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ORIGINAL ARTICLE

Intraperitoneal drains move

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KEYWORDS
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Summary
Introduction: The use of surgical drains is the subject of much debate but they continue to be commonly used. The phenomenon of drain migration from their desired position following surgery has not been studied. The aim of this study was to evaluate the incidence of the displacement of surgical drains among patients undergoing abdominal gastrointestinal surgery.
Patients and methods: We performed a review of all patients who underwent an early CT-scan postoperatively after abdominal gastrointestinal surgery prior to drain mobilization, between January 2013 and April 2016 in the Dijon University Hospital Center. Pre-and intra-operative data (number, type and position of drains) and postoperative data (imaging and evolution) were collected retrospectively.
Results: This study included 125 patients. Thirty-five (28%) were found to have a displacement of at least one drain from its original position. Forty-one (19.8%) of the 207 studied drains had moved. Postoperative morbidity was not higher in patients with displaced drains ($P = 0.51$). None of all the studied preoperative and operative factors have been found to be a risk factor for drain displacement.
Conclusion: Surgical drains displacement is frequently encountered in patients undergoing digestive abdominal surgery. In our experience, this phenomenon does not seem to have any clinical implications. When a benefit is expected from the use of surgical drains, intraperitoneal fixation appears to be necessary.

Introduction

The routine use of drains in the various fields of digestive surgery has been vigorously debated in the literature of recent years, especially in the context of early rehabilitation programs [1—7]. While the goal of drain placement in elective surgery is to prevent intra-abdominal infections (whether super infection of an undrained collection or the cutaneous canalization of a possible anastomotic fistula), it has been suggested that drainage can, on the contrary, increase the incidence of intra-abdominal infections, postoperative pain, and length of hospital stay and also alter ventilatory function [8—13].

In clinical practice, it is not uncommon to observe, during postoperative imaging or surgical recovery, that intraperitoneal drains have migrated relative to the position that the surgeon had desired during their placement. However, this phenomenon has never been studied in the litera-

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ture to analyze its incidence and consequences, which may be potentially serious in situations where drains have real added value [14].

We conducted a retrospective monocentric study to study the frequency of drain migration and its impact on postoperative morbidity after digestive abdominal surgery.

Patients and methods

Inclusion criteria

The records of all patients who underwent digestive abdominal surgery at the Dijon University Hospital between January 2013 and April 2016 were retrospectively reviewed to identify patients who had at least one intraperitoneal drain placed during surgery and who had a CT-scan within the first five postoperative days for any reason. This interval of 5 days is justified by the postoperative protocols of our service: intra-abdominal drains are not mobilized before five days. Patients whose surgical records were unavailable or whose drains had been previously mobilized prior to imaging on a voluntary or accidental basis were excluded.

Data collection

For each patient, the preoperative data collected included age, sex, body mass index (BMI) and ASA score. The intraoperative data collected included urgency or elective nature of the surgery, its location in the upper or lower abdomen, the type of surgical approach used at the time of placement of the drain, the type of drain (round or flat), the number of drains, the quadrant where the drain was positioned, the side of exteriorization, the possible implementation of additional surgical gestures after the positioning of the drains (such as epiplöoplasty, repositioning of small bowel loops, manual checking of the position of the nasogastric tube, extraction of a laparoscopic specimen through a trocar orifice or a Pfannenstiel incision, externalization of an ileostomy or a colostomy, peritoneal lavage, or the placement of a mesh prosthesis), and the operative time. The postoperative morbidity was classified according to Dindo-Clavien (DC), and classified as minor for DC stages 0—2, or major for DC stages 3—5 [15] (*ref 15 Dindo est le premier auteur, Clavien est le premier auteur dans un autre article*). We also recorded postoperative imaging time, intra- and extra-abdominal complications, initial length of stay, and 30-day re-admission rate with reassessment of overall morbidity. The evaluation of a possible displacement of the drains was carried out by comparing the ''theoretical'' position, described in the operative report to the ''real'' position objectified on the imagery (Figs. 1 and 2). For systematic analysis we considered the nine traditionally described abdominal regions of classical anatomy, to which we added, for the sake of completeness, the cul de sac of Douglas, and the subhepatic region (Morison's pouch) as distinct from the right hypochondrium region.

The data were studied ''patient by patient'' in order to analyze patient-related variables, the surgical procedures performed, and the consequences of any drain migration on the postoperative course. The non-displaced drain group (ND) consisted of patients whose drains were found in the same quadrant at imaging as described in the surgical report, and the displaced drain group (D) included patients with at least one drain in a different position from its theoretical placement. A drain analysis was carried out in a

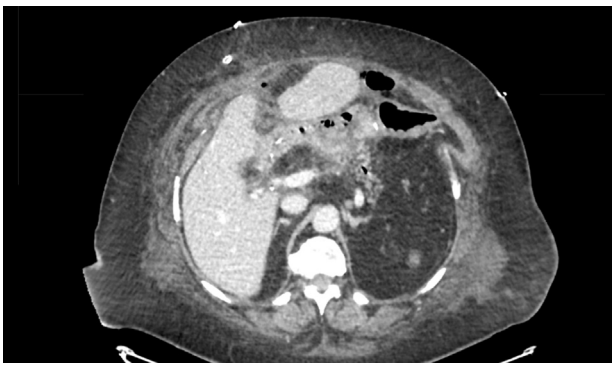

Figure 1. CT-scan on POD 4 following pancreatoduodenectomy in a 68-year-old female: the biliary and pancreatic anastomoses are no longer effectively drained.

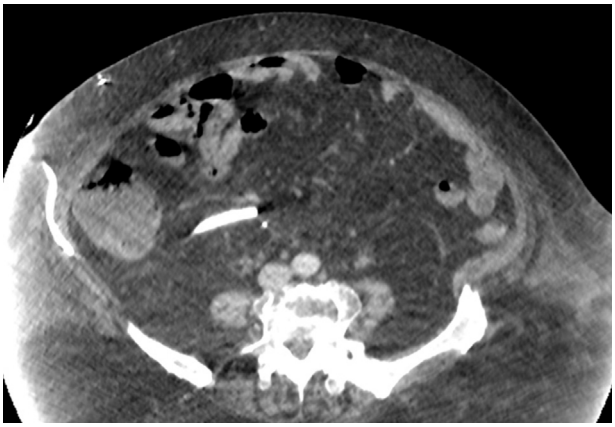

Figure 2. Same patient: migration of the drain that was initially positioned in contact with the biliary and pancreatic anastomoses.

complementary way on the raw data in order to more specifically investigate any risk factors for migration. Using the same schematic system, two groups were constituted: the DD group and the NDD group.

We have created specific indices to analyze the position of each drain and to identify predictive factors for drain migration. These indices were measured on coronal CT sections and expressed in millimeters (Fig. 3). The entry-exit index (EE) was determined by the distance between the inner end of the drain and its point of skin exit. The Base-Summit Index (BS) was measured between the lowest point and the highest point through which the drain passed. The curvature index (C) was calculated by the difference between the EE and BS indexes: the higher the absolute value of the C index, the longer the drain pathway path with one or more curvatures. Index C was used to assess the impact of placing tension on the drains. The ascending or descending direction of each drain was also analyzed in the coronal plane.

Statistical analysis

Quantitative variables were compared with Student's *t*-test for parametric values and the Mann-Whitney test for nonparametric values. Qualitative variables were compared with the χ^2 test and the exact Fischer test, as appropriate. The results are expressed in frequency and percentage for qualitative variables and, either as a mean with 95% confidence interval or as a median with range for the quantitative variables. Statistical analyzes were carried out using R software (R Core Team version 3.3.2 (2016), Vienna, Austria).

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