Epidural steroid injection therapy for low back pain: a meta-analysis

CRD summary
This review investigated the long-term benefits of epidural steroid injections for patients with low back pain. The authors concluded that a long-term benefit of epidural steroid injection for low back pain was not suggested at six months or longer. Introduction of selection bias in most of the injection studies seems apparent. This conclusion reliably reflects the evidence presented.

Authors' objectives
To investigate the long-term benefits of epidural steroid injections for patients with low back pain.

Searching
MEDLINE, EMBASE and The Cochrane Library were searched without language restrictions from 1950 to September 2011. Search strategies were presented.

Study selection
Eligible studies were randomised controlled trials with at least six months of follow-up that focused on epidural steroid injections given to patients with low back pain (including radiculopathy) regardless of pain duration. Studies had to report at least one of the outcomes of pain status, back-specific disability index or number of patients undergoing subsequent surgery. Pain and disability had to be measured at six to 12 months. Studies of patients with low back pain attributed to acute major trauma, cancer, infection, spondyloarthropathy, pregnancy and pain following back surgery were excluded. Studies with control groups using steroid injection or surgery were excluded.

Where reported, epidural injections were performed using caudal, interlaminar or transforaminal approaches. Most studies included patients with subacute or chronic pain; approximately one third of studies focused exclusively on chronic low back pain. Most studies included patients suffered from radicular pain. More than half of the included studies compared epidural steroid injections with epidural saline or local anaesthetic injection; the remaining comparisons comprised conservative treatment, epiduroscopy or interspinous ligament injection. Some trials included multiple comparisons.

Two reviewers independently selected the studies for inclusion. Disagreements were resolved by discussion and consensus.

Assessment of study quality
Study quality was assessed using criteria developed by the Cochrane Back Group for randomisation, allocation concealment, blinding, similarity of baseline characteristics, use of cointerventions, compliance to allocated therapy, adequate reporting of drop-outs, loss to follow-up, non-differential timing of outcome assessment and use of intention to treat analysis.

The authors did not report how many reviewers were involved in the quality assessment of studies.

Data extraction
Data were extracted (or calculated/standardised, where necessary) in relation to pain scores measured on a visual analogue scale and on back-specific disability using the Oswestry Disability Index or the Roland-Morris Disability Questionnaire at six and 12 month follow-up points. Where only graphs were reported, mean scores and standard deviations were estimated, where possible. Intention-to-treat data were collected for the analysis.

Data were extracted by one reviewer and checked by a second reviewer. Differences were resolved by discussion.

Methods of synthesis
A random-effects meta-analysis was used to calculate pooled effects and 95% confidence intervals using weighted mean difference for pain, standardised mean difference for disability and relative risk in relation to subsequent surgery.
Statistical heterogeneity was assessed with the $I^2$ statistic. Multilevel regression was used to calculate the baseline score-adjusted weighted mean difference. Subgroup analyses were conducted to explore the influence of pain characteristics, pain duration, method of injection and control treatment. Publication bias was investigated using a funnel plot and by Egger's test.

**Results of the review**

Twenty-nine studies were included in the review. Twenty-three studies satisfied more than five of 11 quality criteria, although selection bias (particularly differences in baseline pain status between study groups) was apparent, largely in studies evaluating pain.

**Pain:** Compared with control, epidural steroid injections showed a favourable effect for pain at six months of follow-up (WMD -0.41, 95% CI -0.66 to -0.16; 10 comparisons). At 12 months follow-up the difference was no longer statistically significant (nine comparisons). There was no substantial heterogeneity. The results at both time points were not statistically significant when the analysis was adjusted for baseline pain score.

**Disability:** There were no statistically significant differences at six months (eight comparisons) or 12 months (nine comparisons) between epidural steroid injections and placebo/other procedures. Substantial heterogeneity was observed ($I^2$=70.6% for six-month comparisons and $I^2$=89.6% for 12-month follow-up comparisons). Adjustments for baseline score did not alter the main result.

**Subsequent surgery:** There was no statistically significant decrease in numbers of patients treated with epidural steroid injections (delivered by any approach) who subsequently underwent surgery compared with placebo/other procedures (19 comparisons). There was no evidence of heterogeneity. After baseline adjustments were made, subgroup analyses did not reveal any statistically significant impacts.

Publication bias was a possibility in studies that evaluated disability. Additional results were reported in the paper.

**Authors’ conclusions**

Long-term benefit of epidural steroid injection for low back pain was not suggested at six months or longer. Introduction of selection bias in the majority of injection studies seems apparent.

**CRD commentary**

The review question was clear. Inclusion criteria were specified sufficiently to enable replication. Relevant data sources were searched and steps were taken to minimise language bias. There was no apparent search for unpublished studies. Publication bias was assessed and found to be a possibility. The review process included efforts to minimise error and/or bias for all aspects apart from quality assessment. Suitable quality assessment criteria were applied and the results of this (particularly in relation to selection bias) were used in the interpretation of findings. Although statistical heterogeneity was not substantial, wide variation was evident in the characteristics of included studies.

The authors’ cautious conclusion and particular recommendations for future research reliably reflect the evidence presented.

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

**Practice:** The authors stated that the decision-makers should consider the impact on budgets of treatment effects and the cost differential of different intervention approaches.

**Research:** The authors stated that further randomised controlled trials with long term follow-up were needed to guide the appropriate use of epidural steroid injections. Baseline adjustment is essential when pain is evaluated as a main outcome of injection therapy and appropriate statistical methods to account for selection bias should be considered. Network meta-analysis was suggested as an extended approach to traditional meta-analysis for deciding on the best treatment in the class of epidural steroid injections.

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