

Percutaneous Management of Abscess and Fistula Following Pancreaticoduodenectomy

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Abstract

Purpose: To evaluate the efficacy of percutaneous drainage of fluid collections following pancreaticoduodenectomy (Whipple's procedure).

Methods: We performed a retrospective review of 19 patients referred to our service with fluid collections following pancreaticoduodenectomy. The presence of associated enteric or biliary fistulas, the route(s) of access for image-guided drainage, the incidence of positive bacterial cultures, and the duration and success of percutaneous management were recorded.

Results: Fistulous communication to the jejunum in the region of the pancreatico-jejunal anastomosis was demonstrable in all 19 patients by gentle contrast injection into drainage tubes. Three patients had concurrent biliary fistulas. In 18 of 19 patients, fluid samples yielded positive bacterial cultures. Successful percutaneous evacuation of fluid was achieved in 17 of 19 patients (89%). The mean duration of drainage was 31 days.

Conclusion: Percutaneous drainage of abscess following pancreaticoduodenectomy is effective in virtually all patients despite the coexistence of enteric and biliary fistulas.

Key words: Abscess—Fistula—Pancreas—Biopsy—Drainage

Pancreaticoduodenectomy (Whipple's procedure) remains the surgical procedure of choice for the management of tumors confined to the pancreatic head, distal common bile duct, or peri-ampullary region, offering the potential for cure in appropriately selected patients. In addition to resection of the duodenum and proximal pancreas, the procedure involves the creation of four anastomoses (hepatico-jejunal, pancreatico-jejunal, jejuno-jejunal, and gastro-jejunal). As a result, postoperative morbidity is not uncommon, affecting up to 50% of patients in some series [1, 2].

A treatable source of morbidity following pancreaticoduodenectomy is the development of intra-abdominal abscesses, which occur in up to 10% of patients [3]. These abscesses may occur in several locations, including the subhepatic space, between loops of the jejunum, and in the bed of the resected pancreas. We report an analysis of the percutaneous management of such fluid collections, focusing on the frequency and type of associated fistulas and the success rate of percutaneous therapy.

Patients and Methods

A review of all interventional procedures performed by our service over 3 years revealed 19 patients with pancreaticoduodenectomy (12 men and 7 women) who were referred for management of postoperative abscess and/or fistula. Their mean age was 61 years (range 25–79). Seventeen patients had undergone classic pancreaticoduodenectomy (with distal gastrectomy) and two patients had had a pylorus-preserving pancreaticoduodenectomy; in all 19 patients a pancreatico-jejunal anastomosis was created. Preoperative diagnoses included nine ampullary adenocarcinomas, five pancreatic adenocarcinomas, two cholangiocarcinomas, one duodenal leiomyosarcoma, and one pancreatic islet cell tumor; in one patient, final pathology revealed only chronic pancreatitis. Percutaneous management of the fluid collections followed standard techniques in all patients, as described below.

Drainages were performed either by the creation of new percutaneous tracts or via the tracts of surgical drains placed at the time of pancreaticoduodenectomy. Both routes of access were used in many patients. Percutaneous access for drainage was performed under computed tomography (CT) (12 procedures) or ultrasound (US) (2 procedures) guidance using standard techniques. In the remaining 23 procedures, CT demonstrated fluid collections accessible via surgical tracts and drainage procedures were performed under fluoroscopic guidance. Drains placed at the time of pancreaticoduodenectomy were removed over a guidewire. A 5 or 7 Fr curved angiographic catheter (Cobra-2 or Kumpe shape, Cook, Bloomington, IN, USA) was placed over the guidewire and manipulated into the optimal position for cavity drainage. The angiographic catheter was then replaced by a drainage catheter over a guidewire. Drainage catheters ranging in size from 12 to 24 Fr

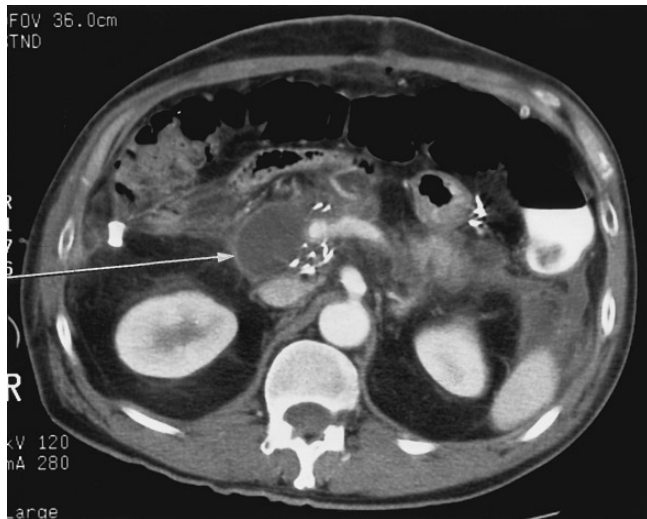


Fig. 1. Contrast-enhanced CT scan in a 48-year-old man with clinical signs of infection 1 week following pancreaticoduodenectomy. A rim-enhancing fluid collection is present in the bed of the resected pancreas. Percutaneous access was obtained along the route indicated by the white arrow, fluid was sent for culture, and a 12 Fr sump catheter was placed.

(Cook) were used in all cases. Single-lumen drainage catheters were connected to bulb suction and sump catheters were connected to wall suction. Routine flushing with 3–5 ml of sterile saline was performed to maintain catheter patency.

Three to 5 days following placement, all drainage catheters were gently injected with sterile water-soluble contrast media under fluoroscopic guidance in order to evaluate tube position and the presence of an enteric fistula. Drainage catheters were repositioned or replaced if necessary to optimize drainage. In the presence of demonstrable jejunal or biliary fistulas, drainage tubes were repositioned with their tips adjacent to the luminal defect. On follow-up procedures in such cases, tubes were maintained with tips 1–2 cm away from the defect to allow ingrowth of occlusive tissue.

In order to insure optimal tube placement and to reveal undrained collections, follow-up CT examinations were performed in any patient who did not improve clinically or who re-developed signs of infection.

Catheters were removed (usually on an outpatient basis) when three criteria were met: 1) the patient had no clinical signs of persistent infection; 2) drainage was less than 10 ml in 24 hr; and 3) gentle hand injection of contrast demonstrated no significant residual fistula or cavity.

Results

Thirty-five initial and two follow-up drainage procedures were performed in the 19 patients, including 23 drainages through existing tracts of surgical drains and 14 drainages through new percutaneous tracts (Table 1). Initial drainages were performed within 14 days of the surgical procedure in 12 patients, from 14–21 days in 2 patients, and at 31, 33, 35, 43, and 65 days in the remaining 5 patients. Fluid collections

Table 1. Routes of access for 19 patients treated percutaneously for abscess and fistula following pancreaticoduodenectomy

Route of drainage	No. patients (%)	No. drainages (%)
Existing surgical tracts alone	7 (37)	10 (27)
Percutaneously created tracts alone	4 (21)	4 (11)
Both surgical and percutaneously created tracts	8 (42)	23 (62)

in the pancreatic bed were present in all 19 patients; 8 patients had a single collection requiring a single tube, and 11 patients required two tubes for separate collections. At the time of initial drainage, concurrent subhepatic ($n = 3$) and lesser sac ($n = 2$) collections were percutaneously drained with a single tube in 5 patients.

In all but one patient, the fluid obtained from the pancreatic bed was cloudy or purulent and yielded positive bacterial or fungal cultures. In the remaining patient, milky fluid obtained at initial drainage revealed a high concentration of amylase but no microbial growth.

Contrast injection through drainage tubes 3–5 days after placement revealed a fistulous communication to the jejunal loop in the region of the pancreatico-jejunal anastomosis in all patients. Separate communications to the biliary system were identified in three patients (16%), one of whom developed a biliary stenosis which was successfully managed percutaneously.

Clinical improvement, abscess resolution, fistula closure, followed by drainage tube removal were achieved by 4 weeks in 8 patients (42%), by 6 weeks in 13 patients (68%), and by 10 weeks in 17 patients (89%). The mean duration of therapy for these 17 patients was 31 days (range 8–65 days). Two of the 19 patients required operative revision, one due to gastric outlet obstruction secondary to a surrounding abscess, and one due to a persistent fistula and recurrent abscess despite aggressive percutaneous therapy.

Following initial drainage, two patients required additional percutaneous drainage procedures for new fluid collections—one in the subhepatic space (8 days following initial drainage) and one in the gastrosplenic space (14 days following initial drainage).

There were no catheter-related complications in any of the 19 patients. A representative case is shown in Figures 1–3.

Discussion

Pancreaticoduodenectomy is a complex surgical procedure which entails up to a 50% risk of postoperative morbidity, including delayed gastric emptying, pancreatico-jejunal anastomotic leak, abscess formation, and hemorrhage. This retrospective review provides the first report in the interventional literature that specifically focuses on the particular considerations of abscess management in patients following pancreaticoduodenectomy. These patients are susceptible to

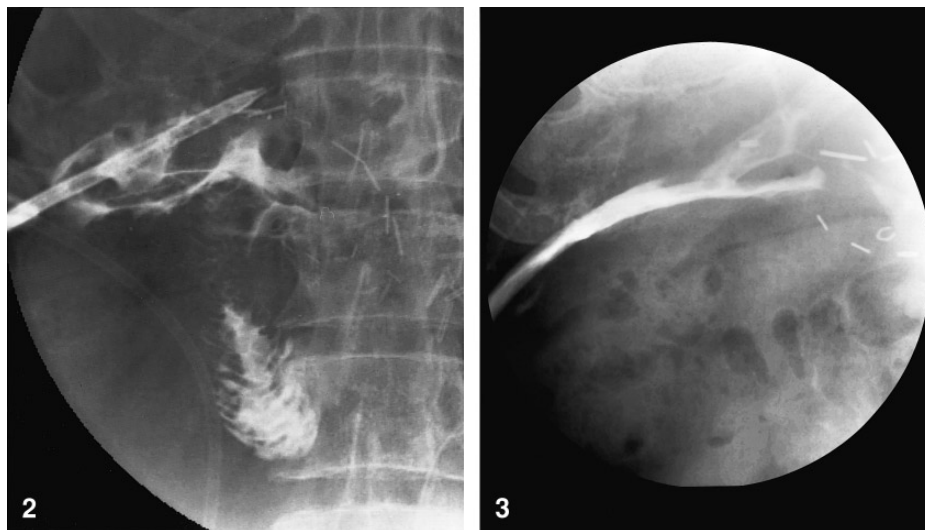


Fig. 2. Contrast study of the infected fluid collection at 3 days through the 12 Fr sump catheter. A loop of jejunum adjacent to the abscess cavity is filled indicating the presence of a jejunal fistula.

Fig. 3. Contrast study at 5 weeks through the 12 Fr sump catheter. There is no residual cavity and no enteric communication. The patient had no clinical signs of infection and there were no additional undrained collections. The drainage tube was removed and there was no recurrence of abscess or fistula.

abscess formation due to the numerous anastomoses required and the difficulty in creating a complete seal at the pancreatico-jejunal anastomosis [3–6]. Leak from the pancreatico-jejunal anastomosis occurs in approximately 20% of patients and is strongly correlated with abscess formation [6]. Proven risk factors for the development of leak have not been unequivocally established, though advanced patient age, small caliber of the pancreatic duct, soft consistency of the pancreatic parenchyma, and large intra-operative blood loss have been implicated in some reports [3, 7]. The frequency and consequences of postoperative anastomotic leak have led to the prospective investigation of techniques to reduce the incidence. In one surgical series, performing a pancreatico-gastrostomy in place of a pancreatico-jejunostomy did not significantly decrease the incidence of leak [7]. Other studies have suggested that the perioperative use of octreotide (synthetic somatostatin) may decrease the incidence of anastomotic leak by hormonal inhibition of pancreatic secretion [8, 9].

In our series, the pancreatico-jejunal anastomosis appeared to be responsible for postoperative fluid collections in all 19 patients. All but one of these patients had positive microbial cultures obtained at the time of drainage. Percutaneous management of the fluid collections was successful in 89% of patients, and there were no catheter-related complications.

The high rate of successful drainage was achieved despite the presence of accompanying fistula to the pancreatico-jejunal anastomosis, and compares favorably with previous series in which successful percutaneous management of abscess and coexistent fistula has ranged from 60%–90% [10–12]. In addition, the duration of drainage required for successful resolution reported herein (mean 31 days) is in agreement with reports in the literature [13, 14]. In considering the success of percutaneous therapy in our series, it is important to note that fistulas were revealed by postdrainage contrast tube studies performed in part to assess for their

presence; otherwise, many of these fistulas may have escaped detection [12].

Abscess and fistula resolution were achieved in virtually all cases despite unfavorable conditions for resolution. Following pancreaticoduodenectomy, the pancreatico-jejunal anastomosis is exposed to high concentrations of digestive enzymes secreted by the pancreatic remnant. Such an environment would be expected to hinder fistula closure and successful abscess drainage; however, this was not the case in this series of patients.

Three patients (16%) had biliary fistulas in addition to pancreatico-jejunal fistulas. These concomitant biliary fistulas had no adverse effect on successful drainage.

We conclude that fluid collections following pancreaticoduodenectomy are consistently associated with a fistula to the pancreatico-jejunal anastomosis. As a result, patients require a relatively extended percutaneous drainage, close monitoring, and proper positioning of drainage tubes to promote fistula closure. This review indicates that with careful management, successful percutaneous therapy can be achieved in virtually all patients.

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