Evidence-based value of prophylactic drainage in gastrointestinal surgery: a systematic review and meta-analyses
Petrowsky H, Demartines N, Rousson V, Clavien P A

CRD summary
This review assessed the effects of prophylactic drainage in gastrointestinal (GI) surgery. The authors concluded that many GI operations can be performed safely without prophylactic drainage, and drains should be omitted after hepatic, colonic, or rectal resection and appendectomy. The limited search and lack of an adequate quality assessment make it difficult to comment on the robustness of the evidence.

Authors' objectives
To assess the effects of prophylactic drainage in gastrointestinal (GI) surgery.

Searching
MEDLINE was searched from 1966 to February 2004 without any language restrictions; the search terms were reported. In addition, manual cross-referencing of the identified studies was undertaken.

Study selection
Study designs of evaluations included in the review
Studies of all designs were eligible for inclusion.

Specific interventions included in the review
Studies that compared prophylactic drainage with no drainage were eligible for inclusion.

Participants included in the review
Studies that included patients undergoing GI surgery were eligible for inclusion. The participants in included studies were undergoing elective liver resection, open cholecystectomy, pancreatic resection, oesophageal, gastric and duodenal surgery, colorectal surgery and appendectomy.

Outcomes assessed in the review
Studies that reported on mortality, overall complication rates, leakage rates, infection rates (wound, intra-abdominal collections, abscess), pulmonary complication rates, reoperation rates and the length of hospital stay were included.

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

Assessment of study quality
The authors did not state that they assessed validity.

Data extraction
Two independent reviewers extracted the data, with any disagreements resolved by consensus. For each study, the odds ratio (OR) and associated 95% confidence intervals (CIs) were extracted. When no events were observed for some end points in the groups, 0.25 events were added to each group and each study for the corresponding end point.

Methods of synthesis
How were the studies combined?
The studies were grouped by type of surgery and the RCTs were combined in a meta-analysis using a random-effects model. Pooled ORs with 95% CIs were calculated, where possible, for each outcome. Where there were few RCTs or studies of other designs, the studies were combined in a narrative.

How were differences between studies investigated?
Heterogeneity between the studies was assessed using the Q-statistic. Differences between the studies were discussed with respect to characteristics of the patients and interventions.

Results of the review
The authors reported that the review included 30 randomised controlled trials (RCTs) (n not reported).

Liver resection (3 RCTs): there was a statistically non significant decrease in infected intra-abdominal collections with no drainage compared with drainage (OR 2.83, 95% CI: 0.82, 9.71). There was no statistically significant difference between treatments for bile collections (OR 1.15, 95% CI: 0.36, 3.68) or pulmonary complications (OR 1.40, 95% CI: 0.73, 2.68). There was no statistically significant heterogeneity between the trials observed in any of the three meta-analyses.

Cholecystectomy (number of studies not reported): all trials failed to demonstrate a reduction in post-operative complications by routine drainage.

Pancreatic resection (1 RCT and 1 cohort study): both studies failed to demonstrate a reduction in complications with drainage compared with a no-drainage treatment strategy.

Oesophageal, gastric and duodenal surgery: no studies were identified on prophylactic drainage versus no drainage after oesophageal or gastric surgery. One prospective cohort study that assessed prophylactic drains after surgery for perforated duodenal ulcer found that drainage had no effect on the incidence of intra-abdominal fluid collections, including abscesses, or the duration of hospital stay.

Colorectal surgery (8 RCTs): there was no statistically significant difference between drainage and no drainage for clinical leakage (OR 1.38, 95% CI: 0.77, 2.49), wound infections (OR 1.41, 95% CI: 0.87, 2.29) and pulmonary complications (OR 0.83, 95% CI: 0.52, 1.32). No significant statistical heterogeneity was observed between the trials.

Acute Appendectomy (2 RCTs): one RCT found a significantly higher wound infection rate in drained patients with acute or simple appendicitis, whereas the second RCT found similar wound and intra-abdominal infection rates between the drained and non-drained groups.

Appendectomy for gangrenous and perforated appendicitis: there was no significant difference in the rates of intra-abdominal infection between the drained and non-drained patients (3 RCTs; OR 1.43, 95% CI: 0.39, 5.29). There was significant statistical heterogeneity between the 3 trials. There were no significant differences between the rates of wound infections between drained and non-drained patients (4 RCTs; OR 1.75, 95% CI: 0.96, 3.19). There was a significant reduction in faecal fistulas with no drainage compared with drainage (3 RCTs; OR 12.4, 95% CI: 1.14, 135). No significant statistical heterogeneity was observed between the trials in either of these meta-analyses.

Authors’ conclusions
Many GI operations can be performed safely without prophylactic drainage. Drains should be omitted after hepatic, colonic or rectal resection with primary anastomosis and appendectomy for any stage of appendicitis.

CRD commentary
The review question was broad but clearly defined in terms of the interventions, participants and outcome measures. By limiting the search to published studies identified from only one database, in conjunction with reference checking, other potentially relevant studies might have been missed. It was unclear how the studies were selected for inclusion in the review. The authors did not formally assess the validity of the primary studies as a level of evidence approach was used; the reliability of the primary studies included in the review is therefore unclear. In addition, since details of...
several of the included studies were not provided, the evidence could not be examined.

The use of both a meta-analysis and narrative synthesis to combine the studies appeared appropriate, and heterogeneity was assessed. Overall, the authors' conclusions appear consistent with the evidence reviewed but, owing to limitations in the review itself, they may not be highly reliable.

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

Practice: The authors recommended that drains should be omitted after hepatic, colonic or rectal resection with primary anastomosis and appendectomy for any stage of appendicitis, and that prophylactic drainage should be used after oesophageal resection and total gastrectomy.

Research: The authors stated that there is a need for RCTs on prophylactic drainage for many GI procedures, especially upper GI tract surgery.

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