

A Modified Procedure to Improve Pancreatic Drainage in Chronic Pancreatitis With Pancreatic Head Dominant Disease

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Objectives: Chronic pancreatitis is a debilitating and progressive inflammatory disease with an altered quality of life due to severe abdominal pain. Pancreaticoduodenectomy is a surgical option for patients with bulky disease involving the head of the pancreas, especially when this disease has progressed to stricture of the bile duct, duodenum, or both. A long-term issue associated with this procedure is the stricture of the pancreatic anastomosis. Reoperative and endoscopic interventions are difficult related to difficulty in reaching the anastomosis endoscopically. We describe a variation of this procedure with the potential to lead to longer-term improvement in the drainage of the residual pancreas.

Methods: We reviewed electronic medical records of patients undergoing pancreaticoduodenectomy for chronic pancreatitis performed by 1 surgeon at the University of Minnesota Medical Center, Minneapolis, MN, between 2014 and 2023. Information gathered from the patient's records included preoperative demographics, perioperative outcomes, and postoperative follow-up information.

Results: The described procedure was performed on 8 patients between 2014 and 2023. Three patients have died since surgery at 1.5, 5.5, and 8 years postop, with no deaths related to pancreatitis or surgical complications. Of the remaining 5 patients, the median time from surgery is 7.5 years.

Conclusions: We describe a surgical technique that may reduce the risk of pancreaticojejunal stricture in patients undergoing pancreaticoduodenectomy for chronic pancreatitis. In a small series of patients, this procedure can be performed safely with acceptable results.

Key Words: surgical therapy for chronic pancreatitis, chronic pancreatitis with head-dominant disease, pancreatic duct stricture (*Pancreas* 2025;54:e455–e459)

Surgical management of patients with chronic pancreatitis typically includes either pancreatic resection or drainage of the pancreas (Frey or other procedures). One long-term issue with pancreaticoduodenectomy (PD) relates to the development of recurrent pain related to stenosis at the pancreatic duct anastomosis. Endoscopic therapy for stenosis of the pancreaticojejunostomy anastomosis is

technically challenging with limited benefit. In this small case series, we describe a technique to potentially mitigate the development of long-term stenosis.

CASE PRESENTATION

This is a 33-year-old male with a 5-year history of pancreatitis secondary to alcohol use. Past surgical history is positive only for laparoscopic cholecystectomy about 4 years before the evaluation. He has had recurrent episodes of pancreatitis resulting in pain and symptoms once monthly. This progressed despite endoscopic interventions. ERCP (endoscopic retrograde cholangiopancreatography) interventions were not successful. He stopped drinking 3 years before evaluation and has been sober since that time. Despite this, he has continued to have increasing pain and over the last several months, he has lost significant weight, from a high of 180 lbs. to 130 lbs. He is a 1 pack per day smoker and a former heavy drinker. His current medications include narcotics and pancreatic enzymes. On physical exam, this is a thin male without scleral icterus. There is some mild epigastric tenderness on palpation.

His albumin at the time of initial evaluation was 3.2 g/dL. ALT (alanine transaminase) and AST (aspartate aminotransferase) were mildly elevated at 154 and 37 U/L, respectively, decreasing since his ERCP. Total bilirubin was 0.4 mg/dL, and alkaline phosphatase was 210 U/L. His hemoglobin A1C was 5.2% preoperatively. A CT scan shows a markedly dilated pancreatic duct with heavy calcification and stone burden within the head of the pancreas. There are easily visualized multiple side branches in the pancreatic duct (Fig. 1).

The patient underwent a pancreaticoduodenectomy procedure with wide drainage of the pancreatic duct in the remaining body and tail of the pancreas. His postoperative course was unremarkable. He was discharged on day 9 postop. He was transitioned to long-acting narcotics and was weaned over the next 6 months.

MATERIALS AND METHODS

We reviewed electronic medical records of patients undergoing pancreaticoduodenectomy for chronic pancreatitis performed by 1 surgeon at the University of Minnesota Medical Center, Minneapolis, MN, between 2014 and 2023. The University of Minnesota IRB (Institutional Review Board) reviewed the protocol and approved the study. Information gathered from the patient's records included preoperative demographics, perioperative outcomes, and postoperative follow-up information.

Technical Description of Procedure

The pancreaticoduodenectomy is performed in a standard fashion. Reconstruction is typically performed

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The authors declare no conflict of interest.

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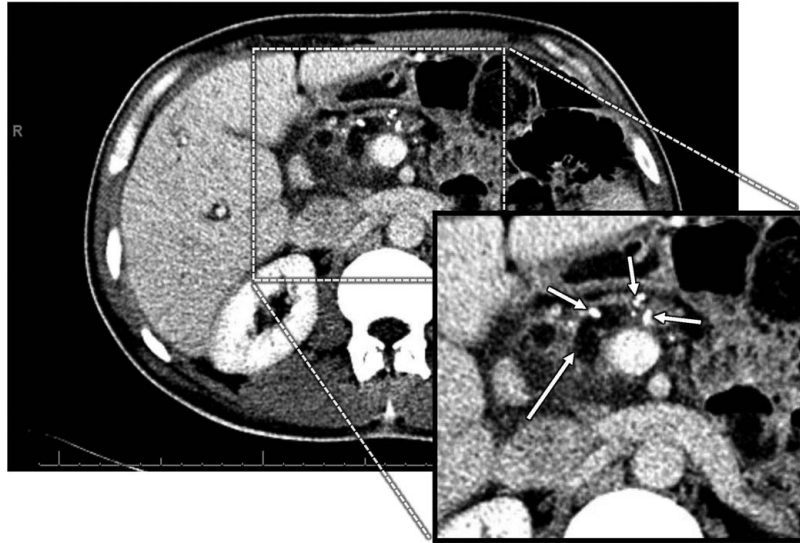


FIGURE 1. CT scan of the abdomen in the patient with calcific chronic pancreatitis. Axial view demonstrating dilated pancreatic duct containing air in head and neck of the pancreas and coned in view with dilated duct in head and neck of the pancreas. Long arrow: dilated pancreatic duct. Small arrows: calcifications.

using Roux-en-Y, with one limb draining the pancreatic and biliary systems and the other draining the stomach or duodenum. Both limbs are typically placed in a retrocolic fashion. The decision to perform a pylorus-preserving

resection or not is based on the severity of inflammation around the proximal duodenum and distal stomach. In our practice, the pylorus is preserved if there is no significant scarring.

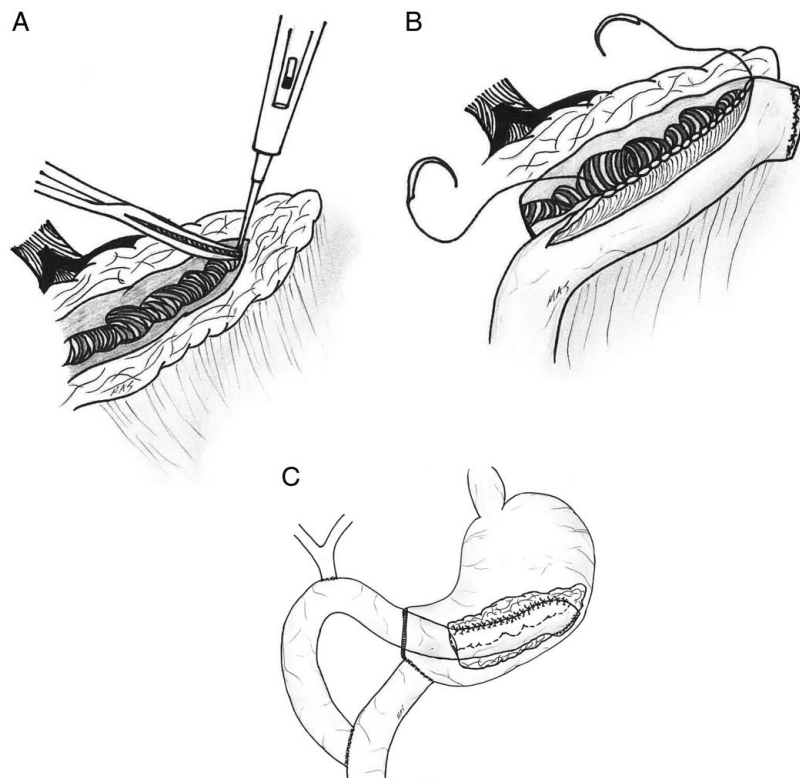


FIGURE 2. A, Opening the pancreatic duct: the pancreatic duct is opened into the distal pancreas using electrocautery over an instrument placed in the duct for head-dominant calcific chronic pancreatitis. B, Creating pancreaticojejunostomy: using a 3-0 or 4-0 absorbable suture, an anastomosis is created between the pancreatic duct and the antimesenteric limb of the small bowel. No attempt is made to completely cover the neck of the pancreas with the bowel. C, Anatomy of reconstruction: Roux-en-Y pancreaticojejunostomy and choledochojejunostomy (biliary-pancreatic limb), and gastrojejunostomy (enteral limb).

The reconstruction is begun with the pancreatic anastomosis. Rather than the typical end-to-side pancreaticojejunostomy, a longitudinal drainage is created between the pancreas and the small bowel. The dilated pancreatic duct is opened using electrocautery over an instrument placed in the pancreatic duct at the resection margin, with the opening of the duct continuing 8–10 cm into the tail of the pancreas. Bleeding from small vessels in the anterior pancreas is controlled with cautery or suture ligation. Strictures or stones in the duct can occasionally create difficulty in opening the duct: intraoperative ultrasound is useful in this situation to localize the duct in the pancreatic tail. After opening the antimesenteric jejunum, a side-to-side pancreatic duct to jejunal anastomosis is created using a single layer absorbable suture (usually 3-0 or 4-0 vicryl). The reconstruction of the biliary and duodenal anastomoses is performed in a standard fashion. A single drain is placed in the subhepatic space, and then the wound is closed in a standard fashion (Figs. 2A–C). Postoperative care is similar to that of having a standard pancreaticoduodenectomy, with the drain evaluated for amylase 3 days postoperatively and removed if there are no signs of pancreatic fistula. Patients receive insulin in the perioperative period using a sliding scale or insulin drip protocols. Patients are started on pancreatic enzyme supplementation for 6 weeks after surgery, and these are continued if the patient has symptoms of pancreatic insufficiency with the trial of interruption.

RESULTS

A total of 8 patients (n=8) underwent pancreaticoduodenectomy with extended pancreatic drainage. Patient information is summarized in Table 1. The median age was 41 years old. Preoperative clinical manifestations include chronic abdominal pain in all patients, with 6 patients experiencing weight loss and 1 patient with intermittent jaundice during the episodes of recurrent acute pancreatitis with associated abnormal LFTs (liver function tests). All patients were receiving daily narcotics preoperatively. The postoperative course was unremarkable, with no apparent complications for 6 patients. Two patients developed cardiopulmonary complications: 1 patient had increasing respiratory distress on day 3 postop with ICU (intensive care unit) transfer requiring high flow nasal cannula. This patient was discharged in stable condition on the 14th postoperative day. The second patient was found to have a perforation at duodenojejunostomy on day 8 postop. After revisional surgery, the patient was discharged 1 month postsurgery. There were no perioperative deaths.

At follow-up between 6 months and 1 year, 3 of the 8 patients were taking daily narcotics. With respect to endocrine function, 2/8 patients were on insulin preop, with 3/8 patients on insulin 1 year postoperatively. Six of 8 patients were taking pancreatic enzymes preop, and all were taking pancreatic enzymes at 1 year after surgery. Three patients have died since surgery at 1.5, 5.5, and 8 years postop. None of the deaths were related to pancreatitis or surgical issues. Of the remaining 5 patients, the median time from surgery is 7.5 years. One patient underwent completion pancreatectomy 4.5 years after initial surgery.

DISCUSSION

Chronic pancreatitis (CP) is a debilitating and progressive inflammatory disease with an altered quality of life due to severe abdominal pain, recurrent attacks of acute

TABLE 1. Patient Demographic and Outcome Information

Patient demographics	
Age, y; median (range)	41 (28–60)
Sex	
Male/female	6/2
Preoperative symptoms and procedures	
Chronic abdominal pain; n (%)	8 (100)
Weight loss; n (%)	6 (75)
Jaundice/Scleral icterus; n (%)	1 (12.5)
Preoperative ERCP/EUS; n (%)	7 (87.5)
Insulin; n (%)	2 (25)
Pancreatic enzymes; n (%)	6 (75)
Intraoperative findings	
Firm pancreatic texture; n (%)	8 (100)
Dilated pancreatic duct; n (%)	8 (100)
Operative time, min; median (range)	373.5 (292–766)
Estimated blood loss, mL; median (range)	625 (200–2000)
Postoperative complications and findings	
Hospital length of stay, d; median (range)	11.5 (5–29)
Wound infection; n (%)	1 (12.5)
Cardiopulmonary complications; n (%)	2 (25)
Postoperative hemorrhage; n (%)	0 (0)
Intra-abdominal fluid collections; n (%)	1 (12.5)
Pancreatic leak; n (%)	0 (0)
Pancreatic fistula; n (%)	0 (0)
Biliary leak; n (%)	0 (0)
Biliary fistula; n (%)	0 (0)
Perioperative mortality; n (%)	0 (0)
Postoperative ERCP; n (%)	0 (0)
Repeat pancreatic surgery; n (%)	1 (12.5)
Daily narcotics; n (%)	3 (37.5)
Postoperative insulin; n (%)	3 (37.5)
Postoperative pancreatic enzymes; n (%)	8 (100)

pancreatitis, fibrotic tissue replacement with a loss of acinar and islet cells leading to exocrine and/or endocrine insufficiency,¹ and malnutrition and related malignancies. Management of CP includes medical and endoscopic therapy, with surgery reserved for patients not responding to medical or endoscopic therapy. Treatment goals for these patients include pain relief, decrease of complications of long-term narcotics, and preservation of islet function with reduction of the long-term complications of diabetes mellitus (DM). Surgery within 3 years of symptoms is correlated with improved pain relief and less endocrine pancreatic insufficiency.² The best surgical approach must be tailored to the patient.³

Surgical Approaches to Chronic Pancreatitis

A number of surgical approaches have been developed to treat CP-related complications. These include drainage procedures such as Peustow, Frey, or Beger procedures, and resection procedures such as classic pancreaticoduodenectomy. Drainage procedures are typically reserved for CP with dilated pancreatic duct with diffuse disease, while resection procedures have been the surgery of choice for disease of dominant involvement of the head or tail of the pancreas, stricture of the duodenum or common bile duct, and small duct disease or familial pancreatitis (these patients receiving a total pancreatectomy and islet autotransplant).

A procedure similar to that described above was described by Jeyarajah et al in 2010.⁴ They applied this procedure (the “Whip-Stow” procedure) to 10 patients with malignant or premalignant disease, including those with periampullary cancer, IPMN, and chronic pancreatitis and note the benefits of technical simplicity, a wide mucosal

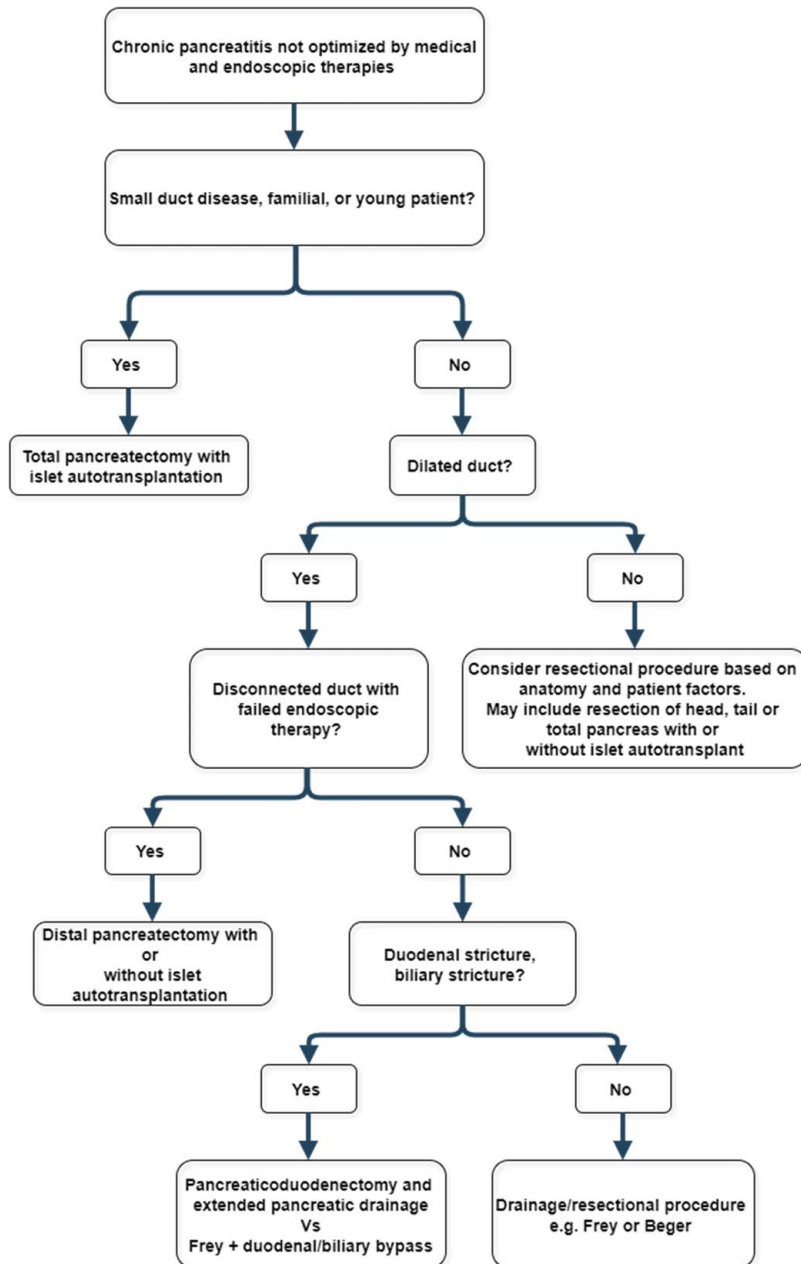


FIGURE 3. Guide to surgical decision-making for the management of chronic pancreatitis. These are general guidelines only. Every patient warrants a tailored approach to care with multidisciplinary input. Modified from Skube and Beilman.³ Adaptations are themselves works protected by copyright. So in order to publish this adaptation, authorization must be obtained both from the owner of the copyright in the original work and from the owner of copyright in the translation or adaptation.

anastomosis, examination of the remnant duct, and elimination of pancreatic stent. In our practice, we perform this procedure in patients with chronic pancreatitis with head-dominant disease who are progressing to secondary local complications such as biliary or duodenal stricture. We have reserved this operation for those with dilated pancreatic ducts and a firm pancreas, due to concerns for pancreatic fistula in those without a fibrotic pancreas. Finally, this and other resectional procedures are more problematic in the setting of superior mesenteric vein occlusion or cirrhosis.

Evidence-based data on the surgical treatment of CP favors tailored organ-sparing procedures, such as the Beger or Frey procedures, over the classic or pylorus-sparing pancreaticoduodenectomy (Whipple procedure).⁵ One approach to operative decision-making is outlined in Figure 3. Many surgeons prefer a pancreaticoduodenectomy procedure for patients with bulky disease involving the head of the pancreas, especially when this disease has progressed to stricture of the bile duct, duodenum, or both. One of the long-term issues associated with this procedure is stricture of pancreatic anastomosis which is probably not a rare event,

particularly in patients with chronic pancreatitis,⁶ occurring in 1.4%–11.4% with a median time interval of 34 months after PD.^{7,8} Reoperative and endoscopic interventions are challenging related to the difficulty in reaching the anastomosis endoscopically. We describe a variation of this procedure with the potential to lead to longer-term improvement in the drainage of the residual pancreas. In our hands, this variation can be performed safely, with results in this small series of patients acceptable in terms of outcomes. The small volume of procedures performed for this problem likely precludes more definitive results in a larger series of patients.

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