Burden of adhesions in abdominal and pelvic surgery: systematic review and meta-analysis

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CRD summary
This generally well-conducted review concluded that the complications of postoperative adhesions were frequent, had a large negative effect on patients' health, and increased the workload in clinical practice; but the quantitative effects should be interpreted with caution. This advised caution seems appropriate, given the methodological limitations of the available evidence.

Authors' objectives
To estimate the disease burden of the most important complications of postoperative abdominal adhesions: small bowel obstruction, difficulties during reoperation, infertility, and chronic pain.

Searching
PubMed, EMBASE and Cochrane Central Register of Controlled Trials (CENTRAL) were searched, without restrictions on language or publication status, for articles from January 1990 to December 2012; the search strategy was reported. The reference lists of identified studies and reviews were searched.

Study selection
Studies that reported adhesion-related complications, after peritoneal surgery, were eligible for inclusion; case series with fewer than 10 patients were excluded. The primary outcome was the incidence of adhesive small bowel obstruction, defined as any episode of postoperative small bowel obstruction, with the presence of adhesions, confirmed during reoperation or by imaging, after the exclusion of other causes of bowel obstruction. Various secondary outcomes were considered.

Most of the included studies (85%) were of adults. The most common surgeries were lower gastrointestinal tract (40% of studies) and any surgery (21% of studies); others included gynaecological, urological, upper gastrointestinal, hepatobiliary or pancreatic, and abdominal wall repair. The surgical technique was laparoscopy or laparotomy in most studies.

Two reviewers independently selected the studies for the review.

Assessment of study quality
Two reviewers independently assessed study quality, using the revised Newcastle-Ottawa scale, for cohort studies; a score of 5 was high, 3 to 4 was intermediate, and 1 to 2 was low.

Data extraction
Two reviewers independently extracted the data to calculate the incidence and proportion of outcome events, with corresponding 95% confidence intervals.

Methods of synthesis
The pooled incidence, with 95% confidence interval, was calculated using the inverse-variance random-effects model. Heterogeneity was assessed using I². Pooled odds ratios were calculated, where applicable, to compare the incidence between subgroups.

Best and worst cases were calculated to assess the impact of missing data. Sensitivity analyses were conducted to examine the effects of study quality, single studies, prospective versus retrospective analysis, and the date that the study was conducted.

Publication bias was assessed using funnel plots.

Results of the review
A total of 196 studies met the inclusion criteria (150,797 patients). Of these, 37 were prospective; 125 were...
intermediate quality, 44 were high quality, and 27 were low quality.

**Small bowel obstruction:** Ninety-two studies reported the incidence of small bowel obstruction. The incidence due to any cause was 9% (95% CI 7 to 10; I²=99%; 61 studies; 107,949 patients). The incidence of adhesive obstruction was 2.4% (95% CI 2.1 to 2.8; I²=93%; 87 studies; 110,076 patients). Given the need for reoperation to confirm this outcome, the incidence of reoperation for adhesive small bowel obstruction was similar (2.4%, 95% CI 2.0 to 2.7; I²=91%). Best and worst cases, and subgroup analyses, were reported.

**Reoperation complications:** Sixty-two studies reported on these complications. The pooled incidence of enterotomy during repeated abdominal surgery was 3.3% (95% CI 2.5 to 4.0; I² 86%; 39 studies; 7,654 patients) and need for adhesiolysis was 5.8% (95% CI 3.7 to 7.9; I²=89%; 16 studies; 2,565 procedures). The incidence of enterotomy by site and by type of surgery was reported. Operating time was longer than the original surgery by 15.2 minutes (95% CI 9.3 to 21.1; I²=85%; 13 studies).

**Infertility:** In all 10 studies, the fertility rate was significantly lower in the operated group (50%, 95% CI 37 to 63; I²=94%), than in the non-operated group (82%, 95% CI 70 to 94; I²=97%); the overall odds ratio was 0.15 (95% CI 0.08 to 0.29; I²=82%). Best and worst cases were reported.

**Chronic abdominal pain:** Five studies reported pain. In one, 40% (95% CI 34 to 47) of patients developed chronic pain after lower gastrointestinal surgery. The other four studies reported adhesions as the most likely cause of pain during diagnostic laparoscopy (57% of patients, 95% CI 47 to 67; I²=77%).

**Authors' conclusions**

Complications of postoperative adhesions were frequent, had a large negative effect on patients' health, and increased the workload in clinical practice, but the quantitative effects should be interpreted with caution.

**CRD commentary**

The review addressed a clear question, supported by reproducible inclusion criteria. Several relevant sources were searched, without language restrictions. Unpublished studies were not specifically sought, but a large body of evidence was identified. Each stage of the review process was conducted in duplicate, reducing the risk of error and bias.

Appropriate criteria were used to assess study quality. Most of the evidence was from uncontrolled, retrospective studies. There was a large number of studies, but the quality of the evidence was limited; only 22% of studies were considered to be at a low risk of bias. The methods of synthesis seem to have been appropriate.

This was a generally well-conducted review, but the overall conclusion went beyond the evaluation of the data presented. The authors advised caution when considering the results of their review, and this seems appropriate given the methodological limitations of the available evidence.

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

**Practice:** The authors stated that patients should be informed about the risk of complications from adhesions, before abdominal surgery; failure to do so could result in litigation. They pointed out that, at the time, guidelines were only available for gynaecology, which caused a minority of adhesion problems, compared with general surgery.

**Research:** The authors did not state any implications for research.

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**Bibliographic details**


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Record Status
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.