Laparoscopic versus open mesh repair for recurrent inguinal hernia: a meta-analysis of outcomes

CRD summary
This review concluded that laparoscopic procedures were comparable with open mesh repair in most of the outcomes for recurrent inguinal hernia. These conclusions generally reflect the evidence presented, but a degree of caution might be required in interpreting the authors' conclusions given the small sizes of included studies and the possibility of language bias.

Authors' objectives
To compare laparoscopic versus open-mesh repairs in the treatment of recurrent inguinal hernia.

Searching
The following databases were searched for studies in the English language from 1990 to 2008: PubMed, EMBASE and the Cochrane Library. Search terms were reported. Abstracts from relevant national and international conferences were also searched.

Study selection
Randomised control trials (RCTs) and comparative studies that compared laparoscopic versus open mesh repairs in adult patients undergoing elective surgery for recurrent inguinal hernia (Nyhus class II to III) were eligible for inclusion. The eligible studies had to use intention-to-treat analysis.

The review outcomes were the incidence of early hernia recurrence, overall hernia recurrence, and postoperative complication (haematoma/seroma, urinary retention and wound infection).

The included studies evaluated the following interventions: laparoscopic mesh repair, totally extraperitoneal (laparoscopic hernia repair with extraperitoneal mesh placement), and transabdominal pre-peritoneal (laparoscopic hernia repair through the peritoneal cavity with extraperitoneal mesh placement). The controls included Lichtenstein open procedure and open pre-peritoneal mesh repair. The mean age of patients in included studies ranged from 52 to 64 years (where reported). Most of included patients were male.

Two reviewers independently assessed studies for inclusion, with any disagreement resolved by consensus.

Assessment of study quality
The quality of studies was assessed using the methods described in the Cochrane Handbook for Systematic Reviews of Interventions. The key criteria assessed included allocation generation, allocation concealment, and blinding. Trials were classified into "A" (high quality RCTs), "B" (low-quality RCTs) and "C" (comparative studies).

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

Data extraction
Event rates were extracted to enable the calculation of odds ratios (ORs) or relative risks (RRs) with 95% confidence intervals (CIs).

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

Methods of synthesis
The studies were combined in meta-analyses. Pooled odds ratios or relative risks, with 95% confidence intervals, were calculated. A random-effects model was used when there was significant heterogeneity; otherwise a fixed-effects model
was employed. Statistical heterogeneity was assessed using $I^2$.

Sensitivity analysis was conducted to evaluate the impact of each individual study on the results.

Publication bias was assessed using funnel plots and Egger's test.

**Results of the review**

Five RCTs and seven comparative studies (five retrospective and two prospective studies) were included in the review (n=1,542 patients). All five RCTs were classified as high quality RCTs.

Transabdominal pre-peritoneal mesh repair was associated with a significant increase in the rate of overall hernia recurrence compared with totally extraperitoneal mesh repair (RR 3.25, 95% CI 1.32 to 7.9; three studies). There were no significant differences in the rate of overall hernia recurrence between totally extraperitoneal mesh repair and Lichtenstein open repair, as well as between laparoscopic procedure and Lichtenstein open repair.

Laparoscopic mesh repair was associated with a significant decrease in the rate of haematoma/seroma formation compared with Lichtenstein open repair (OR 0.38, 95% CI 0.15 to 0.96; six studies). There were no significant differences in the rate of haematoma/seroma formation between totally extraperitoneal mesh repair and Lichtenstein open repair, as well as between laparoscopic mesh repair and open pre-peritoneal mesh repair.

There were no significant differences in the rate of early hernia recurrence, urinary retention and wound infection between laparoscopic procedures and Lichtenstein open repair.

Substantial heterogeneity was only observed in the outcome of haematoma/seroma formation when totally extraperitoneal mesh repair was compared with Lichtenstein open repair ($I^2=75.1\%$), when laparoscopic procedures were compared with Lichtenstein open repair ($I^2=64\%$), and when laparoscopic procedures were compared with open pre-peritoneal mesh repair ($I^2=74\%$).

Sensitivity analyses showed that removal of one study (by Alani et al) from the analysis significantly altered the result of haematoma/seroma formation when laparoscopic procedures were compared with open pre-peritoneal mesh repair.

There was no evidence for publication bias.

**Authors' conclusions**

Laparoscopic procedures versus open mesh repairs for recurrent inguinal hernia were equivalent in most of the outcomes, particularly for overall recurrence.

**CRD commentary**

The inclusion criteria of the review were clear. Relevant databases were searched. Efforts were made to find published and unpublished studies, which minimised the potential for publication bias. Publication bias was assessed and little evidence of it was found. Only studies in English language were searched, which may have increased the risk of language bias. Steps were made to minimise reviewer bias and errors in the study selection process, but it was unclear whether the data extraction was performed in duplicate.

Appropriate criteria were used to assess study quality, but details on study quality were not reported in full. Statistical heterogeneity was assessed and appropriate methods were used to pool the results. The Moses-Shapiro-Littenberg method was used to explore sources of heterogeneity; however, this approach might be not appropriate to the data included in the review.

The authors’ conclusions reflected the evidence presented. However, a degree of caution might be required in interpreting the authors’ conclusions, given the small sizes of included studies and the possibility of language bias.

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

Research: The authors stated that further long-term follow-up data from existing studies and new RCTs with a large sample size are required to evaluate the benefits of laparoscopic mesh repairs over open mesh repairs for the treatment of recurrent inguinal hernia.

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