Meta-analysis of randomized controlled trials on laparoscopic gastrectomy vs open gastrectomy for distal gastric cancer

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CRD summary
The authors concluded that laparoscopic gastrectomy provided patients with an alternative to open gastrectomy for distal gastric cancer. Potential for reviewer error and bias in the review process, uncertainties surrounding the evidence synthesis, unclear trial quality and high levels of statistical heterogeneity all suggest that the authors’ conclusions may not be reliable.

Authors' objectives
To compare the safety and effectiveness of laparoscopic versus open gastrectomy for distal gastric cancer.

Searching
MEDLINE, EMBASE, CNKI (English and Chinese), Wanfang (English and Chinese) and Cochrane Central Register of Controlled Trials (CENTRAL) were searched from 2000 to January 2012. Google Scholar was searched. Search terms were reported.

Study selection
Eligible studies were randomised controlled trials (RCTs) that compared laparoscopic versus open gastrectomy for the treatment of early and advanced gastric cancer. Outcomes of interest were operative time, blood loss, wound length, number of harvested lymph nodes, time to first flatus, oral intake time, duration of hospital stay or postoperative hospital stay, complications, rate of tumour recurrence and mortality. Trials were excluded if the cancer stage (TNM classification of malignant tumours) and method of reconstruction did not match well in the same trial or if gastrectomy was not for adenocarcinoma.

Included trials were conducted in Japan, Korea, Italy and China. Most trials included patients with stage I cancer. The main method of reconstruction was B1 anastomosis. Lymph node dissection included D1 or D2 dissection.

The authors did not state how many reviewers performed study selection.

Assessment of study quality
The authors did not state that they assessed the quality of trials.

Data extraction
Continuous outcomes were extracted to calculate mean differences and 95% confidence intervals. Dichotomous outcomes were extracted to calculate odds ratios along with their 95% confidence intervals.

The authors did not state how many reviewers performed data extraction.

Methods of synthesis
It appeared that a fixed-effect model was used to combine odds ratios (OR) or Peto odds ratios and 95% confidence intervals (CIs). Mean differences were combined to calculate weighted mean differences (WMDs) and 95% CIs. Statistical heterogeneity was assessed using the $\chi^2$ test and $I^2$ statistic.

Results of the review
Eight RCTs (782 patients, range 20 to 340) were included in the review.

Operative time: There was a statistically significant increased operative time with laparoscopic gastrectomy compared to open gastrectomy (WMD 63.16 minutes, 95% CI 57.64 to 68.68; seven RCTs); there was evidence of statistical heterogeneity ($I^2=94\%$).

Compared to open gastrectomy, laparoscopic gastrectomy showed a statistically significant reduced wound length...
(WMD -13.14 cm, 95% CI -14.77 to -12.55; three RCTs; no statistical heterogeneity I²=0%) and volume of blood loss (WMD -117.19 mL, 95% CI -134.69 to -99.68; eight RCTs; statistical heterogeneity I²=71%). The number of harvested lymph nodes was similar between procedures (WMD -0.91, 95% CI -1.83 to 0.00; six RCTs; statistical heterogeneity I²=76%). Laparoscopic gastrectomy showed significantly better bowel function recovery: first flatus after operation (WMD -0.68 days, 95% CI -0.80 to -0.57; five RCTs; statistical heterogeneity I²=91%) and first intake after operation (WMD -0.39 days, 95% CI -0.56 to -0.22; six RCTs; I²=91%).

For overall complications, laparoscopic gastrectomy showed a statistically significant reduced number of events (OR 0.56, 95% CI 0.39 to 0.79; no statistical heterogeneity I²=0%). Subgroup analyses for complications showed that laparoscopic gastrectomy statistically significantly reduced pulmonary complications (OR 0.42, 95% CI 0.21 to 0.83; six RCTs; no statistical heterogeneity I²=0%). All other complications were not significantly different between the two procedures.

The laparoscopic gastrectomy group had a statistically significant reduced total hospital stay (WMD -1.01 days, 95% CI -1.46 to -0.55; three RCTs; statistical heterogeneity I²=83%) but there were no differences in postoperative hospital stay.

There were no statistically significant differences between open and laparoscopic gastrectomy in the number of recurrences at two-, three- and five-year follow-up.

Authors' conclusions
Laparoscopic gastrectomy provided patients with an alternative to open gastrectomy for distal gastric cancer.

CRD commentary
The review question and inclusion criteria were clearly defined. Several databases were searched. Search date and language restrictions were applied and it did not appear that unpublished data were sought so language and publication bias could not be ruled out. Trial quality was not assessed and it was unclear whether review processes were performed in duplicate so reviewer error and bias may have been introduced.

Study details and patient characteristics were limited and it was unclear whether combining data was appropriate. The authors stated that a random-effects model was used to combine outcome data but forest plots indicated that a fixed-effect model was used. Given that there was evidence of statistical heterogeneity for most outcomes, it appeared that the statistical synthesis may not have been appropriate. Sample sizes were generally small.

The authors' conclusions reflect the evidence but there was potential for reviewer error and bias in the review process and uncertainties surrounding the evidence synthesis. The authors' conclusions should be interpreted with caution as they may not be reliable.

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

Research: The authors stated that endorsing laparoscopic gastrectomy as a better alternative to open gastrectomy requires more data on long-term survival, quality of life and cost effectiveness.

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