Metaanalysis of trials comparing laparoscopic and open surgery for Crohn's disease

Rosman A S, Melis M, Fichera A

CRD summary
This review assessed the effectiveness and safety of laparoscopic surgery for Crohn's disease. Laparoscopy is associated with a shorter hospital stay, fewer post-operative complications and a faster post-operative recovery time in terms of the restoration of bowel function. The review findings appear promising, but were largely based on small retrospective non-randomised studies and so require further confirmation.

Authors' objectives
To assess the effectiveness and safety of laparoscopic surgery for Crohn's disease.

Searching
MEDLINE (1990 to 2004) was searched for primary studies; the search terms were reported. In addition, the reference lists of included studies were checked for relevant studies.

Study selection
Study designs of evaluations included in the review
Comparative trials were eligible for inclusion in the review. Both randomised and non-randomised controlled trials were included in the review.

Specific interventions included in the review
Studies assessing laparoscopic surgery compared with open surgery for Crohn's disease were eligible for inclusion. All of the studies included in the review assessed laparoscopic ileocolic resections; several studies also reported that patients underwent other laparoscopic procedures. Seven of the studies also reported that other synchronous procedures were performed: stricturoplasty, left or transverse colectomy, small bowel resection, drainage for intra-abdominal abscess and fistula closure.

Participants included in the review
Studies of patients with Crohn's disease who required surgery were eligible for inclusion. In order to be included in the review, the severity of disease had to be similar in both the intervention and control group patients. Both adults and adolescents were included in the review; 2 studies specifically reported including only adults, while another 2 studies only included adolescents. The patients included in the studies were mainly undergoing ileocolic resection; some patients were undergoing ileoileal anastomosis, intestinal surgery or intestinal resection.

Outcomes assessed in the review
Studies that assessed relevant outcomes were eligible for inclusion. Relevant outcomes included: operative time, hospital stay, time to first flatus, time to first bowel movement, time to solid intake, days requiring narcotics, rate of all post-operative complications, and rates of major complications (e.g. percutaneous drainage of abscesses). Longer term outcomes such as rates of bowel obstruction, recurrent disease and reoperation were also eligible. The studies included in the review also reported operative blood loss, costs and time to oral diet.

How were decisions on the relevance of primary studies made?
Two reviewers assessed the relevance of the primary studies. The authors did not state whether the assessments were made independently, or how any disagreements were resolved.

Assessment of study quality
The authors did not report specific criteria to assess the validity of the primary studies. However, the information given in the review indicated for each study whether randomisation methods were used, if the studies were prospective or...
Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.

For outcomes using contingency tables such as complication rates and reoperation rates, odds ratios (ORs) with 95% confidence intervals (CIs) were calculated. Where the event rates were 0 or 1, 0.5 was added to all cells in the contingency table. For continuous outcomes such as length of operation, length of hospital stay and time to normal diet, mean differences with 95% CIs were reported. Studies were excluded from the analysis if mean differences with 95% CIs could not be calculated because of a lack of data, i.e. standard errors of mean, standard deviations or the CIs were not reported. Where data were reported in graphs, quantitative values were obtained by carefully measuring distances on the graphs and, where necessary, error bars were assumed to be standard deviations. One study reported separate data for those patients undergoing successful laparoscopy and those undergoing an initial attempt that later required conversion to an open procedure. These data were mathematically pooled in order to generate a single value for the laparoscopy group.

Methods of synthesis
How were the studies combined?
The data were pooled using a random-effects model (DerSimonian and Laird) and all p-values less than 0.05 were considered statistically significant.

How were differences between studies investigated?
Differences between studies were assessed statistically using the Q statistic (with p value). Differences and similarities between the studies were also evident from the data tables and were discussed within the text of the review.

Results of the review
Sixteen studies were included in the review: 1 randomised controlled study (n=62), 2 prospective non-randomised studies (n=86) and 13 retrospective non-randomised studies (n=692).

Surgical outcomes.
The pooled rate (16 studies) for conversion to an open procedure significantly favoured laparoscopy over open surgery (7%, 95% CI: 4, 10). However, laparoscopic surgery was significantly associated with longer operating times (9 studies; 26.8 minutes, 95% CI: 6.4, 47.2). There were no significant differences between open and laparoscopic surgery in terms of intra-operative blood loss (3 studies).

Post-operative outcomes.
Compared with open surgery, laparoscopic surgery significantly reduced the duration of ileus as indicated by the time to first flatus (4 studies; -0.82 days, 95% CI: -1.30, -0.33), time to first bowel movement (5 studies; -0.75 days, 95% CI: -1.32, -0.17), time to oral intake (5 studies; -1.52 days, 95% CI: -2.36, -0.68), length of hospital stay (7 studies; -2.62 days, 95% CI: -3.62, -1.62) and time to solid intake (5 studies; -1.54 days, 95% CI: -2.96, -0.12). Laparoscopic surgery was also associated with fewer days of post-operative narcotic use (4 studies; -2.3 days, 95% CI: -4.81, 0.18), but this finding was not statistically significant.

Post-operative complications.
Statistically significant reductions in the rates of both total post-operative complications (13 studies; OR 0.62, 95% CI: 0.42, 0.91) and major post-operative complications (15 studies; OR 0.50, 95% CI: 0.27, 0.96) were observed for laparoscopic surgery as opposed to open surgery. In both cases the Q statistic did not reach statistical significance (8.65 and 14.22, respectively; p>0.05). No significant differences were detected between laparoscopic and open surgery in
terms of the number of early reoperations for complications (6 studies; OR 0.81, 95% CI: 0.34, 1.92).

Long-term follow-up (6 studies). Compared with open surgery, laparoscopic surgery resulted in significantly fewer small bowel obstructions (6 studies; OR 0.24, 95% CI: 0.14, 0.41), a reduced rate of late reoperations for Crohn’s recurrences (6 studies; OR 0.46, 95% CI: 0.27, 0.80) and a lower recurrence rate for repeat surgery (6 studies; OR 0.51, 95% CI: 0.28, 0.93); however, these findings were dominated by 1 study.

Cost information
The authors stated that 5 studies (n=271) reported lower hospital costs associated with laparoscopic surgery in comparison with open surgery, but added that a lack of standardisation prevented formal pooling; they did not present their data.

Authors’ conclusions
Laparoscopy for Crohn’s disease appeared feasible and safe. It was associated with a shorter hospital stay, fewer post-operative complications and a faster post-operative recovery time in terms of the restoration of bowel function.

CRD commentary
This review was based on a clear research question with adequately defined inclusion criteria for the participants, intervention and study design. The authors only searched one electronic database and reference lists, which limited the literature search. They also made no attempt to locate unpublished material and publication bias may therefore be a problem. However, two reviewers screened the retrieved studies, thus reducing the risk of selection bias, though it was unclear whether this process was carried out independently and how any disagreements were resolved. Similarly, it was unclear whether appropriate steps were taken to reduce the risk of bias and errors during the data extraction and the authors did not report details of their methods. It was also not clear whether the quality of the studies was systematically assessed, although some aspects of study design and quality were discussed within the review.

Overall, the pooling of data appeared reasonable and the authors seemed to have taken appropriate steps to assess statistical heterogeneity between the studies. Time-to-event data (e.g. time to first bowel movement etc.) would have been more appropriately summarised as hazard ratios but the data were not always adequately reported in the primary studies. Given the data presented, the authors’ findings appear promising and their recommendations for further research reasonable.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated that a large randomised controlled trial with long-term follow-up is required to further evaluate this intervention and its long-term effects.

Bibliographic details

PubMedID
16235128

DOI
10.1007/s00464-005-0114-9

Indexing Status
Subject indexing assigned by NLM
MeSH
Clinical Trials as Topic; Crohn Disease /surgery; Digestive System Surgical Procedures /adverse effects /methods; Humans; Laparoscopy /adverse effects; Postoperative Complications /epidemiology

AccessionNumber
12006000065

Date bibliographic record published
31/08/2007

Date abstract record published
31/08/2007

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.