Laparoscopic distal pancreatectomy is as safe and feasible as open procedure: a meta-analysis
Xie K, Zhu YP, Xu XW, Chen K, Yan JF, Mou YP

CRD summary
This review found that laparoscopic distal pancreatectomy was associated with a shorter hospital stay and operative time, faster recovery and better spleen preservation than open distal pancreatectomy. These results were based on a small amount of variable and low-quality evidence, so the authors’ conclusions may not be reliable.

Authors' objectives
To evaluate the feasibility and safety of laparoscopic, compared with open, distal pancreatectomy.

Searching
PubMed, Cochrane Central Register of Controlled Trials (CENTRAL), Web of Science, and BIOSIS Previews were searched for studies published in English, between January 1995 and June 2011. Search terms were reported.

Study selection
Clinical studies that compared laparoscopic with open distal pancreatectomy, with clear case selection criteria, were eligible for inclusion if they reported the number of cases, surgical methods, and perioperative data. Continuous variables, such as operative time, had to be reported as the mean and standard deviation. Studies of single surgical procedures, laparoscopy-assisted or hand-assisted procedures, and where there was intra-operative conversion from laparoscopic to open surgery, which was classed as a laparoscopic procedure, were excluded.

The included studies were conducted in Japan, Korea, Italy or the USA. Most pancreatic transections were performed using a stapler alone or a scalpel and suture; one trial used a scalpel and micro sealer for some procedures.

Studies were assessed for eligibility by two reviewers.

Assessment of study quality
No quality assessment was performed, but studies were graded by their design, using the levels of evidence system, from the Oxford Centre for Evidence-Based Medicine. It was unclear how many reviewers graded the studies.

Data extraction
Means and standard deviations were extracted for continuous outcomes, and the numbers of events were extracted for dichotomous outcomes. These were used to calculate relative risks, with 95% confidence intervals.

Two reviewers independently extracted the data, with disagreements resolved through discussion.

Methods of synthesis
Statistical heterogeneity was assessed using $\chi^2$ and, if it was statistically significant ($p<0.05$), the data were pooled using a DerSimonian and Laird random-effects model, otherwise a fixed-effect model was used. Weighted mean differences were calculated for continuous variables, and pooled relative risks were calculated for dichotomous outcomes. If heterogeneity was high or there were fewer than three studies, the results were presented descriptively. Publication bias was assessed using funnel plots and Begg’s test.

Results of the review
Nine studies (1,341 patients; range 44 to 310) were included; 501 (37.4%) patients underwent laparoscopic surgery and 840 (62.6%) underwent open surgery. Seven studies were retrospective, one was prospective and one was a case-control study.

The operative time was significantly shorter with open than with laparoscopic distal pancreatectomy (WMD 44.95, 95% CI 13.86 to 76.04; four studies; $I^2=79.5\%$).
The spleen preservation rate was significantly higher with laparoscopic surgery than with open surgery (RR 2.38, 95% CI 1.18 to 4.81; five studies; \(I^2=73.2\%\)). The time to postoperative fluid intake was significantly shorter with laparoscopic than with open surgery (WMD -0.95, 95% CI -1.86 to -0.03; three studies; \(I^2=78.1\%\) as was the length of postoperative stay (WMD -2.71, 95% CI -3.80 to -1.63; three studies; \(I^2=0\)).

No significant differences were seen, between the two surgical types, for the proportion of malignant tumours (four studies), the number of pancreatic fistulae (eight studies), and overall morbidity (eight studies).

There was no evidence of publication bias for the analysis of pancreatic fistulae (other outcomes were not assessed). The units for the weighted mean differences were not reported.

**Authors' conclusions**

Laparoscopic distal pancreatectomy was associated with a shorter hospital stay and operative time, faster recovery and better spleen preservation than open distal pancreatectomy.

**CRD commentary**

The review specified inclusion criteria for the interventions and outcomes. Four databases were searched, but only published articles in English were included so there was a chance of publication and language bias. Two reviewers selected the studies and extracted the data, to minimise error or bias. The quality of the studies was not assessed – they were only rated by their design – so the strength of the evidence is unclear. All studies were observational and most were retrospective, so their results are likely to be less reliable than those of randomised trials. Three of the statistically significant results showed high levels of heterogeneity, which was not explored.

As the conclusions were based on a small amount of variable and low-quality evidence, they may not be reliable.

**Implications of the review for practice and research**

**Practice**: The authors did not make any recommendations for practice.

**Research**: Randomised controlled trials, with large samples, were needed that report the overall morbidity and pancreatic fistula rates, and assess new surgical techniques.

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