CRD summary
This review concluded that laparoscopic and open surgeries for ulcerative colitis have similar operating times and are equally safe for restorative proctocolectomy. However, laparoscopic surgery resulted in shorter hospital stays and times to oral intake. This review had a number of potential methodological weaknesses and only included a limited number of small studies; therefore its findings might not be reliable.

Authors' objectives
To assess the safety and feasibility of laparoscopic surgery for ulcerative colitis (UC).

Searching
MEDLINE and the Cochrane CENTRAL Register were searched from January 1992 to September 2005; the search terms were reported. The reference lists of retrieved studies were checked for additional studies. Only full papers (not abstracts) published in the English language were eligible for inclusion in the review.

Study selection
Study designs of evaluations included in the review
Any comparative clinical study was eligible for inclusion. None of the included studies were randomised and all appeared to be retrospective.

Specific interventions included in the review
Studies comparing laparoscopic surgery with conventional open surgery for UC were eligible for inclusion. Laparoscopic colon resection was defined as 'a minimally invasive technique involving intraperitoneal gas insufflation, dissection and mobilisation of the colon and its mesentery, exteriorization of specimen and anastomosis (intracorporeally by double stapling techniques or extracorporeally by hand-sewn or stapled techniques)'. Half of the included studies compared laparoscopic and open surgery for total colectomy; the other half compared techniques for restorative proctocolectomy. One study presented data separately for total colectomy and proctocolectomy.

Participants included in the review
Studies including adults undergoing surgery for UC were eligible for inclusion. Six studies included patients with familial adenomatous polyposis and one included a patient with colonic inertia.

Outcomes assessed in the review
Studies had to report one of the following short-term outcome measures: conversion rate from laparoscopic to open surgery; blood loss; surgery duration; reoperation rate; time to bowel function and oral intake; length of hospital stay; mortality rate; and post-operative complication rate.

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 independently assessed the quality of each study according to the following criteria: study design (retrospective versus prospective); sample size; inclusion and exclusion criteria; comparability of the study groups; clear description of surgical techniques; and clearly defined outcome measures. The authors did not provide further details and did not describe how any disagreements were resolved.
Data extraction
The data were extracted using a data sheet. The authors did not state how many reviewers performed the data extraction.

Data that were not reported were regarded as missing. Where means and standard deviations were missing, the authors did not estimate them from medians and ranges unless raw data or graphs were available. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated for dichotomous outcomes, and mean differences with standard deviations for continuous outcomes.

Methods of synthesis
How were the studies combined?
Studies reporting risk difference and/or mean differences were combined to give pooled risk differences and/or weighted mean differences (WMDs), respectively, using a random-effects model. Studies reporting medians and ranges were combined in a narrative.

How were differences between studies investigated?
Statistical heterogeneity was assessed using the chi-squared statistic. Data were pooled separately for total colectomy and restorative proctocolectomy. Some differences between the studies were also evident from the data tables and were discussed in the text.

Results of the review
Ten studies (n=387) were included.

Conversion rate (6 studies).
Five studies reported no conversions from laparoscopic to open surgery. One study reported three conversions in the total colectomy group (n=73) and one conversion in the proctocolectomy group (n=28).

Blood loss (5 studies).
Three total colectomy studies and 2 restorative proctocolectomy studies reported a greater blood loss associated with open surgery in comparison with laparoscopic surgery; however, these differences were not statistically significant.

Duration of surgery (10 studies).
Laparoscopic surgery in comparison with open surgery took longer in all 10 studies and was associated with statistically significant differences in 2 total colectomy studies and 4 proctocolectomy studies. On average, the time taken was 40.3% longer for laparoscopic total colectomy and 44.9% longer for laparoscopic proctocolectomy.

Reoperation rate (6 studies).
No statistically significant differences between laparoscopic and open surgeries were observed for reoperation rate.

Gastrointestinal recovery (7 studies).
Three total colectomy studies reported that the time to recovery of bowel function was 92.5% earlier and the time to tolerate first oral intake 78% earlier in the laparoscopic group in comparison with the open group. Four restorative proctocolectomy studies showed similar times to recovery of bowel function and time to tolerate first oral intake for both the laparoscopic and open surgeries.

Length of hospital stay (10 studies).
Laparoscopic surgery was associated with shorter hospital stays in comparison with open surgery in all but 2 studies (one total colectomy and one proctocolectomy). When pooled, 3 colectomy studies and 1 proctocolectomy study
reported a WMD for length of hospital stay that significantly favoured laparoscopic surgery over open surgery (WMD -2.64, 95% CI: -4.36, -0.92; no significant heterogeneity).

Mortality (9 studies).

There were no significant differences in mortality rates for total colectomy (4 studies) between open and laparoscopic surgery. Three of the 5 proctocolectomy studies had zero mortality and two failed to report data.

Morbidity (10 studies).

The overall complication rate was significantly higher for open total colectomy in comparison with laparoscopic colectomy (OR 0.36, 95% CI: 0.17, 0.74; no significant heterogeneity), but no statistically significant differences between the two techniques were reported for restorative proctocolectomy. Reported complications included wound infection, ileus, anastomotic leak, intra-abdominal abscesses, burst abdomen and other nonsurgical complications such as pneumonia, urinary tract infections and deep vein thrombosis.

Authors' conclusions
Laparoscopic surgery for UC was safer compared with open surgery for colectomy, but both techniques were equally safe for restorative proctocolectomy. Both techniques took similar lengths of time to perform, although patients undergoing laparoscopic surgery had a shorter hospital stay and were able to tolerate oral intake earlier.

CRD commentary
This review answered a clear review questions using a broad range of study designs. However, the literature search might have missed relevant studies through the exclusion of abstracts, unpublished data and studies not written in English. It was also difficult to assess the reliability of the findings, owing to the poor reporting of review methods and the quality assessment of individual studies. The authors did, however, state that their review only included a limited number of small studies, all of which appeared to be retrospective and none of which were randomised. Given these limitations and the authors' concerns about the potential introduction of bias in some patient populations, the findings of the review might not be reliable.

Implications of the review for practice and research
Practice: The authors stated that laparoscopic surgery for UC appears to be safe and to have certain short-term benefits.

Research: The authors stated that a multicentre randomised controlled trial is required to compare laparoscopic and open surgery for UC, in particular for restorative proctocolectomy.

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**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.