Laparoscopic versus open resection for colorectal cancer: a metaanalysis of oncologic outcomes

Jackson T D, Kaplan G G, Arena G, Page J H, Rogers S O

CRD summary
This review reported no significant differences between laparoscopic and traditional open surgery for colorectal cancer in terms of oncologic end points. The authors' conclusions appear to follow from the data presented, but it is difficult to assess their reliability without further details of the review methods and study characteristics.

Authors' objectives
To compare the effectiveness of laparoscopic versus open surgery for the resection of colorectal cancer (CRC).

Searching
MEDLINE, PubMed and the Cochrane Database of Systematic Reviews were searched for articles published from 1966 to 2006; the search terms were reported. The reference lists of included studies, previous meta-analyses and reviews were also checked for additional studies. No language restrictions were applied, but studies only available in abstract form were excluded from the review.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) were eligible for inclusion. Studies were excluded if they did not report the method of randomisation or used pseudo-random methods.

Specific interventions included in the review
Studies comparing laparoscopic-assisted colon or rectosigmoid resection using intraperitoneal gas insufflation with traditional open laparotomy were eligible for inclusion. Stapled anastomoses, intra-abdominally or extracorporally, were included.

Participants included in the review
Adults aged 18 years or older with a putative diagnosis of colon or rectal cancer, requiring resection for cure or palliation, were eligible for inclusion. Patients with CRC classified according to the American Joint Committee on Cancer (stages I, II, III or IV) or Duke's (stages A, B, C or D) were included. All included studies were of patients with stage I to IV CRC.

Outcomes assessed in the review
Eligible primary outcomes were CRC-related survival and recurrence rate after at least 18 months. Surrogate markers for adequacy of resection included the number of lymph nodes resected with surgical specimen and the number of positive margins reported. Other eligible outcomes included the number of port site or wound recurrences.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
Two reviewers assessed the validity of the included studies using the following criteria: clarity of outcomes and objectives; adequate description of method of randomisation; sample size calculation; adequate follow-up; adequate description of study population and staging; and use of intention-to-treat analysis or separate analysis for conversions.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction. Relative risks with 95% confidence intervals (CIs) were calculated for the number of cancer-related deaths and the number of recurrences. Hazard ratios with 95% CIs were calculated for primary outcomes where possible, using
estimates from Kaplan-Meier curves if necessary. Means and standard deviations were calculated for continuous outcomes, estimating standard deviations from the range or interquartile range if necessary and means from medians.

**Methods of synthesis**

**How were the studies combined?**
Pooled hazard ratios and relative risks with 95% CIs were calculated using a fixed-effect model. Standardised mean differences were calculated for continuous data. Publication bias was assessed using the methods of Egger and Beggs.

**How were differences between studies investigated?**
Statistical heterogeneity was assessed and some clinical differences or similarities between the studies were discussed. Fixed-effect and random-effects analyses were compared in sensitivity analyses. Additional sensitivity analyses were carried out using log transformations for continuous outcomes because of possible right skewing of the lymph node data.

**Results of the review**
Ten RCTs (n=3,830) were included. The sample sizes ranged from 34 to 1,248. Four studies had fewer than 100 participants.

All 10 studies were adequately randomised, described follow-up and loss to follow-up, and adequately described the study population and staging. Six studies used an intention-to-treat analysis and two reported a separate analysis for conversion to open cases.

No statistically significant differences were found in CRC-related mortality, survival, recurrence, or the number of lymph nodes harvested between patients undergoing resection of CRC with laparoscopic surgery compared with traditional open surgery. No significant heterogeneity was detected and sensitivity analyses showed similar results.

No significant publication bias was found.

**Authors’ conclusions**
No significant differences were identified in oncologic end points between laparoscopic and traditional open surgery for CRC.

**CRD commentary**
This review answered a clear research question. No specific attempts were made to locate unpublished material, and although statistical tests suggested that there was no evidence of publication bias, these are unlikely to be reliable given the small number of included studies. Some relevant studies might also have been missed if other important databases in this topic area (e.g. CINAHL) were not searched. It is not possible to assess the risk of reviewer error and bias since the authors reported few details of the review methods. However, validity was assessed by two reviewers using a number of criteria and it appeared to be good. The review analysis used appropriate methods for survival data and considered the possible effects of estimating data from other variables. Although limited data on study and population characteristics were reported, the authors stated that there was no evidence of statistical heterogeneity or differences between the study populations. Overall, the authors’ conclusions appear to follow from the data presented, but it is difficult to assess their reliability without further details of the review methods and study characteristics.

**Implications of the review for practice and research**
Practice: The authors stated that ‘laparoscopic surgery for colorectal cancer appears to be an oncologically sound option for the treatment of colorectal cancer and may offer distinct advantages over traditional approaches’.

Research: The authors did not state any implications for research from their review, although they did state that a number of large RCTs are underway and that a data pooling initiative may be considered to facilitate future analysis.

**Funding**
Bibliographic details

PubMedID
17324779

DOI
10.1016/j.jamcollsurg.2006.12.008

Indexing Status
Subject indexing assigned by NLM

MeSH
Colectomy /methods; Colorectal Neoplasms /mortality /surgery; Humans; Laparoscopy; Laparotomy; Survival Rate /trends; United States /epidemiology

AccessionNumber
12007001002

Date bibliographic record published
10/03/2008

Date abstract record published
03/11/2008

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.