Groin hernia surgery: a systematic review
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Authors' objectives
To assess which method of surgery (including open and laparoscopic techniques) is the safest and most effective for inguinal hernia repair. In addition, to determine whether: local anaesthesia (LA) is a safe and effective alternative to general anaesthesia (GA); there is a difference in outcome between specialist and non-specialist surgeons; day-case surgery is as safe and effective as inpatient surgery; synchronous bilateral hernia repair is as safe and effective as delayed repair; and to evaluate which method of surgery is the safest and most effective for femoral hernia repair.

Searching
MEDLINE (1966 - February 1996 inclusive) using 'hernia inguinal and hernia femoral' as primary MeSH search terms, and all subheadings using thesaurus. EMBASE (1980 - February 1996 inclusive), using the search terms 'inguinal hernia or femoral hernia' in title, abstract, or keywords. The Cochrane Controlled Trials database was also searched, bibliographies of retrieved papers were examined, and abstracts of papers presented at relevant conferences were screened. Researchers working in the topic area were contacted and asked to give details of studies they had undertaken or current studies they were aware of. All languages were considered.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs), non-randomised trials, prospective cohorts, non-parallel cohorts, and retrospective cohort studies were included which compared the outcomes of different surgical procedures, different methods of anaesthesia, day case versus inpatient stay, or synchronous versus delayed second side herniorrhaphy. When evidence from comparative studies was lacking, case series with over 100 patients (inguinal) and 30 patients (femoral) were considered.

Specific interventions included in the review
For inguinal hernia repair, laparoscopic techniques (transabdominal, totally extra-peritoneal, intraperitoneal onlay mesh, and unspecified), and open techniques (Shouldice, Stoppa, open mesh, open sutured, and unspecified), were included. Techniques could be carried out unilaterally or bilaterally. For anaesthesia: LA, GA, and regional anaesthesia (RA). Setting of care: day-case or inpatient (2, 3, or 5 days, or unspecified). Provider: specialist or non-specialist care. For femoral hernia repair: trans-inguinal, mesh repairs, low, midline, and high techniques were included.

Participants included in the review
Patients undergoing inguinal or femoral hernia repair, presenting as elective or emergency cases, and as primary or recurrent cases, were included. Patients with unilateral and bilateral inguinal hernia repairs were eligible.

Outcomes assessed in the review
Recurrence of hernia, complications, post-operative pain, wound infection, time to return to normal activities and/or return to work.

How were decisions on the relevance of primary studies made?
The authors do not state how the papers were selected for the review, or how many of the reviewers performed the selection.

Assessment of study quality
For RCTs, non-randomised trials and prospective cohort studies, the criteria were internal validity (confounding and bias), power, external validity, and reporting. Each paper was assigned a score of up to 20 for each area, with a maximum total score of 100. Studies with a score of less than 30 were not considered in the narrative summary. The authors do not state how the papers were assessed for validity, or how many of the reviewers performed the validity.
Data extraction
Data were extracted into a series of structured tables, and covered type of surgical/anaesthetic procedure, sample size, length of follow-up, withdrawals, recurrence, post-operative pain, wound complications, wound infection, respiratory effects of anaesthesia, operating time, return to work, specialist or non-specialist surgeon, cost, and study quality. Complications (including recurrence) following surgery were calculated as the number experiencing a complication divided by the number in the treatment group initially at risk, expressed as a percentage, with associated 95% confidence intervals (CIs). Translations were carried out for non-English RCTs, non-randomised trials and prospective cohort studies. For non-parallel and retrospective cohort studies, information was taken from English abstracts. The process of data extraction was not described (i.e. how many reviewers involved, whether independent, how discrepancies were resolved).

Methods of synthesis
How were the studies combined?
The studies were combined in a narrative summary.

How were differences between studies investigated?
Studies were grouped into subcategories for the narrative summary, but differences between studies were not systematically investigated.

Results of the review
One hundred and nineteen studies were included overall. Of these, 44 were RCTs, 26 were other studies with a prospective design, 14 were non-parallel cohorts, and 35 were retrospective cohorts. The number of participants was unclear. The following figures are approximate, and it is possible that there is some overlap between the different categories of studies. Evaluations of different surgical techniques (n=11,470); evaluations of anaesthesia (n=1,070); day-case versus inpatient care (n=401); specialist versus non-specialist surgeon (n=241,315); simultaneous versus delayed repair (n=4,341); evaluations of techniques for femoral repair (n=1,386).

Overall, the methodological quality of studies was poor, and limited the conclusions that could be drawn. The 45 papers reporting RCTs had a median score of 41 (range 9-71). For non-randomised trials and prospective cohort studies, the median score was 33 (range 17-53).

Laparoscopic repair is superior to open procedures in terms of less post-operative pain and faster return to normal activities. Recurrence rates and the incidence of wound complications do not differ significantly, though further research is required to confirm this. Among the open procedures, the Shouldice repair appears to result in fewer recurrences, and possibly fewer complications compared with other suture methods. Open mesh repairs may cause less post-operative pain and lead to a faster return to normal activities compared to Shouldice. It is difficult to draw firm conclusions on the different laparoscopic techniques, although it is possible that the Totally Extra-Peritoneal (TEP) approach may be associated with lower recurrence and complication rates, and less post-operative pain.

There is no evidence to suggest that wound complications are more common with LA compared with GA use. If adequate LA is given, the amount of post-operative pain is no greater than for GA. LA has less adverse effects on respiratory function compared with both GA and RA. Time to return to work is similar regardless of type of anaesthesia.

There is no evidence to suggest a difference in outcome between day-case and inpatient surgery. There are conflicting data regarding patient satisfaction with day-case surgery.

Reports of large case series from specialist centres suggest they achieve low recurrence rates. However, there is insufficient evidence to determine whether specialist surgeons achieve better results than non-specialists.

There is insufficient scientific evidence to determine whether simultaneous repair of bilateral hernias is as safe and
effective as delayed repair.

No conclusions can be drawn as to the relative safety and effectiveness of the different surgical approaches for femoral hernia.

Cost information
As laparoscopic repair takes longer to perform than open procedures, it is more expensive for the health care system, but it is possible that savings due to early return to work may result in lower overall costs for patients and society. The TEP approach appears to be more expensive than other laparoscopic approaches, however this needs to be confirmed.

Authors’ conclusions
Laparoscopic repair is superior to open procedures in terms of less post-operative pain and faster return to normal activities. The use of LA is recommended. Day-case surgery appears to be as safe and effective as inpatient surgery. It is unclear whether specialist surgeons achieve better results than non-specialists, or whether simultaneous repair of bilateral hernias is as safe and effective as delayed repair. It is not possible to reach a conclusion on the relative safety and effectiveness of the different surgical approaches for femoral hernia repair. Further research is required in all the areas reviewed.

CRD commentary
Overall, this is a thorough systematic review. The series of research questions are clearly listed, and the results are structured in a way that relates clearly back to these questions. The search strategy comprises access to relevant specialist sources, and includes an attempt to identify unpublished material by contacting relevant researchers. The selection criteria for primary studies could have been a little more defined, particularly with reference to patient characteristics. Validity assessment and other study details are presented in a series of structured tables. The authors have rightly summarised the primary studies using narrative review, however, it is, at times, unclear as to which are the more reliable data without referring frequently to the tables. There are few details of the process of the review (i.e. how many reviewers involved, whether decisions/data extraction/quality assessment were carried out independently, how discrepancies were resolved). Although the authors’ prior beliefs and views on the topic are explained in a section at the back of the paper, it is unclear what impact consensus had on the final summary of results. The authors’ conclusions appear to follow on from the data presented, and they rightly recommend further research in all the areas reviewed.

Implications of the review for practice and research
The authors state that, for laparoscopic repair versus open procedures, studies with longer follow-up and larger numbers are required to determine whether or not a clinically significant difference exists in terms of recurrence and other post-operative complications. The TEP approach appears to be more expensive than other laparoscopic approaches; however, this needs to be confirmed. While LA is recommended, larger studies with longer follow-up are required. Prospective studies with longer follow-up are required to assess recurrence rates when day-case and in-patient surgery are compared. Rigorous studies comparing specialist and non-specialist hernia surgeons are required. There is insufficient scientific evidence to determine whether simultaneous repair or bilateral hernias is as safe and effective as delayed repair. Further studies are required to determine the most effective approach for femoral hernia repair.

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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.