Meta-analysis of randomized controlled trials comparing laparoscopic with open mesh repair of recurrent inguinal hernia
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CRD summary
This generally well-conducted review concluded, compared with open mesh repair of recurrent inguinal hernia, laparoscopic surgery was associated with significantly less postoperative pain, quicker return to normal activities and fewer wound infections. There was no difference of hernia recurrence or chronic pain. Given the poor quality of included trials, a degree of caution might be required in interpreting these conclusions.

Authors' objectives
To compare the efficacy of laparoscopic versus open mesh repair for the treatment of recurrent inguinal hernia.

Searching
MEDLINE and EMBASE were searched from 1966 to July 2009. Search terms were reported. Current Controlled Trials Register and Cochrane Database of Controlled Trials were also searched, but search dates were not reported. The following conference proceedings were handsearched from 1980 to 2009: Surgical Research Society; Society of Academic and Research Surgery; Association of Surgeons of Great Britain and Ireland; European Hernia Society; Asia Pacific Hernia Society; and American Hernia Society. Reference lists of retrieved publications were also screened.

Study selection
Controlled clinical trials that compared laparoscopic with open mesh repair of recurrent inguinal hernia were eligible for inclusion.

The primary review outcomes were postoperative hernia recurrence and development of chronic pain. Secondary outcomes were: operation time; change in pain score on a visual analogue scale (VAS) during the first seven days post-operation; superficial wound infection; haematoma or seroma formation; time to return to normal activities; and the incidence of complications requiring additional operations.

In the included trials, patients in the laparoscopic arm underwent either transabdominal preperitoneal or totally extraperitoneal procedures, whilst those in the open mesh repair arm underwent either Lichtenstein or giant prosthesis for reinforcement of the visceral sac procedures. The majority of included patients received general intraoperative anaesthesia and postoperative paracetamol anaesthesia. All trials reported the hernia recurrence outcome and most also assessed pain scores.

Two reviewers assessed studies for inclusion.

Assessment of study quality
The quality of trials was assessed and each trial awarded a score using the Jadad scale, a five-point scale evaluating randomisation, blinding and withdrawal.

The authors did not state how many reviewers performed the validity assessment.

Data extraction
For continuous outcomes, means and standard deviations were extracted to enable the calculation of mean differences and 95% confidence intervals (CIs). For dichotomous outcomes, event rates were extracted to enable the calculation of odds ratios (ORs) with 95% confidence intervals.

The authors did not state how many reviewers performed the data extraction.
Methods of synthesis
The trials were combined in a meta-analysis, using a random-effects model of DerSimonian and Laird. The pooled odds ratios and weighted mean differences (WMDs), with 95% confidence intervals, were calculated. Statistical heterogeneity was assessed using Cochran Q and $I^2$ statistics.

Sensitivity analysis was performed by exclusion of the trial that did not randomise patients between operative techniques.

Publication bias was assessed using funnel plots and the Egger test.

Results of the review
Six trials met the inclusion criteria, but only four prospective trials were included in meta-analyses (n=404 patients). The quality score of trials ranged from 2 to 3 points. The mean duration of follow-up ranged from 2.83 to 5.3 years.

There were no significant differences between laparoscopic and open mesh repair groups in terms of the rate of hernia recurrence (five treatment arms) and development of chronic pain during more than one year after surgery (three trials).

Compared with open mesh repair, laparoscopic was associated with a significant reduction in pain on the Visual Analogue Scale (WMD $-0.58$, 95% CI $-0.84$ to $-0.31$; two trials), superficial wound infections (OR 0.29, 95% CI 0.08 to 0.96; five treatment arms) and time to return to daily activities (WMD $-0.82$ days, 95% CI $-1.27$ to $-0.36$; five treatment arms). However, laparoscopic procedure was associated with a significant increase in operation time (WMD 0.68 minutes, 95% CI 0.23 to 1.13; five treatment arms) compared with open mesh repair. There was no significant difference in the rate of seroma or haematoma formation or the need for additional operations between the two groups.

Significant heterogeneity was observed in the outcomes of operation time ($I^2=80\%$), return to daily activity ($I^2=80\%$) and seroma or haematoma formation ($I^2=78\%$).

No evidence of publication bias was found in most outcomes.

Authors' conclusions
Compared with open mesh repair, laparoscopic surgery was associated with significantly less postoperative pain, a quicker return to normal activities and fewer wound infections, but at the cost of a longer operating time. There was no difference of hernia recurrence or chronic pain between the two procedures for treating recurrent inguinal hernia.

CRD commentary
The inclusion criteria of the review were clear. Relevant databases were searched. Efforts were made to find both published and unpublished trials, minimising the potential for publication bias. The authors did not state whether language restrictions were applied in the search, which made it difficult to assess the risk of language bias. Steps were made to minimise errors and biases by having more than one reviewer performed study selection, but it was unclear whether validity assessment and data extraction were also performed in duplicate.

Relevant criteria were used to examine the trial quality. Statistical heterogeneity was assessed and significant heterogeneity was observed for some outcomes. Appropriate methods were used to pool the results.

The review was generally well conducted but, given that the included trials were generally of poor quality, a degree of caution might be required in interpreting the authors' conclusions.

Implications of the review for practice and research
Practice: The authors stated that careful patient selection and surgeons' experience are important in the selection of operative procedures for recurrent inguinal hernia repair.

Research: The authors stated that further research should address the importance of the operative procedures used
during index herniorrhaphy and its implications for the selection of operative procedures for recurrent inguinal hernia repair. Further studies should also investigate the potential advantage of a laparoscopic approach after bilateral recurrence compared with unilateral recurrence, as well as the role of Kugel-Ugahary open approach in the management of recurrent inguinal hernia.

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