Could it be groove pancreatitis? A frequently misdiagnosed condition with a surgical solution

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Key words
groove, pancreatitis, paraduodenal, pancreaticoduodenectomy, Whipples.

Abstract

Background: Groove pancreatitis (GP) is an underrecognised subtype of chronic pancreatitis, focally affecting the area between the duodenum and pancreatic head. It most commonly affects males between 40 and 50 years of age with a history of alcohol misuse. Patients most commonly complain of abdominal pain and vomiting. Due to its focal nature, it is a potentially surgically treatable form of chronic pancreatitis. We report results of patients surgically treated for groove pancreatitis followed by a literature review of patient outcomes post resection.

Methods: A retrospective chart review of patients with histopathologically confirmed GP post-surgical resection at the Princess Alexandra Hospital and Greenslopes Private Hospital in Brisbane, Australia was conducted between 2013 and 2020. Diagnosis was confirmed histologically when Brunner gland hyperplasia and chronic inflammation/fibrosis were found within the pancreaticoduodenal interface. Preoperative and postoperative symptoms were analysed along with complications. Additionally, a systematic review on outcomes of patients undergoing pancreaticoduodenectomy (PD) for GP was performed from three databases.

Results: Eight patients underwent surgery for GP. Elimination of preoperative symptoms was achieved in five of the eight patients. Major complications included one re-operation for pancreatic leak. Our literature review found complete resolution of pain and vomiting in 80% of GP patients after PD.

Conclusion: Optimal management of GP begins with early recognition. Symptoms from GP are likely to respond well to surgical intervention. We advocate for aggressive surgical resection in a patient with a high index of suspicion for GP.

Introduction

Chronic pancreatitis is a relatively common surgical pathology with an annual incidence of 7–10 per 100,000. Aetiology is multifactorial and may be a result of environmental (alcohol, nicotine and nutritional), hereditary, autoimmune factors or as a result of pancreatic ductal obstruction by calcification.1 Groove pancreatitis (GP) is a subtype of chronic pancreatitis focally affecting the area between the first and second parts of the duodenum and the pancreatic head.2 It was first described in 1970 and may account for 3.5%–24.4% of pancreaticoduodenectomy (PD) specimens in patients with symptomatic chronic pancreatitis. However, given it is frequently misdiagnosed or not considered, its true incidence is unknown.2,5

The demographic of patients with GP are predominantly males, aged 40–50 years old, with a history of alcohol misuse. Patients often complain of abdominal pain, vomiting and marked weight loss due to gastric outlet obstruction from duodenal stenosis.6–10 Despite the distal bile duct passing through the head of the pancreas, obstructive jaundice is an uncommon presentation.7,9,11 Management of this condition lies in the ability to recognize and differentiate it from other forms of chronic pancreatitis, as well as from a pancreatic or peri-ampullary malignancy which it often mimics. Due to its focal nature, it is a potentially surgically...
treatable form of chronic pancreatitis with good relief of symptoms. We report the results of eight patients surgically treated for GP followed by a review of the literature of outcomes following PD.

Methods

Retrospective chart review of patients with histopathologically confirmed GP following surgical resection at the Princess Alexandra Hospital and Greenslopes Private Hospital in Brisbane, Australia was conducted over 7 years (2013–2020). Cases were identified by a search of the hepatobiliary surgeon’s logbooks for patients with the discharge diagnosis of GP. Ethics approval was sought and granted by Greenslopes Hospital Ethics Committee as a negligible risk project.

Data collected included gender, alcohol and smoking history, diabetes, history of pancreatitis, presenting symptoms, imaging findings, other investigations, surgical management, post-operative complications, histopathological findings and long term follow up.

Indications for surgical treatment were, ongoing pain and vomiting in clinically suspected GP recalcitrant to medical and non-operative measures, or when unable to rule out malignancy. All patients were discussed at a multidisciplinary hepatobiliary meeting where a consensus management decision was formed.

Table 2 Demographics of 8 patients with groove pancreatitis

|                |               |
|----------------|---------------|
| Mean age       | 58.5 years    |
| Gender M:F     | 6:2           |
| History alcohol abuse | 5 (62.5%) |
| Current smoker | 5 (62.5%)     |
| Diabetic on presentation | 5 (62.5%) |
| History of recurrent/chronic pancreatitis | 7 (87.5%) |
| Presenting complaint |               |
| Gastric outlet obstruction | 7 (88%) |
| Epigastric pain | 4 (50%)       |
| Weight loss    | 4 (50%)       |
| Jaundice       | 2 (25%)       |
Diagnosis of GP was confirmed histologically when the following features(s) were seen: Brunner gland hyperplasia, chronic inflammation/fibrosis within the pancreaticoduodenal interface, duodenal cystic dystrophy, heterotopy of pancreatic tissue in the duodenum, with absence of a neoplastic processes.

Surgical complications were graded using the Clavien-Dindo classification system. All patients have been routinely followed up by the hepatobiliary unit and assessed for resolution of preoperative symptoms, and requirement for exocrine and endocrine pancreatic replacement.

In addition, a systematic review was performed following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Table 1). Three databases (MEDLINE from 1946, PubMed from 1946, and EMBASE from 1949) were searched to 04 July 2019. Search terms included: groove, pancreatitis and paraduodenal. Included studies were case reports and series with histopathologically confirmed GP in patients that underwent PD. In selected studies, the surgical approach, morbidity, mortality and curative outcome of PD were evaluated where follow up duration was reported.

Results

Eight patients with a clinical diagnosis of GP were identified from review of clinical records. Their demographics are illustrated in Table 2. Two patients were female, one patient was transgender and on testosterone hormonal treatment, deemed to be the cause of his recurrent pancreatitis. Two of the five patients were drinking >4 standard alcohol drinks at per day at presentation, but stopped when the diagnosis of GP was made. The predominant symptom was vomiting, followed by epigastric pain and weight loss; obstructive jaundice was present in two patients. In all patients, the diagnosis of GP was delayed by weeks or months. Some had been labelled as chronic pancreatitis and were being treated with supportive care and some had a period of prolonged investigation in an attempt to exclude malignancy. There was a general lack of recognition of this condition by non-hepatobiliary clinicians. As a consequence, the patients were in a poor nutritional state at presentation and required enteral or parenteral feeding prior to definitive management.

Pre-operative diagnosis of GP was based on clinical history and diagnostic investigations. Computed tomography scan (CT) was performed in all patients and typical findings included a hypodense sheet of tissue within the pancreaticoduodenal groove region...
There was no post-operative mortality. One patient suffered post-operative haemorrhage on day one and a pancreatic leak on day five requiring operative intervention and prolonged drainage. One patient developed a 15 cm pseudocyst 12 months post-operatively, managed with endoscopic transgastric drainage. One patient developed a stricture at their biliary anastomosis 6 months after PD and was treated by percutaneous transhepatic dilatation.

Follow up period was 6–90 months (median 42 months). Elimination of symptoms (relief of vomiting, weight gain and elimination of pain,) was achieved in five patients following PD; one patient continues to have chronic pain. In the two patients that underwent surgical bypass alone, gastrointestinal obstruction and biliary obstruction was relieved with subsequent weight gain however chronic pain persisted. Three patients did not have pre-operative diabetes and none of these patients were diabetic following surgery.

No patients required nutritional support beyond the peri-operative period. All patients were placed on pancrelipase tablets postoperatively to regulate bowel motions and improve nutrition.

**Literature review**

The initial search found 889 articles. Key words included groove, pancreatitis, paraduodenal, pancreadoenectomy, Whipples. Duplicate articles (n = 507) were excluded; a further 234 articles were excluded after a title and abstract review. Full text review was performed for 131 articles. Seventeen studies were included for final review, comprising 146 patients with histopathologically confirmed GP. Mean age was 42.1 years; 79% of patients were male. A smoking history was significant in 71% of patients (95% CI: 64–88%). Alcohol misuse was present in 75% of patients (95% CI: 60–86%). Most common symptoms were vomiting (60% [95% CI 46–73%]), abdominal pain (91% [95% CI 81–96%]) and weight loss (67% [95% CI: 48–81%]). PD was performed in 97.95% of cases (n = 143). Post-operative morbidity was classified using Clavien–Dindo (CD) system. Major morbidity (CD≥3A) rate was 5.5% (n = 8) for all patients, mortality rate was 2% (n = 3). Following PD, the rate of clinically significant pancreatic fistulas was 3.5% (n = 5) and mortality rate was 2.05% (95% CI: 0.6–11.5).
Whilst being minimally invasive, these interventions tend to occur in younger patients between the 4th and 5th decade of life with a prior history of alcohol misuse and a longer history of symptoms of recurrent or chronic pancreatitis. In direct contrast to malignancy of the head of the pancreas, jaundice is the least common symptom, whilst vomiting is the most frequent. The characteristic findings on CT as described above do not rule out an underlying malignancy. However, the absence of a hypodense mass on CT and EUS provides a degree of reassurance.

Treatment for patients with GP aims to relieve gastric outlet obstruction, correct malnutrition and promote weight gain.7,46 There have been reports of endoscopic modalities to address GP as an alternative to surgery including cystenterostomy, pancreatic or biliary sphincterotomy with stent placement and duodenal dilation.47–49 Whilst being minimally invasive, these interventions are not a single stage definitive treatment and also fail to rule out the possibility of pancreatic or duodenal malignancy. Chantarajansiri et al. reported seven patients with GP managed endoscopically with pancreatic duct drainage and stenting via the minor papilla. Five cases were able to achieve both clinical and imaging response to treatment. The median total number of sessions was five (3–31), with a median of four sessions (range, 3–5) performed within the first 6 months.48 In a series by Casetti et al. all three endoscopically treated patients eventually needed definitive therapy with PD.7

Given the number of interventions needed to achieve symptom control, an argument for surgical resection balances the logistical and economic benefits for a similar clinical outcome, especially considering the risk of a missed malignancy without a resection. The surgical options include bypass procedures such as gastrojejunostomy with the addition of choledochojunostomy for biliary involvement, if the patient is unfit for radical resection. These have the disadvantage of no definitive histology and leaving the diseased duodenum and head of pancreas in-situ may not completely relieve the patient’s symptoms.

The definitive surgical procedure is PD. This has several advantages. The first is that it will completely remove the affected area. In a study by Casetti et al., histopathological examination of the PD specimens in patients with GP often revealed neural proliferation characterized by hyperplastic nerves intimately integrated with proliferating islets.7 It is the aim of an en-bloc resection to remove this diseased hyperplastic neural tissue and this may assist in

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relieving the chronic pain associated with this condition. Finally, as no imaging or endoscopic assessment is able to rule in or out malignancy, PD allows a definitive diagnosis of benign disease based on the histopathological analysis of the resected specimen.

We advocate for aggressive surgical resection in a patient with a high index of suspicion for GP. Moreover, when in doubt over the possibility of a malignancy, the management decision should lean even further towards surgical resection.

In our systematic review of 17 studies (Table 3) with 146 patients of which 143 (98%) underwent PD, complete resolution of symptoms was achieved in more than 80% of patients whilst the remaining 20% achieved some improvement of their pre-intervention symptoms over a 31 month follow up.7,9,11,14-27 The major morbidity and mortality rates were 5.5% and 2% respectively, with a clinically significant pancreatic fistula rate of 3.5%. This demonstrates that PD can be performed safely, with acceptable outcomes despite a higher technical difficulty. Similarly, in our clinical series of six patients who underwent PD, five achieved complete resolution of pre-treatment symptoms, with one major complication and no mortality. We found gastroenterostomy and/or hepaticojejunostomy suboptimal for pain control and for some time, there was still the lingering question of underlying malignancy. Given the lasting patency of operative biliary and gastroenteric bypass we would still favour this approach over long-term stenting.

Given the lasting patency of operative biliary and gastroenteric bypass we would still favour this approach over long-term stenting in cases of suspected GP who for whatever reason are unable to undergo PD.

Conclusion

Whilst uncommon and underappreciated, GP appears to display a specific set of pathognomonic features and its diagnosis should be considered whenever a patient presents with signs and symptoms of gastric outlet obstruction. This is particularly the case when imaging demonstrates thickening of the duodenopancreatic interface or cystic change in the duodenal wall and there is a history of alcohol misuse and pancreatitis. The differential diagnosis of GP may also include pancreatic adenocarcinoma, duodenal lymphoma, autoimmune pancreatitis, eosinophilic duodenitis and chronic pancreatitis causing an inflammatory duodenal stricture, with every effort made to rule these out. The definitive diagnosis of GP is best established following the histopathological examination of the resected surgical specimen. Our case series whilst small, when combined with the other available literature, seems to support an aggressive surgical approach to GP. This must be balanced against the patient’s co-morbidities and the risks of undergoing a PD.

Author contributions

Joshua Teo: Project administration; visualization; writing – review and editing. Arul Suthananthan: Formal analysis; investigation; methodology; writing – original draft. Ryan Periera: Data curation; investigation; methodology; writing – original draft. Mark Bettington: Resources. Kelcee Slater: Conceptualization; data curation; formal analysis; investigation; methodology; resources; supervision; writing – original draft; writing – review and editing.

Acknowledgement

Open access publishing facilitated by University of Tasmania, as part of the Wiley - University of Tasmania agreement via the Council of Australian University Librarians.

Conflict of interest

None declared.

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