogue scale score means were extracted and standardised to a 10-point scale. In studies where outcomes were recorded on multiple postoperative days, day two was used for early analyses, and day seven for late analyses. Details were provided about classification of oedema measurement methods.
Two reviewers independently extracted data, with disagreements resolved by group discussion.

**Methods of synthesis**

Meta-analyses were performed, using a random-effects model, to calculate pooled standardised or weighted mean differences with 95% confidence intervals (CIs). Meta-regressions were performed to examine the effect of a range of specified factors.

Funnel plots were used to assess for publication bias.

**Results of the review**

Twelve trials were included in the review (n=630 patient, range 31 to 120). Eleven trials were randomised and 10 were double-blind. Two trials used appropriate methods of randomisation. Two trials used appropriate methods for allocation concealment. Six trials had a cross-over design. One trial received private funding.

Treatment with corticosteroids was associated with significantly less oedema during both early assessment (SMD 1.4, 95% CI 0.6 to 2.2; 10 trials) and late (SMD 1.1, 95% CI 0.1 to 2.0; nine trials) assessments, and less trismus (measured as improved jaw movement) at early assessment (WMD 4.1mm, 95% CI 2.8 to 5.5; 10 trials) and late assessment (WMD 2.7mm, 95% CI 0.8 to 4.6; nine trials) than control treatments.

There were no statistically significant differences in mean pain scores (six trials for early assessment; four trials for late assessment).

For oedema, sub-group analyses found that results differed significantly by type of impaction.

There was no evidence of publication bias.

**Authors’ conclusions**

Perioperative administration of corticosteroids produced a mild to moderate reduction in oedema and improvement in range of jaw motion after third molar removal.

**CRD commentary**

The review addressed a clear question supported by appropriate inclusion criteria. Several sources were searched to locate relevant studies, but the restriction to studies in English meant the possibility of missed studies (and associated language bias) could not be ruled out. Although two reviewers independently extracted data, it was unclear whether similar methods were used to minimise the risk of reviewer error and bias during the study selection and quality assessment processes.

Trial quality was adequately assessed; the authors discussed many of the limitations of the primary trials. The authors chose to analyse change from baseline data, rather than after-treatment data, despite the fact that all but one trial were randomised. Meta-analyses were used to pool data. Clinical heterogeneity was investigated using meta-regression, but no assessment of overall statistical heterogeneity was reported; forest plots for both the oedema and pain analyses appeared to suggest that such heterogeneity existed, casting doubt on the validity of the overall pooled results.

The limited quality of included trials and the likely lack of generalisability of the review's pooled results were not reflected in the authors' somewhat over-optimistic conclusions, which should be interpreted with caution.

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

**Practice**: The authors advocated the perioperative use of corticosteroids to limit the known, predictable side effects and symptoms associated with routine third molar removal.

**Research**: The authors stated that further studies are needed to determine the optimal dose, timing, and duration of corticosteroid therapy, and the role of corticosteroid therapy compared with NSAIDs.
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