Sutures versus staples for the management of surgical wounds: a meta-analysis of randomized controlled trials
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CRD summary
This review concluded that staples were associated with fewer wound infections compared with sutures in the evaluated types of surgery. A limited number of studies reported that the use of staples was associated with more pain. Given the potential for publication bias and the limited quality of almost half of included studies, these conclusions should be interpreted with caution.

Authors’ objectives
To compare sutures versus staples for the management of surgical wounds.

Searching
PubMed, Scopus and Cochrane Central Register of Controlled Trials (CENTRAL) were searched up to June 2010; search terms were reported. Reference lists of relevant publications were screened for additional articles. Conference abstracts were excluded, as were studies published in languages other than English, Spanish, German, French, Italian or Greek.

Study selection
Randomised controlled trials (RCTs) that compared sutures with staples for the management of traumatic or surgical wound were eligible for inclusion. Studies that evaluated deep tissue suturing alone were excluded, as were studies evaluating sutures versus staples in orthopedic operations. The review outcomes of interest were pain, wound closure time, infection, cosmetic outcomes and patient satisfaction.

Included studies evaluated interventions for various surgical wounds such as obstetrics and gynaecological operations, general surgery, head and neck operations, vascular surgery and emergency care surgery. The duration of follow-ups ranged from seven days to 11 months. Most studies were of adult patients, whilst a small proportion of studies were of paediatric patients. Where reported, the mean age of treatment groups ranged from 4.5 to 71.4 years.

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

Assessment of study quality
The quality of studies was assessed using the Jadad scale, a five point scale evaluating randomisation, blinding and withdrawals. Studies scoring greater than two points were classified as adequate quality.

It appears that at least two reviewers performed quality assessment, with disagreements resolved by discussion.

Data extraction
For continuous outcomes, data were extracted on mean and standard deviations to enable the calculation of mean differences with 95% confidence intervals (CIs). For dichotomous outcomes, data were extracted on event rates to enable the calculation of odds ratios (ORs) with 95% confidence intervals.

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

Methods of synthesis
Where appropriate, the studies were combined in a meta-analysis; otherwise the studies were synthesised narratively. The pooled odds ratios and weighted mean differences (WMDs) with 95% confidence intervals were calculated using a random-effects model. Statistical heterogeneity was assessed using $X^2$ and $I^2$.

Results of the review
Twenty RCTs were included in the review (2,111 patients; 1,233 underwent suture closure and 878 underwent staple
closure). The sample sizes of trials ranged from 15 to 182. Eleven trials were judged as adequate quality.

Compared with staples, sutures were significantly associated with increased wound closure time (WMD 5.56 minutes per wound, 95% CI 0.05 to 11.07; five RCTs) and an increased rate of wound infections (OR 2.06, 95% CI 1.20 to 3.51; nine RCTs). Substantial heterogeneity was only observed in the outcome of wound closure time ($I^2=100\%$).

Eleven RCTs evaluated pain outcomes; four showed a non-significant difference in pain between the two groups, five reported that the use of staples was significantly associated with more pain compared with sutures and two reported significantly less pain in the staple group. Most RCTs reported that there was no significant differences in cosmetic outcomes and patient satisfaction between the suture and staple groups.

**Authors' conclusions**

Staples were associated with fewer wound infections compared with sutures in the evaluated types of surgery. A limited number of studies reported that the use of staples was associated with more pain.

**CRD commentary**

The review question was clear and supported by appropriate inclusion criteria. Relevant databases were searched. Unpublished studies such as conference abstracts were excluded which increased publication bias potential. Studies published in languages other than English, Spanish, German, French, Italian and Greek were excluded so the risk of language bias cannot be completely ruled out. It was unclear whether sufficient attempts were made to minimise reviewers' errors and biases in the processes of study selection and data extraction. Appropriate criteria were used to assess study quality.

Statistical heterogeneity was assessed and appropriate methods were used to pool the results. However, given the potential for publication bias and limited quality of almost half of included studies, the authors' conclusions should be interpreted with caution.

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

**Practice**: The authors did not state any implications for practice.

**Research**: The authors stated that further high quality studies incorporating more objective methods for assessment of pain, cosmetic outcomes and patient satisfaction were required to compare the efficacy of staples and sutures for the management of surgical wounds.

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