Pancreaticoduodenectomy and Outcomes for Groove Pancreatitis

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Keywords

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Abstract

Background/Aims: The operative management of groove pancreatitis (GP) is still a matter of controversy and pancreaticoduodenectomy (PD) can be a high-risk procedure for patients. The aim of this study was to report our 9-year experience of surgical resection for GP and to review relevant literature. **Methods:** A retrospective review of patients undergoing pancreatotomy for GP from August 1, 2008, through May 31, 2017 was performed. Patients with clinical, radiologic, and final pathologic confirmation of GP were included. Literature on the current understanding of GP was reviewed. **Results:** Eight patients from total 449 pancreatotomies met inclusion criteria. Four male and 4 female patients (mean age, 51.9 years; mean body mass index, 25.3) underwent pylorus-preserving pancreatoduodenectomy (3 by laparoscopy and 5 by open approach). Mean (range) operative time and blood loss was 343 (167–525) min and 218 (40–500) mL respectively. Pancreatic fistula and delayed gastric emptying were noted in one patient each. No major complications oc-

curred, but minor complications occurred in 5 (62%) patients. Mean hospital stay was 6.1 (range 3–14) days. At median follow-up of 18.15 (interquartile range 7.25–33.8) months, all patients experienced a resolution of pancreatitis and improvement in symptoms. **Conclusions:** PD is a safe procedure for GP. Short-term surgical outcomes are acceptable and long-term outcomes are associated with improved symptom control.

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Introduction

Groove pancreatitis (GP) is a rare variant of chronic pancreatitis. Unlike other forms of pancreatitis, GP involves the tissue that is bound by the duodenum, pancreatic head, and common bile duct [1]. Over the years, GP has been described in various ways by different authors. It was initially described by Potet and Duclert [2] as cystic dystrophy of the duodenal wall; Stolte et al. [3] later used the term GP. Adsay and Zamboni [4] suggested the name paraduodenal pancreatitis to include different disease entities with overlapping characteristics, including GP, periampullary duodenal wall cyst,

cystic dystrophy of the heterotopic pancreas in the duodenal wall, pancreatic hamartoma of the duodenum, and myoadenomatosis. Becker and Mischke [1] categorized GP into 2 types: (1) the pure form, which does not involve the main pancreatic duct or the pancreatic parenchyma apart from the groove, and (2) the segmental form, which involves the groove and the head of the pancreas with stenosis of the pancreatic duct leading to upstream dilatation.

The anatomical landmarks of the groove include vessels at the second portion of the duodenum (laterally), the head of the pancreas and the common bile duct (medially), the first portion of the duodenum or gastric antrum (anteriorly), and the third portion of the duodenum or inferior vena cava (posteriorly) [5, 6]. Literature on this disease is limited and the aim of this study was to report our experience with patients undergoing surgical resection for GP over the past 9 years and to review the current literature regarding this disease.

Methods

A retrospective review of the patients undergoing pancreaticoduodenectomy (PD) for various diseases at Mayo Clinic, Jacksonville, Florida from August 1, 2008, through May 31, 2017 was performed. Patients with clinical, radiologic, and final pathologic confirmation of GP were included in the study. Patient information, including demographics, clinical history, alcohol consumption, smoking, and pancreatic insufficiency (endocrine and exocrine), was collected. All patients had routine blood tests. The presence of GP was confirmed with further investigations, including endoscopic ultrasonography (EUS), computed tomography (CT), and magnetic resonance imaging (MRI). The diagnostic criteria for GP were symptoms related to chronic pancreatitis, past medical history of chronic pancreatitis, and radiologic findings of pathologic features (thickened wall and cystic dystrophy) mostly in the head of the pancreas and paraduodenal ("groove") zone. Consequently, lesions were classified as 1 of 2 types: solid or cystic. All patients were described and discussed at a multidisciplinary pancreas board of surgeons, radiologists, oncologists, and gastroenterologists. Indications for surgical intervention were failure of medical management, difficulties in distinction between inflammation and neoplasia (especially in the "solid" type), and severe continuous pain.

Either laparoscopic or open pylorus-preserving PD was performed as described in our previous publications [7, 8]. Final diagnosis was confirmed with specimen study by experienced pathologists and surgeon groups. The diagnosis of GP was confirmed with the presence of Brunner gland hyperplasia, chronic inflammation with or without cystic dystrophy, and heterotopy of pancreatic tissue in the duodenum and absence of neoplastic processes. The patients were followed postoperatively for recovery from surgery and resolution of preoperative symptoms. Complications were graded using the Clavien-Dindo classification System [9]. Exocrine and endocrine insufficiency and the need for narcotic pain medicine were assessed over a long term.

Results

Demographics, comorbidities, operative details, complications, and follow-up data are presented in Table 1. Of the 8 patients, 4 were male and 4 were female, with a mean (range) age of 51.9 (40–58) years and a mean (range) body mass index of 25.3 (21–56). All patients had a past medical history of chronic pancreatitis and various symptoms, such as abdominal pain, weight loss, nausea, and vomiting. Four patients (50%) had a history of alcohol abuse, and 5 were active smokers (62%). One patient (12%) had diabetes mellitus (DM). No patient had preoperative symptoms of exocrine pancreatic insufficiency.

All patients underwent EUS and CT (Table 2), and 7 underwent MRI (one patient did not require MRI because of obvious radiologic signs of GP on CT and EUS). During EUS, 4 patients (50%) underwent fine-needle aspiration biopsy; all had cytologic findings consistent with GP (e.g., Brunner gland hyperplasia and chronic inflammation). According to the imaging studies, the pancreatoduodenal complex was affected in all patients (100%), with 3 patients (38%) having the solid type with edematous duodenal wall and 6 patients (75%) having cystic dystrophy of the edematous duodenal wall. One patient had pancreatic head mass thought to be consistent with adenocarcinoma by MRI and EUS. The main pancreatic duct dilatation was observed in 5 patients (62%) and calcifications of pancreatic parenchyma in 3 (38%).

Six of the 8 patients (75%) had major medical comorbidities and were categorized as American Society of Anesthesiologists class III (Table 1). PD was laparoscopic in 3 patients (38%) and open in 5 (62%); none had conversion. The mean (range) operative time was 343 (167–525) min. No patient died or had a major complication at 90 days.

Histopathology showed heterotopic pancreatic tissue in the duodenum in 2 patients (25%) and Brunner gland hyperplasia in 4 (50%). Five patients (62%) had minor complications (Clavien-Dindo grade I or II) postoperatively, and the mean (range) length of stay was 6.1 (3–14) days (Table 1). Patient 1 was readmitted for progressive heart failure and required appropriate conservative management (Clavien-Dindo grade II). Colitis developed in patient 2, but no specific treatment was needed (Clavien-Dindo grade I). Patient 3 developed a postoperative pancreatic fistula (grade A; Clavien-Dindo grade I). Delayed gastric emptying in patient 5 was managed with a temporary course of parenteral nutrition. Patient 7 had resistant pain (Clavien-Dindo grade I).

Table 1. Patient characteristics and post-pancreatoduodenectomy outcomes with groove pancreatitis

Patient	Age, years/ gender	BMI	ETOH	Smoking	HTN	DM	Cardiac disease	ASA	Surgery	Operative time, min	EBL, mL	LOS, days	Morbidity	Follow-up, months
1	58/male	28	+	+	+	–	+	II	LPD	509	200	6	HF, readmission, Clavien-Dindo grade II	14.6
2	40/male	24	–	–	–	–	–	III	OPD	167	200	6	Colitis, Clavien-Dindo grade I	35.2
3	54/female	23	–	–	–	–	–	III	LPD	438	50	4	PF grade A, Clavien-Dindo grade I	29.6
4	51/male	23	+	+	+	–	–	III	OPD	389	200	3	None	21.7
5	54/female	34	+	+	+	+	–	III	OPD	167	40	14	DGE, Clavien-Dindo grade II	9.5
6	56/male	56	–	+	–	–	–	III	OPD	367	450	5	None	37.2
7	45/female	21	–	–	+	–	–	II	LPD	525	500	8	Pain, Clavien-Dindo grade I	6.5
8	57/female	21	+	+	–	–	–	III	OPD	179	100	3	None	6.0

ASA, American Society of Anesthesiologists physical status classification; BMI, body mass index (calculated as weight in kilograms divided by height in meters squared); DGE, delayed gastric emptying; DM, diabetes mellitus; EBL, estimated blood loss; ETOH, alcohol abuse; HF, heart failure; HTN, hypertension; LOS, length of stay; LPD, laparoscopic pancreatoduodenectomy; OPD, open pancreatoduodenectomy; PF, pancreatic fistula; –, absent; +, present.

Postoperative follow-up time for all 8 patients was median 18.15 (interquartile range 7.25–33.8) months (Table 1). Symptoms resolved completely in 4 of the 8 patients (50%; Table 2). Three patients (37.5%) had considerably less pain and one patient had mild nausea; one reported mild weight loss and floating stools, but the symptoms improved greatly at 3.5 months. No patient had any further episodes of pancreatitis or related hospitalizations. No patient had signs, symptoms, or a medication requirement related to pancreatic exocrine insufficiency, and only the patient with preoperative DM had signs, symptoms, or medication requirements for DM in the long-term follow-up.

Discussion

The limited literature available on the disease makes it difficult to estimate the true prevalence of GP. In a case series published thus far, GP was found in 2.7–24.4% of patients who underwent pancreatic resection for chronic pancreatitis [1, 3, 10]. It is thought that GP results from primary or secondary obstructive mechanisms [3]. The primary obstructive causes may include anatomical abnormalities such as heterotropic pancreatic tissue in the duodenum or functional variations, making these pa-

tients more susceptible to environmental pathogens from smoking and use of alcohol; in conjunction, an increase in the protein concentration and viscosity of the pancreatic juice, led to inflammation and subsequent calcification of the pancreas [11, 12]. Secondary causes include a history of gastrectomy causing trauma to the pancreatic head, duodenal ulcers, biliary tract disease, pseudocysts, and neoplasms [3, 13–17]. The Santorini duct may also be obstructed by protein plugs from true pancreatic cysts with intraluminal necrosis [16].

GP is seen most commonly in men in the 4th or 5th decade of life, and it has also been strongly associated with a history of chronic alcohol consumption [3, 18] and cigarette smoking [19]. Similarly, the history of patients from our series was significant for alcohol consumption and nicotine abuse. Generally, patients with GP present with a long history of symptoms similar to those with chronic pancreatitis, including recurrent nausea, vomiting, postprandial abdominal pain, and subsequently impaired gastric emptying [3, 5, 20], but abdominal pain is the most common symptom in all patients [10]. Abdominal pain was a major complaint for all 8 patients in our group.

The main differential diagnosis of GP is pancreatic ductal adenocarcinoma [3, 13, 14, 21–23]. In addition, there are reports of pancreatic adenocarcinoma arising in

Table 2. Clinical, radiologic, and pathologic findings and symptom resolution for 8 patients who underwent pancreatoduodenectomy for groove pancreatitis

Patient	Clinical symptoms	EUS findings	CT findings	MRI findings	Pathologic description	Symptom resolution
1	Abdominal pain, nausea, vomiting	Edematous duodenal wall with cystic dystrophy	Calcifications of the pancreatic head	Edematous duodenal wall with cystic dystrophy	Edematous duodenal wall with cystic dystrophy; focal intramural pancreatic heterotopia; Brunner gland hyperplasia	Complete
2	Abdominal pain, nausea, vomiting	Calcifications of the pancreatic head; edema of the duodenum	Calcifications of the pancreatic head	Dilatation of the MPD to 6 mm	Calcifications of the pancreatic head; Brunner gland hyperplasia	Complete
3	Abdominal pain, nausea, weight loss	Edematous duodenal wall with cystic dystrophy	Edematous duodenal wall	Edematous duodenal wall	Edematous duodenal wall with cystic dystrophy; Brunner gland hyperplasia	Complete
4	Abdominal pain, nausea, vomiting	Edematous duodenal wall with cystic dystrophy; chronic pancreatitis (head)	Edematous duodenal wall; MPD dilatation to 7 mm	Questionable pancreatic mass worrisome for carcinoma	Chronic pancreatitis (head); focal intramural pancreatic heterotopia; edematous duodenal wall	Partial (mild weight loss and floating stools); symptoms greatly improved at 3.5 months
5	Abdominal pain, weight loss	Chronic pancreatitis (head)	Edematous duodenal wall with cystic dystrophy	Edematous duodenal wall with cystic dystrophy	Edematous duodenal wall with cystic dystrophy; multifocal side branch IPMN	Partial (pain)
6	Abdominal pain, weight loss	Edematous duodenal wall with cystic dystrophy; calcifications of the pancreatic head; MPD dilatation to 6 mm	Edematous duodenal wall	NA	Edematous duodenal wall with cystic dystrophy; Brunner gland hyperplasia; chronic pancreatitis (head)	Complete
7	Abdominal pain	Edematous duodenal wall with cystic dystrophy	Edematous duodenal wall	Edematous duodenal wall with cystic dystrophy; MPD dilatation to 8 mm	Edematous duodenal wall with cystic dystrophy; chronic pancreatitis (head)	Partial (pain)
8	Abdominal pain	Mass in the head of the pancreas (15 mm); MPD and CBD dilatations to 4 and 7 mm, respectively	Edematous duodenal wall; mass in the head of the pancreas (15 mm); MPD and CBD dilatations to 4 and 7 mm, respectively	Mass in the head of the pancreas (15 mm); MPD and CBD dilatations to 4 mm and 7 mm, respectively	Chronic pancreatitis (head) with pseudocyst formation; edematous duodenal wall	Partial (nausea)

CBD, common bile duct; CT, computed tomography; EUS, endoscopic ultrasonography; IPMN, intraductal papillary mucinous neoplasm; MPD, main pancreatic duct; MRI, magnetic resonance imaging; NA, not applicable.

paraduodenal pancreatitis [24, 25]. Despite the advances in high-quality imaging techniques, distinguishing this entity from malignancy is difficult since they share similar characteristics, making operative resection a preferred intervention if this is suspected [26, 27].

Involvement of the pancreatoduodenal complex is a shared finding in all patients with this disease. The cystic type is observed in a majority patients, whereas the solid type is seen only in 29–32% of patients [19]. The pure form, with no involvement of the pancreatic duct or the pancreatic parenchyma apart from the groove, is less frequent than the diffuse form, which involves the pancreatic parenchyma and the pancreatic duct (18.3 vs. 81.7% of patients) [19].

On CT and MRI, GP often appears as a sheet-like hypodense mass-like appearance on CT; whereas hypointense on T1-weighted MRI images [25, 28] and poorly enhanced mass between the pancreatic head and the thickened, stenotic duodenal wall near the minor papilla. In our experience, edematous changes of the duodenal wall are well visualized on CT imaging (Fig. 1). However, cystic dystrophy can often be even better appreciated by MRI and EUS imaging modalities (Fig. 2, 3).

If the preoperative workup suggests benign disease, initial management with conservative therapy is appropriate. Otherwise, surgical intervention PD is the next step to consider [20]. Initial conservative treatment of GP consists of bowel rest, avoidance of fatty foods, pancreatic enzymes, analgesics, and abstinence from alcohol and smoking. In general, initial medical therapy is effective, but usually symptoms will recur in future [12]. Patients receiving conservative treatment should be followed up regularly with clinical examination, imaging studies, and biochemical tests to determine treatment success [13].

Isayama et al. [29] reported a case of complete relief of symptoms after a 12-month follow-up in a patient with GP treated by endoscopic drainage of the accessory pancreatic duct. Although the long-term clinical efficacy is unclear, this procedure has been proposed as an alternative to surgery in a subgroup of patients with GP [29]. In patients with few large cysts, endoscopic fenestration with cystoduodenostomy seems to provide effective symptomatic treatment [24].

Indications for Surgery

If the patient's condition does not improve or the symptoms increase in severity without a confirmed diagnosis, surgery is warranted. The most common indication for surgery is persistent abdominal pain. A much less

Fig. 1. Computed tomography (CT) findings in the patient with groove pancreatitis. Arrows indicate paraduodenal edema.

Fig. 2. Magnetic resonance imaging (MRI) findings in the patient with groove pancreatitis. Arrows indicate cystic dystrophy of the duodenal wall.

commonly described indication is duodenal stenosis with gastric outlet obstruction. An inability to exclude malignancy as a diagnosis is a strong indication for surgery.

Surgical Management and Outcomes

Surgery is the mainstay treatment of GP, obviating the symptoms and allowing histopathologic examination to accurately assess for malignancy. PD is the usual initial surgical approach to treat these patients, but some authors recommend performing a preliminary gastroenterostomy to relieve symptoms of obstruction [30].

A study performed by Casetti et al. [31] showed an increase in body weight and improvement of chronic abdominal pain in all their patients who underwent PD;

Fig. 3. Endoscopic ultrasound (EUS) findings in the patient with groove pancreatitis. The arrow indicates focal inflammation and cystic dystrophy of the groove zone.

complete relief of abdominal pain was achieved in 76% of the patients with the other patients reporting occasional relapses of abdominal pain.

Long-term outcomes after PD are excellent. De Pretis et al. [19] reported that among 120 patients affected by GP, 81 underwent surgery with 73% of those patients having complete resolution of pancreatitis. The patients were followed up for an average of 6.6 years and only 19% of patients who underwent resective surgery had clinical relapse compared to 59% of patients who underwent conservative management [19].

According to a recently published review study [32], conservative therapy as well as endoscopic and surgical interventions in patients with GP can be effective. These authors recommend a stepwise management with initial conservative therapy. In cases where malignancy cannot be excluded, surgical intervention is recommended.

Prognosis

Given the small number of patients included in the published series, it is difficult to make concrete conclusions about long-term prognosis. From the limited data published, however, the short-term results after PD appear to be favorable, and in our study, complete resolution of symptoms was achieved in 4 out of 8 patients and partial resolution of symptoms was seen in the other 4 patients.

Conclusions

GP is a rare subtype of chronic pancreatitis. The latest classifications include this entity under paraduodenal pancreatitis, along with other similar uncommon histo-

pathologic conditions. Imaging may be helpful, but the clinical diagnosis is challenging and there is the potential to fail to distinguish GP from other more common cause of recurrent pancreatitis. Although medical management may be moderately effective, it should be pursued with caution because of the inability to definitively exclude a pancreatic malignancy. The mainstay of therapy for this condition is PD. PD is a safe and effective procedure with acceptable short-term surgical outcomes and long-term outcomes are associated with improved symptom control.

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