PART D: Surgery for chronic pancreatitis: pancreatic duct drainage procedures

Dirk J. Gouma[1] & Philippus C. Bornman[2,3]
[1] *Academic Medical Center, Amsterdam, the Netherlands*
[2] *Department of Surgery, University of Cape Town, Cape Town, South Africa*
[3] *Groote Schuur Hospital, Cape Town, South Africa*

Introduction

The first pancreatic duct drainage procedure was described by DuVal in 1954, which entailed a distal pancreatectomy and caudal pancreaticojejunostomy [1]. The operation was then modified by Puestow who introduced the longitudinal pancreaticojejunostomy of the body and tail, and shortly thereafter it was modified to a side-to-side anastomosis. This longitudinal side-to-side Roux-en-Y pancreaticojejunostomy (LPJ) was later described in detail by Partington–Rochelle [2] to whom this operation is now commonly referred to. This operation is less commonly referred to as a "modified Puestow procedure."

This section covers pancreatic duct drainage procedures for pain in uncomplicated chronic pancreatitis (CP). The surgical strategies for complications such as bile duct obstruction, pancreatic cysts, and duodenal obstruction are reviewed in Chapter 16C. Other new concepts of combining the drainage of the duct and (organ sparing) resection, the so-called hybrid procedures such as the Frey procedure [3, 4], and the Beger procedure and Bern procedure are described in detail in Chapter 16E.

Patient selection

Persistent uncontrolled pain after adequate medical treatment is the most common indication for surgical drainage procedures [5–8]. As with other interventional procedures, patients should first undergo an adequate trial of intensive medical therapy before a pancreatic drainage operation is considered. This should include eliminating etiologic factors such as alcoholic consumption, optimal pain medication in a step-up fashion, and when appropriate administration of pancreatic enzymes for exocrine insufficiency and control of diabetes mellitus [5–8]. Autoimmune pancreatitis is a separate entity with the opportunity to start with specific treatment options such as corticosteroids, which might even be effective in management of ductal stenosis [5–7].

The selection for either a minimally invasive endoscopic drainage procedure or one of the different surgical procedures will depend mainly on morphological features as determined by contrast-enhanced computed tomography (CT) or magnetic resonance imaging (MRI) [5–8]. The most common morphological changes are an inflammatory mass and local fibrosis, pancreatic duct dilatation and stenosis, and ductal stones. Associated complications such as pseudocysts, bile duct stenosis, and duodenal stenosis are also frequently encountered. Considering surgical series from major centers around the world, there seems to be a remarkable difference in the morphological changes between series from the United States and some countries in Europe [9]. When comparing the median sizes of the pancreatic heads in patients who underwent surgery, Keck et al. showed a significantly larger pancreatic head mass in the German group (4.5 cm) when compared with an American group (2.6 cm) [9]. This resulted in a different surgical approach. They suggested that the population might be different in Europe [9]. The results of a recent analysis from the Netherlands mirrored the American experience showing that 65% of the patients underwent a drainage procedure because of a small

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pancreatic head mass while only 18% had a pancreatic head resection [10]. It remains difficult to explain these differences of treatment in the same area in Europe. This might be due to a different treatment philosophy; delay in referral may also result in more advanced disease by the time patients come to surgery. A survey from the Netherlands indeed highlighted a conservative approach among internists and gastroenterologists who consider (local) inflammation in the pancreas as a self-limiting disease, which should "burn out" over the years, while patients with dilated ducts and stones are treated primarily with interventional endoscopic procedures [11]. An inflammatory mass in the head of the pancreas is a relative contraindication for a drainage procedure; these are best treated by a resection or a hybrid procedure (resection and drainage). Patients best suited for a pancreatic drainage procedure are those without an inflammatory mass and dilated main pancreatic duct greater than 5 mm in diameter.

Pancreaticojejunostomy (Partington–Rochelle procedure)

A bilateral subcostal incision provides the best exposure of the pancreas. This is achieved by full Kocherization of the duodenum, mobilization of the hepatic flexure of the colon, and division of the gastrocolic ligament toward the splenic flexure of the colon. The neck of the pancreas is usually the best site to enter the pancreatic duct. The pancreatic duct is identified using palpation and a syringe or, if these fail, by intraoperative ultrasonography. The longitudinal incision into the main pancreatic duct is extended as far as possible toward the tail and the head. The extension into the head, as in the Frey procedure, is a new addition to the original description of the operation and helpful to remove stones. When the pancreatic duct is exposed, a biopsy is taken for frozen section if there is any doubt about a malignancy and stones are removed. The side-to-side anastomosis with the jejunal limb is carried out with a one layer continuous or interrupted monofilament 4/0 sutures. The longitudinal pancreaticojejunostomy is shown in Figure 16D.1. The Roux-en-Y loop is then completed with a one layer continuous 3/0 monofilament sutures.

Results of lateral pancreaticojejunostomy (LPJ)

LPJ is associated with a low morbidity (20%) and mortality (1%) rate. The early and long-term pain relief is reported to vary between 42% and 100% [3–7, 12, 13]. The outcome of LPJ in studies that included >20 patients is summarized in Table 16D.1 [13]. In these studies, long-term pain relief was better in patients with a dilated duct >7 mm, while pain relief is relatively low in patients with nondilated ducts with some studies achieving only 50% pain relief after 5 years. These poor results have been attributed to undrained side duct in an inflammatory mass in the pancreas head and those with small-duct disease. The alternative drainage operation for small-duct disease is the V-shaped excision

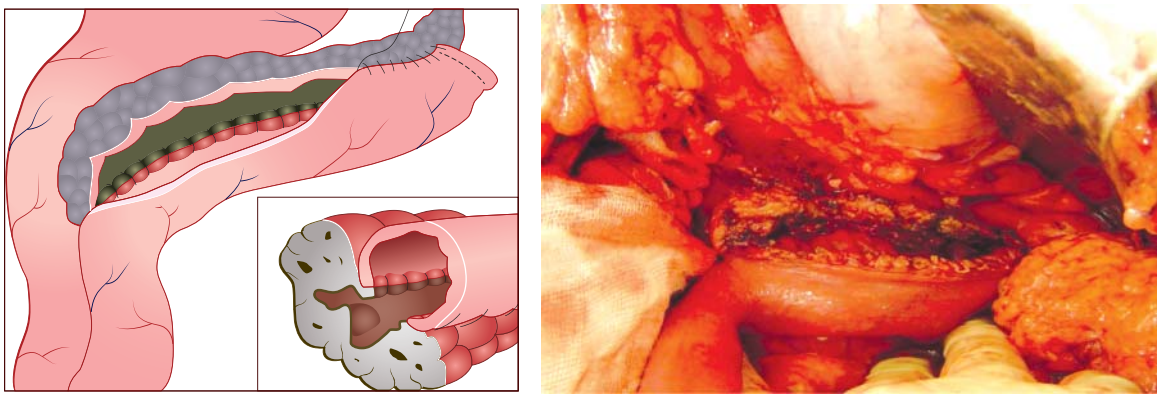

Figure 16D.1 The longitudinal side-to-side pancreaticojejunostomy. The opened pancreatic duct with ductal mucosa. The posterior layer is sutured and a start is made for the anterior layer at the schematic drawing.

Table 16D.1 Results of drainage procedure by pancreaticojejunostomy in series of >20 patients.

Reference	No. of patients	Complete or partial pain relief (%)	Mortality (%)	Mean follow-up (months)
Sarles et al. [14]	69	85	4	60
Warshaw [12]	33	83	3	43
Morrow et al. [15]	46	80	0	72
Sato et al. [16]	43	100	0	110
Bradley [17]	48	66	0	69
Nealon et al. [18, 19]	41	93	0	15
Drake and Fry [20]	23	90	0	60
Greenlee and Prinz [21][a]	86	80	3	95
Adloff et al. [22]	105	93	2	65
Wilson et al. [23]	20	76	5	60
Delcore et al. [24][b]	28	86	0	42
Adams et al. [25]	85	55	0	76
Buhler et al. [26][c]	35	42	0	48
Sielezneff et al. [27]	57	84	0	65
Sakorafas et al. [28]	120	81	0	96
Boerma et al. [29, 30]	50	88	0	27
Mean results (±SD)	889	80.1 ± 14.8	1.1 ± 1.7	62.7 ± 24.9

[a]Study consisted of 91 patients, 5 omitted who underwent a caudal PJ.
[b]Eighty nine percent of the patients without dilated pancreatic ducts.
[c]Either ductal or cyst drainage.
Adapted from van der Gaag et al. [13], Aliment Pharmacol Ther 2007; 26 Suppl 2:221–232.

operation described by Izbicki and the Hamburg group [31]. By excision of the ventral pancreas and removing a small segment of parenchyma, the duct is opened and partly a new artificial channel for drainage is created. It is also a combination of drainage and decompression of the pancreas [31]. A low morbidity (20%) and mortality (0%) have been reported, with long-term complete pain relief in 73% of patients after a median follow-up of 83 months. These results appear to be superior to the standard LPJ for small-duct disease, but the downside of this operation is a relatively high rate of new onset exocrine and endocrine insufficiency. The V-shaped excision procedure is not widely practiced and as such there is a paucity of data to support the Hamburg experience.

Surgical versus endoscopic drainage procedures

Endoscopic stenting techniques with and without extracorporeal shockwave lithotripsy (ESWL) have been introduced in the 1990s as alternative minimally invasive therapy to surgical drainage operations. Apart from less morbidity and mortality, these minimally invasive options may also be associated with fewer new-onset endocrine and exocrine pancreatic insufficiencies. As a consequence, endoscopic interventional procedures have enjoyed increasing support as first-line treatment for pain due to CP. A review of the short-term results of endoscopic pancreatic duct drainage for painful CP showed complete or partial pain relief in 74% of cases [13]. However, the initial enthusiasm for endoscopic intervention has been dampened by subsequent studies showing disappointing long-term results of pain relief [32, 33]. The first randomized controlled trial (RCT) by Dite et al. compared endoscopic drainage and different types of surgical treatment and showed significantly better pain control in the surgical arm [32]. In the second RCT, the Dutch group restricted the surgical procedure to an LPJ, which eliminated the bias in favor of surgery when there is an inflammatory mass in the head of the pancreas [33]. After 24-month follow-up, patients who underwent surgery had lower Izbicki pain

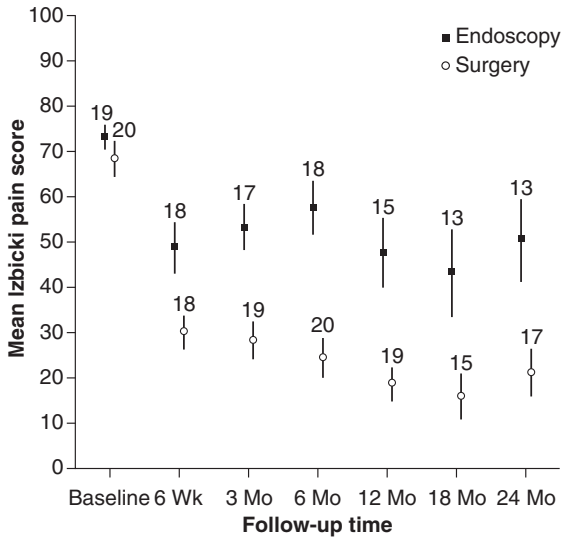

Figure 16D.2 The mean Izbicki Pain scores at baseline and 6 weeks up to 24 months after endoscopic and surgical drainage. Adapted from the Cahen et al. [33], NEJM 2007; 356:676–684.

scores (25 vs. 51) and better physical health scores compared with those who were treated endoscopically (Figure 16D.2). Complete or partial pain relief was obtained in 75% after surgery compared with 32% after endoscopic therapy [33]. A recent analysis with a longer follow-up period of 79 months showed that 68% of patients treated by endoscopy needed repeated endoscopic drainage. About half of these patients needed surgery as opposed to 5% in the surgical group [34]. Pain relief in the surgery and endoscopy groups was 80% and 38%, respectively. Costs of surgery were also lower compared with endoscopy treatment. A recent meta-analysis confirmed that surgery is superior to endoscopy in patients with a dilated pancreatic duct [35].

While it should be conceded that the current studies comparing surgery with endoscopic treatment for CP are small and have methodological shortcomings, there is mounting evidence that surgery provides superior long-term pain relief when compared with current endoscopic interventional procedures. Therefore, the current recommendation from the recent guideline of the ESGE that endoscopic intervention should be considered as first-line interventional therapy for pain in CP should be revisited [36].

Timing for surgical drainage in relation to other procedures

Considering the relatively high percentage of patients who need additional surgery after long-term stenting and on the other hand the good relatively early results, the choice first stenting, and timing of surgery in this ongoing disease process needs to be evaluated further. Older studies did not show a negative effect of previous stenting [29], but a recent series from the Academic Medical Center demonstrated that poor response to surgical treatment for CP in terms of pain relief and good quality of life was related to increasing numbers of stenting procedures prior to surgery [37]. Surgery after more than 3 years of symptomatic disease was another important risk factor [38]. An experimental study in pigs also suggested that early surgery resulted in less histological damage and better exocrine function [30]. The fact that surgical intervention is generally performed at a later stage of disease a trial comparing early surgery versus optimal current step-up practice for CP is currently performed [39]. In the previous RCT, it was not allowed to perform a Frey procedure because only surgical and endoscopic drainage of the pancreatic duct should be compared [34]. In patients with intraductal stones in the pancreatic head area, it is sometimes difficult to remove these stones without removing a wedge of the pancreatic tissue ventrally to the duct. Therefore, pancreatic parenchyma in this area toward the duodenum/papilla is now more frequently removed to have better access to the duct and this concept is also accepted in the new ESCAPE trial [39]. Many surgeons believe nowadays that, therefore, resection should be part of a surgical procedure. This might be an explanation for the increasing popularity of the Frey procedure and other organ-sparing resection procedures such as the Beger and Bern procedure (Chapter 16E).

Summary and conclusion

The longitudinal pancreaticojejunostomy (LPJ) has been used for decades as the only therapeutic drainage procedure in CP and is nowadays a relatively safe procedure, but with certain limitations for long-term pain relief. The introduction of duodenal preserving resection operations with or without drainage of the

pancreatic duct has to a large extent superseded LPJ, especially in those cases with an inflammatory mass in the head of the pancreas. Yet, this operation still deserves its rightful place when there is a dilated main pancreatic duct without an inflammatory mass in the head of the pancreas. There is good reason to believe that LPJ should yield results that are similar to the duodenum-preserving resection operations if the operation is restricted to these selection criteria. The proposed RCT comparing Frey and LPJ operations to endoscopic stenting should throw more light on the overall role of LPJ in the management of patients with CP with intractable pain. Timing of surgical drainage procedures (combined with partial resection) in relation to long-term outcome, pain relief, and function is an important subject for new studies.

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