A meta-analysis of laparoscopy compared with open colorectal resection for colorectal cancer

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CRD summary
The review found that the risk of overall complications was lower in laparoscopic surgery compared with open surgery resection in patients with colorectal cancer. There was no difference in cancer recurrence or death rates between the groups. Unclear quality of the included trials and methodological problems in review process mean that the authors’ conclusions should be interpreted with caution.

Authors' objectives
To compare safety outcomes between laparoscopic and open surgery for colorectal cancer resection.

Searching
The databases PubMed, EMBASE and The Cochrane Library were searched for studies published from 1991 to 2008. Search terms were reported. The “related article” feature was used in PubMed. Reference lists in selected articles were searched manually. No language restrictions were applied to the search.

Study selection
Randomised controlled trials (RCTs) that compared laparoscopic with open surgery in patients undergoing colorectal cancer resection were eligible for inclusion.

The included trials were published between 1997 and 2008; they were small to moderate in size. Trials included patients with colon, rectal or colorectal cancer; most trials included cancers of all stages (where reported). The mean age of participants ranged from 44 to 73 years. The proportion of men ranged from 36% to 78%. The outcomes reported in the review were overall recurrence, local recurrence, distant metastasis, wound-site recurrence, overall complications, cancer-related mortality, and overall mortality.

Two reviewers independently performed the study selection; disagreements were resolved by discussion.

Assessment of study quality
Trial quality was evaluated using the Jadad composite scale, which assessed adequacy of randomisation, blinding, and management of withdrawals and drop-outs.

Two reviewers independently assessed the study quality; disagreements were resolved by third reviewer.

Data extraction
Data on the number of patients operated on using each technique were extracted to calculate odds ratios (OR) and 95% confidence intervals (CI). Authors of included trials were contacted to obtain further information, if necessary.

Two reviewers independently performed the data extraction; disagreements were resolved by discussion.

Methods of synthesis
Trials were combined using a fixed-effect or random-effects model, depending on statistical heterogeneity. Statistical heterogeneity (X² and I²) was reported. Synthesis of hazard ratios for tumour recurrence and mortality were performed using Parmar's method.

Sensitivity analysis was conducted by removing one trial at a time. Publication bias was assessed visually using a funnel plot.

Results of the review
Fifteen trials (4,207 patients) were included in the review. The mean Jadad score of the included trials was reported as 3 out of 5 points. Follow-up ranged from one to 59 months.
**Complications:** Based on 11 studies (2,603 patients), the risk of overall complications was lower in the laparoscopic surgery than the open surgery group (OR 0.71, 95% CI 0.58 to 0.87). Despite significant heterogeneity (p=0.004), a fixed-effect model was used.

**Cancer recurrence:** There was no statistically significant difference in overall recurrence, local recurrence, distant metastasis or wound site recurrence between patients in the laparoscopic and open surgery groups.

**Mortality:** None of the results of colorectal cancer-related mortality, colon cancer-related mortality, rectal cancer-related mortality or overall mortality reached statistical significance (p=0.07 to 0.2), but all showed lower mortality in the laparoscopic surgery group.

Removing one trial at a time in the sensitivity analysis did not significantly affect the results for complications, recurrence or mortality.

No publication bias was detected for the one outcome (recurrences) for which a funnel plot was presented.

**Authors’ conclusions**
Successful laparoscopic colorectal resection for colorectal cancer was as effective as open surgery for oncological outcomes.

**CRD commentary**
The objectives and inclusion criteria of the review were clear. Relevant sources were searched, but the search appeared to be restricted to published papers. Although the authors investigated publication bias, this was only done for one outcome. Steps were taken to minimise the risk of reviewer bias and error by having more than one reviewer independently perform the study selection, data extraction and validity assessment.

Insufficient details of the results of the quality assessment were given. No attempt was made to investigate the effect of the quality of the individual trials on the results of the review.

Appropriate statistical techniques were used to combine the data in some instances. For the only outcome in which the intervention and control groups differed (overall complications), random-effects models were not used despite the presence of statistical heterogeneity; no attempt was made to investigate possible sources for this heterogeneity. The authors noted that all analyses were reported as odds ratios, which did not take time-to-event into account and did not include patients who were lost to follow-up; therefore they may be biased.

In view of the unclear quality of the primary trials and methodological problems in the review process, particularly the failure to address heterogeneity between the trials, the authors’ conclusions should be interpreted with caution.

**Implications of the review for practice and research**
**Practice:** The authors stated that as laparoscopic surgery was as effective as open surgery for oncological outcomes, the results supported the continued use of laparoscopic surgery in patients with colorectal cancer.

**Research:** The authors did not state any implications for further research.

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