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REVIEW

Is there still a need for prophylactic intra-abdominal drainage in elective major gastro-intestinal surgery?

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Review

Summary Prophylactic drainage of the abdominal cavity after gastro-intestinal surgery is widely used. The rationale is that intra-abdominal drainage enhances early detection of complications (gastro-intestinal leakage, hemorrhage, bile leak), prevents collection of fluid or pus, reduces morbidity and mortality, and decreases the duration of hospital stay. However, dogmatic attitudes favoring systematic drain placement should be questioned. The aim of this review was to evaluate the evidence supporting systematic use of prophylactic abdominal drainage following gastrectomy, pancreatectomy, liver resection, and rectal resection. Based on this review of the literature: (i) there was no evidence in favor of intra-peritoneal drainage following total or sub-total gastrectomy with respect to morbidity-mortality, nor was it helpful in the diagnosis or management of leakage, however the level of evidence is low, (ii) following pancreatic resection, data are conflicting but, overall, suggest that the absence of drainage is prejudicial, and support the notion that short-term drainage is better than long-term drainage, (iii) after liver resection without hepatico-intestinal anastomosis, high level evidence supports that there is no need for abdominal drainage, and (iv) following rectal resection, data are insufficient to establish recommendations. However, results from the French multicenter randomized controlled trial GRECCAR5 (NCT01269567) should provide new evidence this coming year. Accumulating data support that systematic drainage of the abdominal cavity in digestive surgery is a non-beneficial and obsolete practice, except following pancreatectomy where the consensus appears to indicate the usefulness of short-term drainage. While the level of evidence is high for liver resections, new randomized controlled trials are awaited regarding gastric, pancreatic and rectal surgery.

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Strong points
- After partial or total gastrectomy, routine prophylactic drainage has not been shown to be of any benefit.
- After pancreatic resection, data suggest that absence of drainage can be deleterious and suggest a probable benefit of short-term drainage in selected patients.
- After liver resection, there is level 1 evidence that routine drainage is of no benefit in formal hepatectomy without bilio-intestinal anastomosis.
- After rectal excision, data are insufficient but the GRECCAR5 trial should provide decisive information this year.
- French surgeons are participating actively in clinical research on the topic, and particularly, in the GRECCAR5 [NCT01269567] and Pancreatic Drainage [NCT01368094] randomized trials.

Introduction

Ambroise Paré first described drainage of the abdominal cavity following gastro-intestinal surgery and it has been a surgical tradition for many years. The rationale is that drainage should allow:
- early detection of gastro-intestinal anastomotic leakage;
- better management of gastro-intestinal anastomotic leakage;
- avoidance of re-operation;
- drainage of postoperative collections (hematoma, chyle, bile, abscess...);
- shorten hospital stay;
- finally reduce postoperative morbidity and mortality.

However, the use of routine abdominal drainage has been questioned based on current evaluation of the evidence, and some authors have suggested that abdominal drains might be responsible for increased superficial and deep (organ site) surgical site infection (SSI), pain related to the drain itself, negative effects on ventilation and increased hospital stay [1,2]. Other complications specifically linked to drainage have been reported, although their exact prevalence is difficult to estimate from the literature: abscess along the drainage tract, gastro-intestinal fistula related to erosion caused by the drain, omental protrusion into the drainage tract, hemorrhage, gastro-intestinal obstruction by the drain, sub-cutaneous emphysema, and even tumor seeding along the drainage tract (0.4%) [3–5].

Moreover, the value of postoperative drainage for certain procedures has been questioned to the point that routine drainage is no longer recommended after cholecystectomy [6], splenectomy [7], and colonic surgery with intra-peritoneal anastomosis [8,9]. The French Society of Gastro-intestinal Surgery (Société Française de Chirurgie Digestive [SFCD]) made several recommendations in 1999 concerning these particular indications [10]. However, no similar recommendations have been published for other indications, such as gastrectomy, pancreatectomy, hepatectomy and proctectomy. Lastly, improvements in operative techniques, and peri-operative management (nutrition, antibiotics, etc.) have led to a decrease in postoperative complications making it necessary to call into question the routine use of drains in gastro-intestinal surgery.

The goal of this short review is to appraise the literature and the level of evidence associated with routine drainage of the abdominal cavity after gastrectomy, pancreatectomy, hepatectomy, and proctectomy. Data were analyzed in relation to the impact of drainage on the postoperative course and on the diagnosis of anastomotic leakage or collections.

Material and methods

We performed a systematic literature search of PubMed and the Cochrane database from 1990 to 2014 using the terms corresponding to the above-mentioned procedures. The references of each article were further reviewed to avoid missing any publications. Included in this review were articles concerning gastric, pancreatic, hepatic and rectal resections, with comparisons between the presence or absence of drainage (or early removal vs. classical removal for pancreatectomy). Only articles for which the entire text was available, in English or French, were included. Articles concerning emergency surgery were not included in this review.

Value of drainage after gastrectomy

Before 2004, were no randomized studies on the value of drainage after gastrectomy, in contrast to hepatic or colorectal surgery [9]. Since then, several randomized trials have been published, some of which included subgroup analysis separating total vs. partial gastrectomy.

In 2011, a Cochrane meta-analysis was published, assembling four randomized trials and including 438 patients [11] (Table 1). No significant differences were found between patients undergoing drainage or not with regard to postoperative mortality (relative risk [RR] = 1.73, 95% confidence interval [CI]: 0.38–7.84), the rate of re-operation (RR = 2.49, 95% CI: 0.71–8.74), the rate of postoperative complications (respiratory infections: RR = 1.18, 95% CI: 0.55–2.54), SSI (RR = 1.23, 95% CI: 0.47–3.23), organ site infection (OSI) (RR = 1.27, 95% CI: 0.29–5.51), anastomotic leakage (RR = 0.93, 95% CI: 0.06–14.47), or the interval before postoperative feeding. Conversely, the presence of a drain prolonged duration of operation (9.07 min, 95% CI: 2.56–15.57), duration of hospital stay (0.69 days, 95% CI: 0.18–1.21) and was associated with drain-specific complications in two studies (i.e. 5 out of 208 patients).

For the total gastrectomy subgroup, no statistically significant difference was found in patients with or without drainage with regard to 30-day mortality (RR: 3.20, 95% CI: 0.14–75.55), postoperative complications such as respiratory infections (RR: 2.37, 95% CI: 0.39–14.23), SSI (RR: 0,23, 95% CI: 0.01–5.37), OSI (abscesses) (RR: 0.68, 95% CI: 0.04–10.24), duration of operation (median difference of 2.0 min, 95% CI: 12.16–16.16), duration of hospital stay (median difference: 0.77 days, 95% CI: 2.13–3.68), the interval before postoperative feeding (median difference 0.4 days, 95% CI: 0.87–1.76). The sample size for total gastrectomy was too small to allow analysis of rarer events such as re-operation or anastomotic leakage rates, or drain-specific complications.

For the partial gastrectomy subgroup, no statistically significant difference was found between drainage vs. no drainage with regard to 30-day mortality (RR = 1.39, 95% CI: 0.24–8.01), the rate of postoperative complications such as respiratory infections (RR = 0.95, 95% CI: 0.36–2.50), superficial SSI (RR = 1.41, 95% CI: 0.45–4.46), OSI (RR = 1.65,