Surgical versus non-surgical treatment of chronic low back pain: a meta-analysis of randomised trials
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CRD summary
This largely well-conducted review concluded that compared to non-surgical treatment, surgical fusion may improve Oswestry Disability Index scores in patients with chronic low back pain, but was associated with a high risk of complications. The authors' cautious conclusion accurately reflects the limited evidence presented, and is likely to be reliable.

Authors' objectives
To evaluate the effectiveness of surgical fusion compared to non-surgical intervention for the treatment of chronic low back pain.

Searching
MEDLINE, EMBASE, CINAHL, Science Citation Index and Cochrane Registry of Clinical Trials (search dates spanned 1966 to 2005) were searched to identify published studies in any language for inclusion in the review. Search terms were reported. Bibliographies and review articles were handsearched for additional articles of interest.

Study selection
Randomised controlled trials (RCTs) that compared surgical (spinal fusion with or without instrumentation) and non-surgical (physical therapy with or without cognitive therapy) interventions for patients with chronic back pain were eligible for inclusion in the review. Trials had to use the Oswestry Disability Index (ODI) as an outcome measure. RCTs with primary outcomes that could not be pooled were excluded. All included patients were adults (aged between 18 and 65 years) with chronic back pain that persisted from 12 months to at least two years. Surgery included spinal or posterolateral fusion with or without flexible stabilisation or pedicle screws; non-surgical intervention included exercise programmes with or without cognitive therapy.

Two authors independently selected trials for inclusion in the review.

Assessment of study quality
Trial quality was assessed for selection, performance and detection biases, and sample attrition (adapted from Juni et al.). Items adapted from van Tulder et al. were also applied; these included randomisation, treatment allocation, blinding, withdrawals and drop outs.

Two authors independently assessed trial quality; disagreements were resolved by consensus

Data extraction
Mean differences (change from baseline to follow-up) in ODI and 95% confidence intervals (CI) were extracted. Where mean differences were not reported, the inverse variance-weighted log mean difference estimate was used. The number of patients with early complications in the surgery arms (within two weeks of intervention) were extracted and 95% CIs calculated from the included trials.

Two authors independently performed the data extraction.

Methods of synthesis
Mean ODI differences and early complication rates, along with their 95% CIs, were pooled in a random-effects meta-analysis using the inverse-variance weighting method. Sensitivity analyses were performed by repeating the analysis with imputed data for one trial and using follow-up data from another trial focused on patients with ishmic
spondylolisthesis (the latter was not included in the main analysis). Heterogeneity was assessed using the $I^2$ statistic.

**Results of the review**

Four trials (n=634 patients) were included in the review. Sample sizes ranged from 61 to 289 patients. Three trials were used for the primary analysis and one was included solely for sensitivity analysis. Study quality was good for treatment allocation, randomisation and use of intention-to-treat analysis. Patient/caregiver blinding was not possible due to the nature of the intervention. Blinding of outcomes was poor due to the use of patient administered questionnaires. Loss to follow-up ranged from 2% to 19%.

Surgery led to a slight improvement in ODI score (mean difference 4.13, 95% CI -0.82 to 9.08, p=0.10); there was moderate heterogeneity ($I^2=44.4\%$). The change in ODI using the study with imputed data was minimal, and remained non significant. Pooled analysis showed that the early complication rate associated with surgery was 16% (95% CI 12 to 20); no heterogeneity was reported. The inclusion of the study focused on patients with isthmic spondylolisthesis reduced the overall complication rate to 13% (95% CI 6 to 20); there was substantial heterogeneity ($I^2=66.9\%$).

Further analysis including the study focused on patients with isthmic spondylolisthesis (using available or imputed results of another trial), showed a statistically significant reduced mean difference in ODI of 3.9 (95% CI 0.17 to 7.62, p=0.04, $I^2=21.4\%$).

**Cost information**

Two studies in the meta-analysis reported that surgical fusion was associated with significantly higher societal and health care costs.

**Authors’ conclusions**

Surgical fusion may have improved the ODI score for chronic low back pain, but this was of limited clinical importance. Treatment was associated with a high risk of complications.

**CRD commentary**

The review addressed a clear research question that was supported by potentially reproducible detailed inclusion criteria. The search strategy appeared to access a number of relevant sources. Attempts were made to minimise any language bias. However, the decision to exclude unpublished material may have led to publication bias. Study quality was assessed in detail and the criteria were appropriate to the included study designs. All parts of the review process were conducted with adequate attempts to minimise error and bias. Study details were provided, heterogeneity was assessed and the method of synthesis was appropriate. This was a well-conducted review. The authors cautious conclusion accurately reflects the limited evidence presented and is likely to be reliable.

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

**Practice:** The authors stated that current evidence did not support the routine use of surgery for the treatment of chronic low back pain.

**Research:** The authors stated that long-term follow up of studies included in this meta analysis was needed to provide more conclusive evidence.

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**Bibliographic details**


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Record Status
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.