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Risk factors for failure of percutaneous drainage and need for reoperation following symptomatic gastrointestinal anastomotic leak

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Abstract

BACKGROUND: Few studies have evaluated the role of computed tomography-guided percutaneous drainage (PD) in the management of gastrointestinal (GI) anastomotic leaks.

METHODS: Ten-year review of an interventional radiology database identified patients with symptomatic GI anastomotic leaks. Clinical, laboratory, radiographic, and operative characteristics following a technically successful PD which then failed and required reoperation for anastomotic leak were compared with those successfully treated with PD.

RESULTS: Sixty-one patients met study inclusion criteria. Fifty patients (82%) successfully underwent therapeutic PD of a perianastomotic fluid collection, with median follow-up of 16 months. Eleven patients (18%), at a median interval of 16 days, required reoperation following PD. A forward logistic regression showed cardiopulmonary disease ($P = .03$) and cancer surgery ($P = .01$) to be factors independently associated with the need for reoperation. The level of the anastomosis, initial fecal diversion/stoma, fluid collection size, and microbiology of aspirate did not predict failure of PD.

CONCLUSIONS: Cardiopulmonary disease and cancer surgery appear to be independent predictors for failure of PD and need for reoperation following a symptomatic GI anastomotic leak.

Anastomotic leak following gastrointestinal surgery (GIS) is an unavoidable complication, resulting in significant patient morbidity and mortality.[1,2] Previous literature has confirmed the benefits of computerized tomography (CT)-guided percutaneous drainage (PD) as an initial treatment for intra-abdominal abscesses of heterogeneous etiologies[3] when compared to laparotomy and drainage.[4–9] However, no large series has specifically examined the role of PD related to alimentary tract anastomotic leaks alone. Few predictive variables[5,10] have been defined for selecting patients most likely to benefit from PD and avoid repeat laparotomy for source control. Although a lack of standardized definition and method for measuring an anastomotic leak[11] makes comparisons difficult, treatment choices are relatively limited–antibiotics alone or in conjunction with either percutaneous or surgical drainage.[8] The aim of this study

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was to define predictive clinical, laboratory, radiographic, or operative factors for CT-guided PD failure in symptomatic anastomotic leaks following GIS.

Methods

Following Institutional Review Board study protocol approval, inpatients undergoing GIS and subsequently referred for CT-guided PD for a symptomatic anastomotic leak between January 2000 and March 2011 were retrospectively identified by searching the Cedars-Sinai Medical Center Interventional Radiology Database. A symptomatic anastomotic leak was defined in our study as a leak of luminal contents from a surgical joint between 2 hollow viscera causing fever, abscess, septicemia, metabolic disturbance, and/or multiple-organ failure,[12] in conjunction with a supporting CT scan demonstrating a perianastomotic fluid collection. Inclusion criteria were patients having small bowel, colon, or rectal surgery, the operating surgeon documenting clinical concern for postoperative anastomotic leak, a supporting CT demonstrating a fluid collection adjacent to an anastomosis, and the use of PD along with antibiotics as initial therapy. The radiologist must have interpreted the CT scan as displaying an adjacent anastomotic fluid collection considered accessible percutaneously to be included in the study, although contrast extravasation was not necessary. Patients requiring more than 1 PD procedure to achieve source control were considered successfully treated by PD. In an attempt to make the study population as standardized as possible, we excluded patients undergoing foregut surgery with or without solid organ resection, concomitant hepatobiliary/pancreatic anastomoses, or solid organ resection/transplantation, patients who had undergone a recent abdominal surgery (<3 months) with a subsequent operation followed by a PD, patients with <90 days of postoperative follow-up, patients undergoing a trauma laparotomy bowel anastomosis in a setting of multiple intra-abdominal injuries, and a technically failed attempt to access the fluid collection(s) percutaneously by the interventional radiologist.

Medical charts were reviewed to extract patient demographics, clinical characteristics, and operative details. Age, sex, and body mass index were collected along with patient comorbidities including cardiopulmonary disease (history of coronary artery disease, myocardial infarction, dysrhythmia, heart failure, cardiomyopathy, chronic obstructive pulmonary disease, or lung cancer), diabetes mellitus, history of malignancy, cirrhosis, irritable bowel disease (IBD), and immunosuppression status (corticosteroids, biological therapy, chemotherapy, history of solid organ or bone marrow transplantation, or human immunodeficiency virus). The laboratory data were recorded just before PD and clinically relevant cutoffs were utilized for the purposes of the analysis; leukocytosis was defined as white blood cell count $\geq 11 \times 1{,}000$ per UL, renal insufficiency as creatinine ≥ 1.5 mg/dL, and hypoalbuminemia <3.5 mg/dL. In addition, the presence of prior cancer surgery as well as a history of abdominal or pelvic radiation was collected. The perianastomotic fluid collection features assessed included the number and maximal diameter as estimated by CT. The microbiologic analysis of the PD fluid contents was recorded. The indication for operation, type, and location of anastomosis, and the presence of initial fecal diversion were also retrieved from the medical records.

Patient characteristics following a technically successful PD which then failed and required reoperation ("reoperation group") for leak were compared with those successfully treated with PD ("no reoperation group"). Procedural PD technical success was defined as catheter drain placement within the fluid collection(s). CT-guided PD was considered a treatment success when a patient resolved the intra-abdominal source of sepsis without needing an additional operation within 90 days of the initial operation. PD was considered a treatment failure in cases of persisting clinical deterioration necessitating a salvage reoperation for source control within 90 days of the initial operation.

Fisher's exact test was used to compare categorical variables and a Mann–Whitney test was used to compare continuous variables. Time intervals are reported as medians with interquartile ranges (IQR). A forward logistic regression was utilized to identify factors that were independently associated with the need for reoperation using all available covariates, with a P value of <.05 considered to be statistically significant.

Results

During the 10-year study period, a total of 170 patients undergoing CT-guided PD for symptomatic anastomotic leak following GIS were identified. One-hundred nine patients (64%) did not satisfy inclusion criteria and were excluded, leaving 61 patients for analysis (Fig. 1). Fifteen patients undergoing foregut surgery with or without solid organ resection, 23 patients with concomitant hepatobiliary/pancreatic anastomoses or solid organ resection/transplantation, 41 patients who had undergone a recent abdominal surgery (<3 months) with a subsequent operation followed by a PD, 14 patients with <90 days of postoperative follow-up, 10 patients undergoing a trauma laparotomy bowel anastomosis in a setting of multiple intra-abdominal injuries, and 6 patients with a technically failed attempt to access the fluid collection(s) percutaneously by the interventional radiologist were excluded (Fig. 1).

For the remaining 61 patients, the mean age was 48.5 $\pm$ 20.7 years, and 53% were male. Eleven patients (18%) failed PD and required reoperation. Among the comorbidities between patients in the no reoperation group and those patients requiring reoperation, the presence of cardiopulmonary disease ($P = .04$) and IBD ($P = .02$) were higher in the reoperative group (Table 1). Although patients in the