Comparison of interrupted versus continuous closure in abdominal wound repair: a meta-analysis of 23 trials

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CRD summary
This review compared the interrupted technique of abdominal wound closure to the continuous technique, concluding that the interrupted method reduced the odds of wound-closure burst by half, but did not affect incisional hernia rates. The authors’ conclusions appeared to reflect the evidence, but uncertainties about trial quality, potential bias and statistical variation in the review should be borne in mind.

Authors’ objectives
To estimate the pooled odds ratio for dehiscence (wound-closure burst) and incision hernia in the interrupted technique compared with the continuous technique of laparotomy (abdominal) wound closure.

Searching
MEDLINE (from inception onwards), Clinical Evidence, and the Cochrane Library were searched for relevant studies. The search was conducted between August and November 2003; search terms were reported. Some MEDLINE links were also searched. Bibliographies of identified papers and important textbooks were manually searched. Unpublished data were sought from known sources. Only studies published in English were included.

Study selection
To be eligible for inclusion, studies had to be randomised controlled trials (RCTs) that compared continuous with interrupted methods of laparotomy wound closure. Eligible trials had to report incidences of burst abdomen and/or incision hernia as outcomes.

The included trials were conducted in the USA, India, the UK, the Netherlands, and Nepal (in decreasing order of prevalence). Norway, France, Denmark, Australia, Sweden, Italy, and Canada were each the location for a single trial. Trial publication dates ranged from 1975 to 2004. Most included trials used mass closure, with some using layered closure. Most trials used vertical incisions, with some using transverse incision or both incision types. A combination of emergency cases and elective cases were included; some cases were gastric restrictive procedures and some were gynaecological operations.

It was unclear how many reviewers performed the study selection.

Assessment of study quality
Two reviewers assessed trial quality according to the following criteria: randomisation, allocation concealment, assessor blinding, and loss to follow-up.

Data extraction
Two reviewers independently extracted data to calculate odds ratios (ORs) with 95% confidence intervals (CIs) for the primary outcomes. Discrepancies were resolved through discussion. Authors were contacted for further details where necessary.

Methods of synthesis
The odds ratios for the two primary outcomes (incidences of burst abdomen and/or incisional hernias) were pooled using Mantel-Haenszel fixed-effect models for non-heterogeneous data, and using random-effects models for heterogeneous data; it was not clear how cells with zero events were handled. Absolute risk reduction, relative risk reduction, and number needed to treat (NNT) were also calculated. The Χ² test was used to assess heterogeneity.

A large number of sensitivity and subgroup analyses were performed to estimate the effects of trial quality and clinical characteristics (such as type of suture) on outcomes, including assessing the effect of removing the largest trial on the
pooled results.

Funnel plots were created and inspected visually to assess publication bias.

Results of the review
Twenty-three RCTs were included in the review (n=10,953 patients, range 104 to 3,135). Eighteen trials reported participant blinding, but only six reported assessor blinding. All but two trials reported the method of randomisation. Follow-up duration ranged from one to 60 months (where reported).

Pooled results for the risk of dehiscence favoured interrupted over continuous closure (OR 0.576, 95% CI 0.372 to 0.892; NNT 143; 23 RCTs). The two techniques were not found to be significantly different for the risk of incisional hernia (18 studies). Statistically significant heterogeneity (using a p < 0.10 threshold) was identified for both main outcomes.

Sensitivity analysis for quality did not significantly alter the results for dehiscence.

A large number of subgroup analyses were conducted and presented as a table. The main finding was that the interrupted technique appeared to work better in non-absorbable suture and vertical incision subgroups for reducing the risk of dehiscence. No subgroup analysis produced a statistically significant difference in risk of hernia.

The funnel plot was taken to indicate low risk of publication bias, although for the dehiscence outcome the largest trial seemed to indicate some non-symmetry.

Authors’ conclusions
The interrupted method of abdominal wall closure reduced the odds of wound-closure burst by half compared with continuous wound closure. Incisional hernias occurred with the same frequency for both interrupted and continuous techniques of laparotomy wound-closure.

CRD commentary
This review addressed a clear review question using appropriate study selection criteria. Multiple databases were searched, along with other sources. However, the search was restricted to papers in English, which may have introduced publication bias; the largest study appeared to be an outlier. Sufficient efforts were made to reduce reviewer error and bias at the data extraction and quality assessment stages of the review.

Sufficient primary trial details were reported, and assessed quantitatively within subgroup analyses. The trial quality assessment appeared appropriate, although rates of loss to follow-up were not reported; assessors were not blinded in most of the included studies. Data extraction and synthesis both appeared appropriate. Most trials included only a small number of events, potentially increasing the risk of error in the pooled results. The follow-up period varied substantially between trials, with the largest trial having the shortest follow-up period (as well as a different direction of effect to the pooled estimates), which may have affected the reliability of the results. Heterogeneity was statistically significant for both main outcomes.

The results were clearly presented, and the conclusions appeared to reflect the results provided, but uncertainties regarding trial quality, potential bias and statistical heterogeneity in the review should be borne in mind.

Implications of the review for practice and research
Practice: The review stated that the specific technique used for interrupted suturing is of critical importance and either a figure-of-eight or double horizontal mattress technique should be employed to provide a secure repair.

Research: The review did not state any implications for research.

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