Completion Pancreatectomy for Postoperative Peritonitis After Pancreaticoduodenectomy

Early and Late Outcome

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Hypothesis: Completion pancreatectomy in patients with pancreatic leakage associated with postoperative peritonitis after pancreaticoduodenectomy is a viable salvage procedure.

Design: Retrospective analysis from a cohort of consecutive patients admitted between January 1, 1989, and December 31, 1999, for postoperative peritonitis originating from pancreaticojejunos-tomy leakage.

Setting: Tertiary referral center with surgical intensive care unit specializing in the treatment of intra-abdominal sepsis.

Patients: Eight consecutive patients with postoperative peritonitis originating from pancreaticojejunos-tomy after pancreaticoduodenectomy, with a mean Acute Physiology and Chronic Health Evaluation II score of 18.6. We excluded patients with pancreatic fistulas or abscesses amenable to percutaneous drainage or other conservative treatment.

Intervention: Completion pancreatectomy.

Main Outcome Measures: Mortality, morbidity, and long-term outcome, which was assessed by interview.

Results: Three patients died in the postoperative period: 2 required early reoperation during the postoperative period and died of hemorrhage and sepsis, and 1 died of multiorgan failure without reoperation. Recurrence of carcinoma was responsible for late death of 2 other patients.

Conclusions: Postoperative peritonitis after pancreaticoduodenectomy still has high mortality; however, completion pancreatectomy may represent the only means to achieve source control of infection in cases of postoperative peritonitis.

Arch Surg. 2004;139:16-19

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in our institution. Among these patients, 31 developed pancreatic fistulas that were conservatively managed and 7 developed postoperative peritonitis suspected on clinical grounds and confirmed at surgery. During the same period, 2 patients were referred to our institution for the treatment of postoperative peritonitis after a Whipple procedure. One of them was referred after 3 reoperations and died before reoperation at our institution, on the day of his admission. This study included the 7 patients initially operated on at our institution and the patient referred to us for treatment of postoperative peritonitis that could be operated on.

There were 2 women and 6 men, with a median age of 58.5 years (range, 45-70 years; mean ± SD, 58.1 ± 10.3 years). The pancreaticoduodenectomy was performed for adenocarcinoma of the pancreas (n = 2), adenocarcinoma of the duodenum (n = 1) or ampulla (n = 3), chronic pancreatitis (n = 1), and stage IV duodenal lesion of familial adenomatous polyposis classification (n = 1). During pancreaticoduodenectomy, the gross texture of the pancreas was described by the surgeon as normal in 7 patients and hard in 1 patient. The pancreatic duct was managed by nonintussusceptive pancreaticojejunostomy (n = 7) and pancreaticogastrostomy (n = 1). Partial portal vein resection followed by reconstruction was performed in 1 patient, and 1 other patient required dissection of the celiac trunk under intermittent vascular exclusion of 2 hours for extrinsic compression of the celiac trunk.

Medical comorbidity was present in 7 patients: cardiac disease (n = 3), chronic respiratory insufficiency (n = 1), familial adenomatous polyposis (n = 1), alcoholism (n = 1), and previous gastric resection for ulcer followed by a gastrojejunostomy (n = 1).

Postoperative peritonitis in patients operated on at our institution was suspected with the appearance of fever (n = 7) and abdominal tenderness (n = 6). Failure of at least 1 organ was an indication for reoperation in 6 patients. The mean number of organs failed in these 6 patients was 2 (renal insufficiency, n = 2; shock, n = 5; liver failure, n = 1; pulmonary deficiency, n = 1). In 1 patient, operation was indicated because fluid was found in the peritoneal cavity on ultrasonography. The patient referred to our institution was in shock and required artificial ventilation.

The median time between the initial operation and treatment in this department was 6 days (range, 2-11 days). The referred patient was operated on the same day he was admitted (day 3 after initial operation). The mean ± SD APACHE (Acute Physiology and Chronic Health Evaluation) II score, measured within 3 after initial operation, was 18.6 ± 5.2 (median, 17.5; range, 12-28).

SURGICAL PROCEDURE

For all patients, peritonitis was confirmed during laparotomy. The surgical procedure included a laparotomy for complete exploration and lavage of the abdominal cavity, excision of all sources of infection, drainage of dependent areas, jejunostomy for continuous enteral nutrition, and primary abdominal wound closure.12 The pancreatic remnant was ablated. The jejunal stump was pulled out as a stoma in 7 patients with leakage of a pancreaticojejunal anastomosis. The stomach was closed after edge excision in 1 patient with leakage of a pancreaticojejunal anastomosis. A capillary Mikulicz packing (B. Braun Medical SA, Boulogne, France) was made of a gauze bag containing long gauze swabs and a 16F silicone tube and was placed with the following technique: The gauze bag was laid in the pancreas area or the pelvis. Then the gauze swabs were loosely packed into the bag; 3 to 5 swabs were usually required. The bag formed a vertical cylinder that was exteriorized through a 5-cm opening at the left extremity of the chevron incision for pancreatic drainage and through a 3-cm median incision just above the pubis for pelvic drainage. Witzel jejunostomy was performed in the ileal loop immediately distal to the gastroenterostomy (Figure) or, in the patient with a gastropancreatic anastomosis, in the ileal loop immediately distal to the hepaticojejunostomy. The abdominal wall was primarily closed in a conventional manner or by exclusive cutaneous suture, depending on the abdominal wall tension.14

Parenteral nutrition was started as soon as possible and replaced by enteral nutrition through jejunostomy once the gastrointestinal ileus resolved.

The Mikulicz packing was left in an open appliance for 7 days, allowing for capillary drainage, or placed in a closed appliance with 100 mm Hg of suction applied on the drain. The exteriorized part of the packing was cleaned every day with oxygenated water. From day 8 onward, irrigation (1 L of isotonic sodium chloride solution plus 10 mL of povidone-iodine in 30 minutes) was performed daily through the silicone tube, in preparation for packing removal. The gauze swabs were removed at postoperative days 9 and 11, and the gauze bag itself at day 14. After removal, a 14F soft silicone tube was placed on the track for a mean of 5 days, allowing for daily irrigation (100 mL in 5 minutes).

Glycemia and capillary tests were performed during hospitalization, and diabetes was treated with regular insulin. Induced pancreatic exocrine insufficiency was treated with oral pancreatic enzymes when feeding started.

SURGICAL FINDINGS AND PROCEDURES

Surgical findings are detailed in the Table. Three patients had Mikulicz drainage, 1 in the Douglas pouch and
PJ, pancreaticojejunostomy.
Pseudomonas (n=1), albicans (n=1), associated with postoperative peritonitis were spontaneous closure. The intraperitoneal microorganisms as-
12 months after pancreatic completion and required resec-
tion in the year after their Whipple procedure (11 and 13 months). An enterocutaneous fistula appeared 13
months after pancreatic completion and required resec-
tion pancreatectomy and had a partial jejunal resection
2/M/70 Completion pancreatectomy, splenectomy, Mikulicz packing (6) PJ leakage, pancreatitis 28 Jejunal necrosis + PJ leakage 1.5 mo after completion (early postoperative death)
5/M/45 Completion pancreatectomy, splenectomy, (9) PJ leakage, peritonitis, pancreatitis 23 Persistent sepsis, recovery from MOF, local recurrence 1 y later (late death)
6/M/66 Completion pancreatectomy, splenic preservation (2) PJ leakage, peritonitis, pancreatitis 12 Splenic vein bleeding and GJ + HJ leakage (early postoperative death)
7/F/46 Completion pancreatectomy, splenectomy (3) PJ leakage, peritonitis, pancreatitis, pancreatic necrosis 18 Alive
8/M/53† Completion pancreatectomy, splenic preservation, biliary intubation, Mikulicz packing (3) Peritonitis, PJ leakage, HJ leakage, pancreatitis 17 Biliary refection (alive)

Abbreviations: APACHE, Acute Physiology and Chronic Health Evaluation; GJ, gastrojejunostomy; HJ, hepaticeojenostomy; MOF, multiorgan failure; PJ, pancreaticojejunostomy.
†This patient was referred to our institution.

2 in the pancreatic area. Five patients had their abdomi-
nal wall closed conventionally and 3 had exclusive cu-
taneous closure. The intraperitoneal microorganisms as-
associated with postoperative peritonitis were Candida albicans (n = 1), Escherichia coli (n = 5), Proteus species (n = 1), Pseudomonas species (n = 1), and Enterobacter cloa-
caes (n = 2). Two patients had polymicrobial infection and 6 had monomicrobial infection.

OPERATIVE MORTALITY AND MORBIDITY

Three patients (38%) died in the early postoperative pe-
riod (2, 19, and 57 days after completion pancreatectomy).
Two of these patients required early reoperation. One pa-
tient had a recurrent intra-abdominal abscess due to je-
junal necrosis. He was reoperated on 49 days after com-
pletion pancreatectomy and had a partial jejunal resection
with intubation of gastrojejunal anastomosis and double
enterostomy. He died 8 days later. One patient had post-
operative bleeding secondary to splenic vein erosion, as-
associated with biliary and gastric anastomosis leak. He was
reoperated on for splenic vein ligation and intubation of
both anastomosis. He died 11 days later.

None of the patients died of the consequences of dia-
betes. Two patients had severe diabetic complications: severe hypoglycemia without the need for hospitaliza-
tion (n = 1) and hypoglycemic coma with neurologic com-
parative mortality or morbidity. Two patients died of cancer recur-
rence in the year after their Whipple procedure (11 and 13 months). An enterocutaneous fistula appeared 13
months after pancreatic completion and required resec-
tion of the fistulated gastrojejunostomy and a new gas-
trojejunostomy.

LONG-TERM OUTCOME

Four patients had their enterostomy closed without mor-
tality or morbidity. Two patients died of cancer recur-
rence in the year after their Whipple procedure (11 and 13 months). An enterocutaneous fistula appeared 13
months after pancreatic completion and required resec-
tion of the fistulated gastrojejunostomy and a new gas-
trojejunostomy.

COMMENT

The safety of the pancreatic anastomosis is closely re-
lated to the quality of the pancreatic remnant. While there
is no more than 8% anastomotic leak in chronic pancre-
atitis, it can reach 14% to 23% when the pancreatic pa-
renchyma is normal. Among patients with a post-
operative pancreatic anastomotic leak, 70% to 80% can be
treated nonoperatively, but 10% to 15% need invasive at-
tempts and percutaneous drainage of intra-abdominal ab-
scess. Moreover, 10% to 15% of the patients with pan-
creatic anastomotic leak develop severe complications
such as peritonitis or bleeding, requiring reinter-
vention. Few articles have been written about the re-
results of completion pancreatectomy in the early postop-
erative period regarding the management of postoperative peritonitis associated with pancreatic leakage. Most pub-
lished series about completion pancreatectomy men-
tion it as a means to control postoperative complica-
tions such as uncontrollable anastomotic leaks, bleeding,
or abscesses, but not specifically peritonitis. In our group
of patients, completion pancreatectomy was chosen as a
salvage procedure for the treatment of postoperative perito-
ritis associated with pancreatic leakage.

The importance of considering postoperative perito-
nitis separately has been stressed by many authors. This
distinction between other forms of peritonitis and post-

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operative peritonitis is further justified by the high mortality rates reported in series focused on the subject, which average 50%, well above the usual mortality rate associated with primary peritonitis, which averages 20%. In our series, the early death rate was 38%.

Postoperative leakage from the upper gastrointestinal tract associated with peritonitis represents a specific technical challenge to the surgeon, as exteriorization of the source of infection is impossible. Other series have published the outcome of completion pancreatectomy. van Berge Henegouwen et al compared the outcomes of percutaneous drainage and completion pancreatectomy. The group of patients undergoing completion pancreatectomy showed fewer relaparotomies, less mortality, and a shorter hospital stay. However, in this series, most of the patients were reoperated on for persistent pancreatic fistula, without peritonitis. Farley et al, in their series of 17 patients mainly reoperated on for postoperative complications, pointed out the necessity for completion pancreatectomy when operative findings are irreparable pancreatic anastomotic dehiscence with extended sepsis or severe pancreatitis.

Reoperation was not delayed in our series; patients were reoperated on a mean of 5.8 days after pancreaticoduodenectomy. Smith et al reported in a selected group of patients with postoperative complications that delayed reexploration with possible completion pancreatectomy can lead to death. Seven (64%) of their 11 patients reoperated on a mean of 18 days after Whipple resection died. The authors suspected that reoperation came too late in patients with systemic manifestations.

Splenic preservation was performed in 2 patients in our series. Our aim was to reduce the space left after completion pancreatectomy and splenectomy, not to reduce the risk of overwhelming postsplenectomy infection. However, as one of our patients died of splenic vein erosion after splenic preservation, we decided not to preserve the spleen in subsequent patients.

Induced diabetes after completion pancreatectomy is unstable, with frequent, severe, potentially lethal hypoglycemic events and low need for insulin. In our series, none of the patients died of severe hypoglycemia, but one of them had a coma with neurologic sequelae.

In conclusion, postoperative peritonitis after pancreaticoduodenectomy is a major complication associated with a high mortality rate. However, completion pancreatectomy is probably the only surgical option available to control the source of infection.

Accepted for publication June 28, 2003.

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