Laparoscopic surgery for Crohn's disease: a meta-analysis
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CRD summary
The authors reviewed published studies comparing the safety and outcomes of laparoscopic versus open surgery for Crohn's disease in adults. The review found that laparoscopic surgery offers significant short-term benefits for patients, including shorter hospital stay, improved recovery of gastrointestinal functions and post-operative morbidity. The conclusions of this review accurately reflect the evidence presented.

Authors' objectives
To examine the safety and outcomes of laparoscopic surgery versus open surgery in Crohn's disease.

Searching
MEDLINE and the Cochrane CENTRAL Register were searched from 1990 to February 2006; the search terms were reported. The references from retrieved studies were also checked. Only full papers published in English were considered.

Study selection
Any clinical studies were eligible for inclusion, regardless of design, provided the participants were adults with Crohn's disease receiving laparoscopic ileocolic, colon or small-bowel surgery compared with conventional laparotomy. Papers were excluded if they did not provide details of patient selection, allocation, study design or one of the outcome measures detailed below.

Eligible studies reported on at least one of the following outcome measures: conversion rate, amount of blood lost, duration of surgery, rate of reoperation, gastrointestinal recovery, duration of hospital stay, mortality rate, post-operative morbidity rate, rate of disease recurrence or costs incurred.

The authors did not state how many reviewers selected the papers.

Assessment of study quality
Two reviewers independently assessed the validity of the studies based on the following criteria: definition of population (inclusion, exclusion and sample size), allocation concealment, blinding, comparability of the treatment groups, outcome variables and analysis based on intention-to-treat.

Data extraction
Dichotomous data were extracted and given as odds ratios (ORs) with 95% confidence intervals (CIs). Where continuous variables were reported as means and standard deviations, a weighted mean difference (WMD) and 95% CI were calculated. Studies reporting median and range values were presented unchanged but not included in any meta-analysis.

The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.

Methods of synthesis
Eligible studies were combined in random-effects meta-analyses using pooled WMDs and ORs with 95% CIs. Random-effects models were used throughout, owing to an a priori assumption of heterogeneity (this was not investigated further).

Results of the review
Fourteen studies comparing laparoscopic with open surgery in Crohn's disease for 881 patients in total were included.
Two prospective randomised controlled trials and two matched case-control studies were found. The remaining ten were comparisons between laparoscopic patients and those receiving open surgery within the same institution.

Publication bias was not assessed.

Conversion rate (10 studies): the rate of conversion from laparoscopic to open surgery was 11.2% (95% CI: 4.8, 29.2); a table summarised the reasons for conversion.

Blood loss (3 studies): patients operated on laparoscopically lost 64.4 mL less blood than those receiving open surgery, however, this was a non significant difference (95% CI: -262.65, -133.86, p=0.52).

Duration of surgery (8 studies): laparoscopic procedures lasted significantly longer than open surgery (WMD 25.54, 95% CI: 3.17, 47.19, p=0.03). There was significant heterogeneity between these studies (I²=90.9%, p<0.001).

Reoperation rate (9 studies): patients undergoing laparoscopic surgery were no more likely to be reoperated on due to surgical complications than those receiving open surgery (3.2% versus 3.68%, respectively, p=0.98).

Recovery of bowel function (4 studies): patients undergoing laparoscopic surgery regained bowel function significantly sooner than those receiving open surgery (WMD 0.75, 95% CI: -1.37, -0.13, p=0.02). There was significant heterogeneity between these studies (I²=64.8%, p=0.04).

Toleration of oral intake (4 studies): patients undergoing laparoscopic surgery tolerated oral intake significantly sooner than those receiving open surgery (WMD -1.43, 95% CI: -2.26, -0.60, p<0.001). No significant heterogeneity was noted within these studies (I²=55.7%, p=0.08).

Duration of hospitalisation (5 studies): patients undergoing laparoscopic surgery stayed in hospital for significantly less time than those receiving open surgery (WMD -1.82, 95% CI: -3.32, -0.32, p=0.02). There was significant heterogeneity between these studies (I²=74.6%, p=0.003).

Mortality (8 studies): of the 8 studies reporting mortality data, only one death was recorded in a patient receiving open surgery.

Morbidity (12 studies): patients receiving open surgery experienced significantly more adverse events than those given laparoscopic surgery (OR 0.57, 95% CI: 0.37, 0.87, p=0.01). No significant heterogeneity was noted within these studies (I²=10.3%, p=0.34).

Recurrence (5 studies): 3 studies reported no recurrence of disease in either laparoscopic or open surgery groups, while 2 studies found no significant difference in recurrence of disease between groups.

Cost information
Five studies reported on comparative costs of laparoscopic versus open surgery. All found open surgery to be significantly more expensive.

Authors' conclusions
Laparoscopic surgery for Crohn's disease takes longer to perform than open surgery but is usually less expensive. Laparoscopic techniques reduce hospitalisation times and improve time to recovery of gastrointestinal function. Post-operative morbidity is reduced compared with open surgery and there is no difference in the incidence of recurring disease.

CRD commentary
The review question was clearly phrased and the inclusion criteria appear to have been adequate to address this question. Two relevant databases were searched and only published English full-text papers included. Relevant studies might have been missed given this restricted search scope, and language or publication bias may have been introduced into the review. The data extraction and assessment were robustly carried out, thus reducing the likelihood of error. Study design and validity appeared not to have been taken into account when weighting the evidence from individual
studies. Details of the individual studies were not fully presented, particularly regarding the population; this makes it difficult to be confident of the generalisability of the results.

Meta-analysis was performed and, from the data presented, the methods used appear to have been appropriate; however, statistical heterogeneity was not addressed beyond the standard use of a random-effects model. There was some indication of the presence of significant heterogeneity in the included studies, potentially as a result of pooling different study designs; this variance was not further assessed with sensitivity analyses.

The conclusions of this review accurately reflect the evidence presented. However, given the variance between pooled studies, some of the results may not be reliable.

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

Practice: The authors stated that laparoscopic surgery should be considered a safe and viable treatment option with significant short-term benefits for patients.

Research: The authors stated that more randomised controlled trials should be carried out to establish the short- and long-term outcomes of laparoscopic surgery.

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