64

Pancreatic Drainage Procedures: Techniques and Results

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Introduction

Compared to the general population, chronic pancreatitis (CP) is associated with a fourfold increase in mortality [1] and an increased risk for pancreatic malignancy. About 5% of patients with CP will develop pancreatic cancer over 20 years [2]. Its progressive inflammatory destruction of the pancreatic parenchyma is usually accompanied by intractable pain, a loss of exocrine and endocrine pancreatic function, clinically evident as malabsorption and pancreatogenic diabetes.

The pathogenesis of pain in CP is likely multifactorial. One potential mechanism may be increased intraductal pressure and obstruction of the pancreatic ductal system. Inflammation itself together with alterations in pancreatic nerve fibers, including an increase in nerve fibers and neurogenic inflammation may also contribute to the typical pain commonly associated with CP. Changes in the central nervous system and alterations in central pain processing may also contribute to pain associated with CP. The characteristic abdominal pain often leads to impaired social and work life due to recurrent hospitalizations [3].

Currently, endoscopic or interventional treatment is considered the first step in the treatment of patients with CP. Endoscopic treatment that relieves the pancreatic ductal system (endoprothesis, stone extraction, extracorporeal shock wave lithotripsy, or ductal dilatation) improves pain for up to 1 year [4]. Multiple interventions improve pain in about 65% of the cases and reduce the rate of patients requiring surgical intervention [5].

However, stent replacement often has to be performed 3-monthly and may require multiple hospital admissions [6,7]. After unsuccessful endoscopic treatment, about 49% of the patients still require surgery within 1 year [8]. While endoscopic duct drainage may provide long-term success in the presence of isolated proximal duct stenosis and in the absence of an inflammatory mass of the pancreatic head and calcifications, surgery is superior to endoscopic therapy in the latter case [9] and may also be more cost-effective [10].

Moreover, early surgical intervention may also prevent disease progression, preserve pancreatic function, and improve long-term pain control [9,11–13]. The initial findings of the Cahen study have recently been validated in another randomized trial conducted in the Netherlands (ESCAPE trial): patients with large duct disease and opioid-dependent pain of less than 6 months' duration were randomized to receive upfront surgery versus endoscopic treatment. At 18 months follow-up, there was significantly better pain control in the upfront surgery group (58% vs. 39% pain relief), with lower number of interventions, comparable pancreatic function as well as 0% mortality [14].

Indication for Surgery

The most common indication for surgery for CP is intractable pain despite pharmacological and/or endoscopic intervention. Other indications for surgery are local complications, such as duodenal or biliary stenosis, symptomatic pseudocysts, pancreaticopleural fistula, a disconnected pancreatic duct, pancreatogenic ascites, or suspicion of neoplasm. All procedures attempt to reduce pain and resolve organ complications while preserving exocrine and endocrine function. Their long-term efficacy is commonly evaluated by the restoration of quality of life and successful rehabilitation. Three distinct groups of procedures can be employed to treat CP: drainage procedures, procedures combining drainage and resection, and resecting proce-

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dures. The choice of procedure depends on the morphologic features of the pancreatitis. Drainage combined with resection of the pancreatic head (Beger procedure [15]), Frey procedure [16]) is commonly chosen if an inflammatory mass of the pancreatic head is present, resecting procedures (pylorus-preserving pancreaticoduodenectomy, Whipple procedure) are used if malignancy is suspected. The majority of patients with CP (85%) have an inflammatory mass of the pancreatic head and thus require drainage combined with resection or resection of the pancreatic head [17] (Fig. 64.1). However, drainage procedures are the procedure of choice in patients with a dilated pancreatic duct (≥5 mm) without an inflammatory mass [18]. Another indication for surgical drainage may be cavernous transformation of the portal vein with collaterals in the case of long segment portal vein stenosis. However, short segmental portal vein or mesenterico-portal vein stenosis with portal hypertension may also be alleviated during pancreatic head resection by decompressing the stenosis [19]. Resection of the pancreatic head is even possible after interventional recanalization of the portal vein for nonfixated portal vein thrombosis. Drainage procedures are thus not mandatory in this situation [20].

Drainage Procedures

The first drainage procedure of the pancreas in humans was performed in 1911 through transcutaneous catheter placed in the pancreatic duct [21]. The procedure provided pain relief and the patient survived for 30 years. More than 50 years later, the procedure was modified and a distal pancreatectomy, splenectomy, and pancreaticojejunostomy were performed [22]. The procedure was further refined as a distal pancreatectomy and side-to-side pancreaticojejunostomy[23]. The latero-lateral panceaticojejunostomy still in use today was first described in 1960 [24].

A Partington–Rochelle procedure (Fig. 64.2) is comprised of an incision of the pancreatic duct at the anterior surface of the pancreas from the tail to the head of the pancreas. Calculi in the pancreatic ducts can then be removed and segmental stenosis can be relieved. The procedure is completed by a Roux-en-Y jejunal limb sutured side-to-side to the pancreatic duct [24].

Drainage procedures are associated with low morbidity and mortality rates (about 1%). However, drainage is inferior to resection regarding pain management and complication management [18,25–36] (Fig. 64.3).

As a hybrid procedure with partial resection of the pancreatic head, the Frey procedure is often also considered a drainage procedure. It is comprised of an excoriation of the pancreatic head combined with an incision of the pancreatic duct at the anterior surface of the pancreas to the tail of the pancreas (Fig. 64.4). The procedure is completed by a Roux-en-Y jejunal limb sutured side-to-side to the excoriated pancreatic head and pancreatic duct [16]. Compared to the Partington–Rochelle procedure, the Frey procedure improves the long-term outcome. Compared to other resection procedures, the outcome achieved by the Frey procedure is equivalent regarding pain control, quality of life, and exocrine and endocrine organ function [34,37–40].

A rare form of CP, termed "small duct disease" affects the whole organ. It is not associated with a dilated

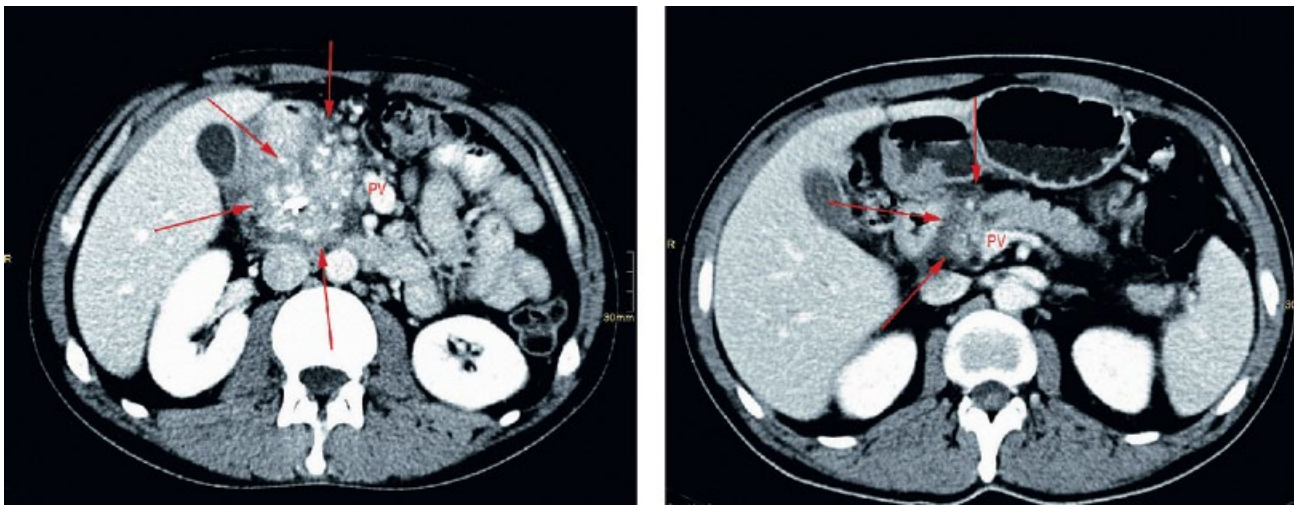

Figure 64.1 CT scan of chronic pancreatitis. (a) The majority of patients with chronic pancreatitis have an inflammatory mass of the pancreatic head and thus require drainage combined with resection or resection of the pancreatic head. (b) Drainage procedures are the procedure of choice in patients with a dilated pancreatic duct (≥5 mm) without an inflammatory mass. PV: portal vein.

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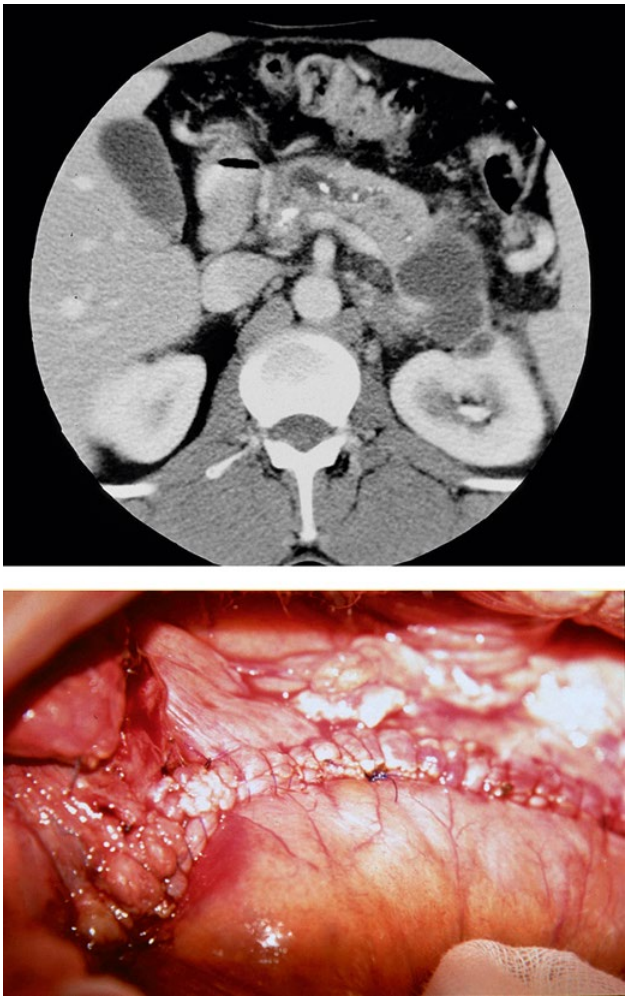

Figure 64.2 Partington–Rochelle procedure. Upper panel: CT scan showing a dilated main pancreatic duct and pancreatolithiasis in chronic pancreatitis. Note the retention cyst in the pancreatic tail caused by chronic ductal hypertension. Lower panel: situs after completion of latero-lateral pancreatojejunostomy.

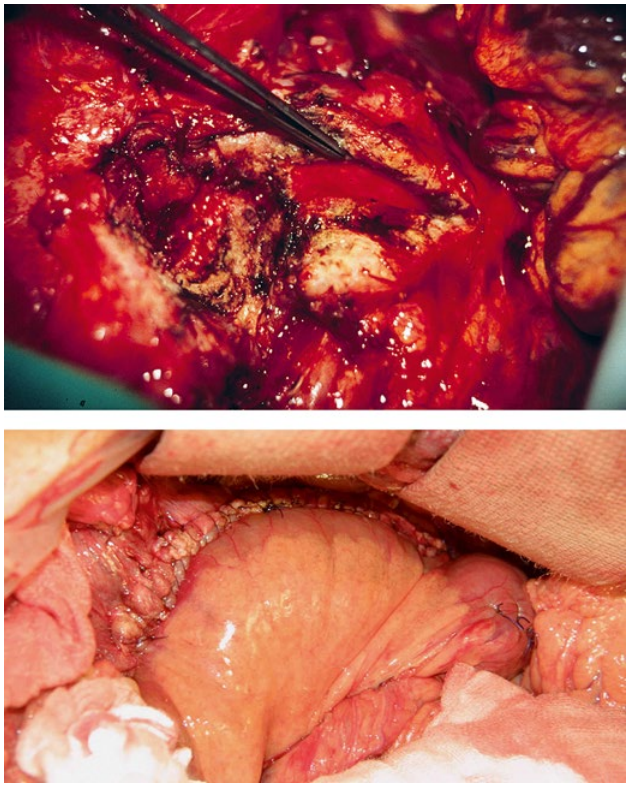

Figure 64.4 Frey procedure. Upper panel: situs after excoration of the pancreatic head and longitudinal excision of the anterior wall of the main pancreatic duct. Lower panel: situs after completion of latero-lateral pancreatojejunostomy.

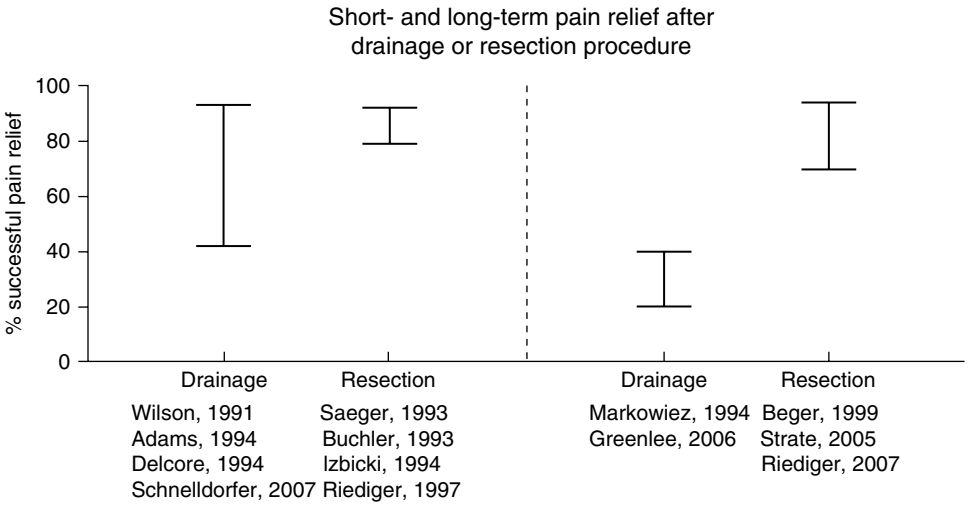

Figure 64.3 Drainage procedures are inferior to resection regarding pain management.

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pancreatic ductal system and may easily be misdiagnosed as autoimmune pancreatitis. Treatment of choice for this small duct disease is the longitudinal V-shaped excision of the ventral pancreas. The procedure combines extensive drainage with a limited resection [41]. This drainage procedure may provide long-term pain relief and an improved quality of life in the majority of patients. Compared to V-shaped excision, resection may not be as effective in the treatment of small duct disease [42].

Conclusion

Taken together, pure drainage procedures such as the Partington–Rochelle procedure are often not sufficient to provide acceptable pain and complication control due to a frequently observed inflammatory mass of the pancreatic head. In the absence of an inflammatory mass, they provide good results with low morbidity and mortality. In the presence of an inflammatory mass, hybrid procedures such as the Frey procedure or V-shaped excision are as effective as resection.

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