Elective sigmoid colectomy for diverticular disease. Laparoscopic vs open surgery: a systematic review

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CRD summary
The review found that elective laparoscopic surgery appeared safe and appropriate compared to open surgery for sigmoid diverticular disease according to non-randomised evidence. The only randomised study supported this view but found that both interventions were associated with high overall morbidity. The authors’ conclusions require some caution due to high heterogeneity for some analyses and risk of selection bias.

Authors' objectives
To compare the effectiveness of laparoscopic versus open surgery for elective treatment of diverticular disease.

Searching
Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, EMBASE and ClinicalTrials.gov were searched from 1990 to December 2009 for studies with full text in English or French. Search terms were reported. The search appeared to be limited to published studies.

Study selection
Eligible studies were randomised controlled trials (RCTs) and controlled clinical trials (CCTs) that compared elective laparoscopic versus open surgical resection for treating complicated or uncomplicated diverticular disease of the sigmoid colon and reported 30-day postoperative morbidity and mortality (primary review outcomes). Other outcomes of interest were overall major and minor complications (as defined in the review) and selected individual complications. The reviewers excluded studies of ascending or transverse colon resection, emergency procedures, procedures conducted by trainees, and those based on a nationwide database.

The studies in the review varied widely in their inclusion and exclusion criteria with respect to the age and clinical status of participants. Several studies excluded patients with complicated diverticulitis or with specific complications (which differed across studies). Study outcomes included various postoperative complications that included anastomotic leak, intra-abdominal abscess, wound infections, postoperative small bowel obstruction and prolonged postoperative ileus. Mean duration of follow-up varied across study groups from one to 87 months, where reported.

Three reviewers selected the studies. Disagreements were resolved by a fourth reviewer.

Assessment of study quality
RCTs were scored for quality with the Jadad scale of adequacy of reported randomisation, double-blinding and withdrawals or drop-outs up to a maximum of 5 points. CCTs were scored using the modified Newcastle-Ottawa Scale of selection procedures, comparability of groups and quality of outcome assessment up to a maximum of 10 points.

Two reviewers independently conducted the assessment. Disagreements were resolved in discussion or by another author.

Data extraction
Odds ratios were extracted or calculated for each study, with 95% confidence intervals (CIs).

The authors did not state how many reviewers extracted data.

Methods of synthesis
Studies were combined using the Mantel-Haenszel method to calculate pooled odds ratios (ORs) and 95% CIs. Heterogeneity was assessed using the $I^2$ statistic and $X^2$ test (threshold $p=0.05$). A fixed-effect model was used unless findings differed using a random-effects model, in which case the random-effects model was used.
Results of the review
Twelve studies were included. There was one RCT (104 participants) and 11 CCTs: three prospective (437 participants, range 46 to 332) and eight retrospective (993 participants, range nine to 271). The RCT scored the maximum 5 points for quality. The CCTs scored from 3 to 7 points out of 10; their most common weakness was lack of comparability of the two groups.

In the RCT there was no significant difference between the groups in mortality. There was only one death in the study which was in the open surgery group (zero out of 52 versus one out of 52). The laparoscopic group had lower rates of overall morbidity (42.3% versus 53.8%) and of major complications (9.6% versus 25%). Minor complication rates were similar (36.5% versus 38.5%).

Mortality was also low in the CCTs and did not differ significantly between the laparoscopic and open surgery groups (two out of 530 versus four out of 736; OR 1.15, 95% CI 0.24 to 5.57; 10 studies; I²=0%). The laparoscopic group had lower rates of overall morbidity (16.84% versus 27.1%; OR 0.46, 95% CI 0.25 to 0.84; 11 studies; I²=74%) and of minor complications (9.1% versus 18.4%; OR 0.37, 95% CI 0.18 to 0.78; nine studies; I²=55%). Major complication rates did not differ between the groups (9.5% versus 13.5%; OR 0.73, 95% CI 0.34 to 1.54; 10 studies; I²=66%). As evident from the I² values, there was high heterogeneity for analyses of morbidity and complications.

Other findings were reported in the review.

Authors' conclusions
According to non-randomised evidence, elective laparoscopic surgery appeared safe and appropriate compared to open surgery for sigmoid diverticular disease. The only randomised study supported this view but reported that both interventions were associated with high overall morbidity.

CRD commentary
The objectives and inclusion criteria of the review were clear. Relevant sources were searched for studies. The search restriction by language and publication status meant that some studies may have been missed and the review may have been subject to publication bias. The risk of publication bias was not assessed. It was unclear whether data extraction was carried out with adequate efforts to minimise risks of reviewer bias and error.

The authors stated that there was risk of selection bias in the primary studies with the choice of intervention left entirely to the surgeons. This seemed at odds with the authors’ judgement that the overall quality of most of the CCTs was satisfactory. No details were reported about how individual CCTs were scored using the modified Newcastle-Ottawa criteria. The authors noted that there were marked clinical differences between the studies in their inclusion criteria for disease severity but overall few details were reported about the characteristics of study participants (such as age, gender). Statistical heterogeneity was high for some analyses and possible causes were not investigated with further analyses. These factors make it difficult to determine the reliability and applicability of review findings.

The authors’ conclusions require some caution due to high heterogeneity for some analyses and risk of selection bias.

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

Research: The authors stated a need for RCTs with homogeneous inclusion criteria to assess the use of elective laparoscopic surgery for diverticular disease.

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Bibliographic details

PubMedID
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.