

The influence of transection site on the development of pancreatic fistula in patients undergoing distal pancreatectomy: A review of 294 consecutive cases

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Background. Pancreatic fistula (PF) is a significant cause of morbidity in patients undergoing distal pancreatectomy (DP), with an incidence of 15–40%. It remains unclear if the location of pancreatic transection affects the rate of PF occurrence. This study examines the correlation between the transection site of the pancreas during DP and the incidence of PF.

Methods. All cases of DP from October 2005 to January 2012 were reviewed retrospectively from an institutional review board-approved database at the Thomas Jefferson University Hospital. Patient demographics and perioperative outcomes were analyzed. The pancreatic transection location was determined by review of operative reports, and then dichotomized into 2 groups: neck/body or tail. PF were graded following the International Study Group on Pancreatic Fistula guidelines.

Results. During the study period, 294 DP were performed with 244 pancreas transections at the neck/body and 50 at the tail. Of the 294 patients, 52 (17.7%) developed a postoperative PF. The incidence of PF after transection at the tail of the pancreas was higher (28%) when compared with transection at the neck/body (15.6%; $P = .04$). When stratified by PF grade, grade A PF occurred more commonly when transection of the gland was at the tail (22% tail vs 8.2% neck/body; $P = .007$); however, no difference was found for grade B/C PF (6% tail vs 7.4% neck/body; $P = 1$).

Conclusion. Our data suggest that PF occurs more often when the tail is transected during DP, although the majority are low grade and of minimal clinical significance. More severe PF occurred equally between the transection sites. (*Surgery* 2015;157:1080-7.)

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DISTAL PANCREATECTOMY (DP), or resection of the pancreas to the left of the mesoportal confluence, is a common operative procedure used to treat both benign and malignant diseases of the body and tail of the pancreas. Although mortality rates for major pancreatic resections have improved to <5% (1% for DP in recent years), morbidity rates

have remained relatively unchanged, and have a significant effect on patient recovery and quality of life.¹ Pancreatic fistula (PF), defined as a parenchymal leak of amylase-rich fluid (>3 times the serum level on or after postoperative day 3),² remains among the most significant causes of morbidity after DP with a reported frequency of 15–40% in published studies.²⁻⁴ Aside from being a major source of morbidity alone, PF is also associated with an increased risk of other related complications, such as delayed gastric emptying, intraabdominal abscess, wound infection, pulmonary complications, and visceral artery pseudoaneurysm development. PF results in prolonged postoperative hospital stays, increased readmission rates, and a delay to the commencement of adjuvant treatment (in patients with malignant disease).⁵⁻⁷

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In an effort to reduce the rate of PF after DP, many groups have attempted different pancreatic stump closure and/or transection techniques.^{2,8,9} Traditionally, parenchymal transection with a scalpel or electrocautery was followed by direct ligation of the pancreatic duct and horizontal mattress suture closure of the pancreatic stump. More recently, and in conjunction with the advent of minimally invasive surgical techniques, transection and ligation of the pancreas is also being performed with gastrointestinal staplers with or without staple line reinforcement. Many adjuncts to decrease PF have been tried. Unfortunately, the data have not shown a clear consensus as to the optimal technique for gland closure, with various studies conflicting on the efficacy of each method.

To date, very little attention has been given to the site of pancreas transection during DP as a risk factor for PF formation. We hypothesized that the site of pancreatic transection during DP would likely affect postoperative PF rates and reviewed our large experience with DP to that end.

METHODS

All cases of DP at the Thomas Jefferson University Hospital (TJUH) from October 2005 to January 2012 were retrospectively reviewed, querying our institutional review board–approved, prospectively maintained pancreatic surgery database. Patients were excluded if they had prior pancreatic surgery or history of a previous PF. At TJUH, DP was performed by either cautery transection with direct duct ligation and mattress sutured remnant gland closure or by the use of a gastrointestinal stapler device with or without buttress material (Seamguard, Gore, Flagstaff, AZ). The decision where to transect the pancreas was made intraoperatively by the attending surgeon based on the location of the pathologic abnormality and with the objective of obtaining clear resection margins. Operative notes, patient charts, laboratory values, imaging studies, pathology reports, and discharge summaries were analyzed to assess pancreas transection location and perioperative outcomes. Location of transection was regionally defined as either “neck/body” (at or around the portal confluence or celiac axis) or “tail” (to the left of the celiac axis; Fig 1).

The International Study Group on Pancreatic Fistula grading system was used to classify PF as 1 of 3 grades: A, B, or C.² In brief, grade A PF are often asymptomatic and typically present only with either amylase-rich fluid collections or drainage of amylase rich fluid via operatively placed drains.

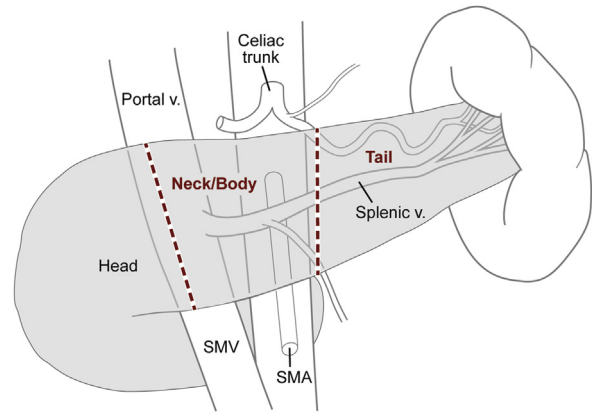


Fig 1. Anatomic determination between neck/body and tail transections. SMA, Superior mesenteric artery; SMV, superior mesenteric vein; v., vein.

These PF typically do not require an alteration in postoperative management. Grade B PF include fistulae that alter clinical management by use of parental nutrition, antibiotics, or additional drainage. At our institution, all patients with amylase-rich fluid in an operatively placed drain after postoperative day 3 receive octreotide (per our standardized post-DP pathway),¹⁰ regardless of PF severity, and so the use of somatostatin analog was not considered in our grading using the International Study Group on Pancreatic Fistula criteria. Grade C fistulae are the most severe, often requiring extensive intervention to address persistent leakage or life-threatening sequelae. Drain amylase values were only measured if clinical suspicion for PF was present. Upon documentation of a leak, octreotide 250 μ g was administered subcutaneously every 8 hours for a total of 6 doses. Additionally, 20 mg of Sandostatin LAR, a long-acting depot formulation of octreotide, was given once intramuscularly upon initial finding of the leak. The dosage is the same for all patients. All complications that arose secondary to PF were treated with standard medical care for the complication at hand.

Statistical analysis of the groups was performed. Categorical outcome variables were compared by use of the Fisher exact test. Continuous outcome variables reported between groups were analyzed using the Kruskal–Wallis test. Logistic regression was used to determine adjusted estimates of association between PF and various patient and procedure characteristics. Variables were included in the full model if they were associated with PF in univariable analysis with $P < .20$, or if they were known to be associated with PF from previous

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