

Original Research Article

Drainage procedures for small duct disease in chronic pancreatitis: a feasible option

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ABSTRACT

Background: Surgery is the treatment of choice for intractable pain in chronic pancreatitis (CP). Drainage procedures are indicated in large duct disease whereas resectional procedures for small duct disease. Aim of this study was to assess prospectively the feasibility of drainage procedures in patients with CP with small duct disease.

Methods: All consecutive patients with CP with small duct disease were included in the study. All patients underwent surgical intervention (lateral pancreaticojejunostomy with head coring). Primary outcome measures were pain relief and morbidity. These outcomes were compared with patients with CP with large duct disease.

Results: 114 patients with CP underwent surgery. Of these 24(21.05%) patients had CP with small duct disease and 90(78.95%) patients had large duct disease. Demographic profile of the two groups was comparable. Mean pain scores were similar (47.75 ± 6.85 versus 51.38 ± 7.40 ; $p = 0.14$). Patients with large duct disease had higher incidence of diabetes mellitus (44.44% versus 8.33%; $p = 0.02$), but exocrine insufficiency was similar. All patients had calcifications in both the groups. Mean intraductal pressures measured intraoperatively were significantly high in patients with large duct disease (22.99 ± 5.65 versus 18.33 ± 3.52 ; $p = 0.001$). Frequency of complications at presentation were similar in both the groups ($p = 0.29$). Surgery relieved pain in 21/24 (87.5%) patients with small duct disease and 82/90 (91.11%) patients with large duct disease. Mean post-operative pain scores in small duct disease group (7.50 ± 9.61 versus 51.38 ± 7.40 ; $p < 0.001$) and large duct disease group (5.14 ± 7.88 versus 47.75 ± 6.85 ; $p < 0.001$) were significantly reduced when compared to preoperative pain scores. Incidence of postoperative complications was similar in both groups (16.66% versus 14.44%).

Conclusions: Drainage procedures (lateral pancreaticojejunostomy with head coring) is a feasible for CP patients with small duct disease with good pain relief.

Keywords: Chronic pancreatitis, Drainage procedures, Lateral pancreaticojejunostomy

INTRODUCTION

Chronic pancreatitis (CP) is defined as a progressive inflammatory disease characterized by irreversible morphologic changes that typically cause pain and/or permanent loss of function.¹ Primary indication for

surgery in CP is intractable pain and disease related complications. Based on the pathophysiology of pain in CP, two types of procedures are described: Drainage procedures and Resectional procedures or a combination of both.^{2,3} Drainage procedures were developed on the basis that pain in CP is due to ductal hypertension and

proper drainage would decompress it. But 15-45% of patients do not have permanent pain relief after drainage operations.⁴ The head of the pancreas has been referred to as the pacemaker of the disease.⁵ Hence resectional procedures including either total or partial resection of head with drainage procedures are used. Only resectional procedures are used when disease is localized. But no procedure assured complete permanent pain relief.

For the purpose of surgery, CP is classified as large duct disease (where main pancreatic duct is dilated) and small duct disease (where main pancreatic duct is not dilated). But there is no clear definition of small duct disease in literature. Large duct disease is considered the classic indication for drainage procedures and resectional procedures are advocated for small duct disease.⁶⁻¹⁰ But the disadvantage with resectional procedure is loss of pancreatic parenchyma with resultant deterioration of endocrine and exocrine function.^{11,12} Hence to preserve pancreatic function, parenchymal sparing procedures are necessary for pain relief. Hence drainage procedures are tried in small duct disease with preservation of pancreatic parenchyma. There are very few studies in literature regarding the role of drainage procedures in CP with small duct disease. Hence, we have done this study to assess the pain relief with drainage procedures in small duct disease.

METHODS

All the diagnosed CP patients admitted for surgery during the period from June 2009 to July 2012 were included in the study. The criteria for inclusion was significant pain not responding to medical treatment, and those patients with complications amenable to surgery. Those patients with suspected or proved malignancy in the background of CP were excluded from the study. Demographic characteristics were recorded. Severity of pain was assessed using an established scoring system (Izbicki). Patients were assessed clinically for exocrine and endocrine dysfunction. They were considered to have exocrine dysfunction if they have loose, greasy, foul smelling stools that are difficult to flush which constitutes steatorrhoea. No laboratory criteria were used to assess exocrine insufficiency. Endocrine insufficiency was considered if they were diabetic on oral hypoglycemic agents or on insulin therapy. In not diagnosed as diabetes mellitus previously, further assessment was done using Oral glucose tolerance test (OGTT). Baseline haematological, biochemical investigations were done.

All patients underwent contrast CT scan abdomen for evaluation of the pancreas. Imaging characteristics of the gland was noted in terms of atrophy of the gland, diameter of main pancreatic duct (MPD), ductal or parenchymal calcifications. Complications of CP such as duodenal or biliary obstruction, splenic or portal vein thrombosis, pleural effusions and ascites were noted if present. Based on the size of the main pancreatic duct, patients were classified into two groups. Patients were

classified as large duct disease (MPD diameter >5mm) and small duct disease (MPD diameter ≤5mm). Definitive surgery was planned based on the morphology of the gland. Patients with large duct disease had drainage procedure (Longitudinal pancreaticojejunostomy) with or without head coring, whereas patients with small duct disease underwent longitudinal pancreaticojejunostomy with head coring. Patients underwent additional procedure based on their complications. Intraoperative ultrasound was used to identify the main pancreatic duct when necessary, especially in small duct disease patients.

Postoperatively patients were followed up for a minimum 1 year. Outcomes in two groups were measured in terms of pain relief and complications. Postoperative pain relief was considered complete if patient did not have any pain episode in first year of follow up. Major complications were defined as those requiring intervention and minor complications are those not requiring intervention. Outcomes in two groups were analyzed and compared.

RESULTS

A total of 116 patients were included in the study. Of these, two patients were excluded as their postoperative pancreatic tissue biopsy was suggestive of malignancy. After exclusion, 114 patients were available for final analysis. Out of 114, 90 (78.95%) patients were classified as large duct disease and 24 (21.05%) patients were classified as small duct disease.

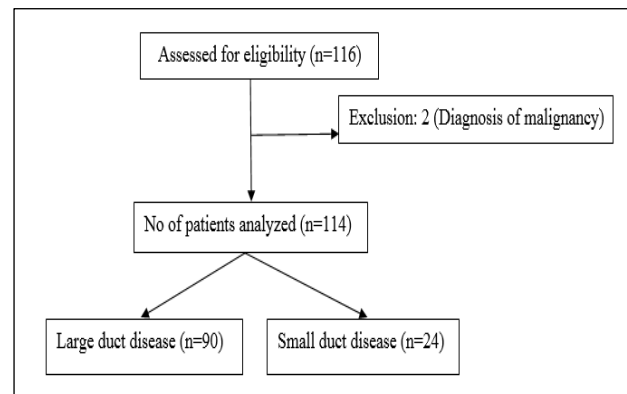


Figure 1: Consort diagram.

Patient characteristics

The characteristics of the patient treated in each group are shown in Table 1. There were no significant differences in demographic characteristics. Ethanol was the etiological factor in more than 60% patients in both groups. Mean preoperative pain score (Izbicki score) was similar.

Incidence of exocrine dysfunction was similar in two groups whereas the incidence of endocrine dysfunction was significantly high in patients with large duct disease (44.4% versus 8.3%; $p = 0.02$). Overall incidence of

disease related complications was similar in two groups. But the incidence of complications such as duodenal obstruction, pancreatic pleural effusion and pancreatic ascites were high in patients with small duct disease.

Table 1: Patient characteristics.

	Large duct disease (n = 90)	Small duct disease (n = 24)	P value
Patient characteristics			
Male	54 (60.0%)	16 (66.6%)	0.67
Age (Years) (Mean±SD)	33.69±13.51	32.17±14.73	0.74
Etiology: Ethanol	60 (66.6%)	16 (66.6%)	1.00
Pain scores			
Frequency of pain	62.22±15.6	68.75±11.3	0.14
Visual analog score	70.22±6.90	72.50±7.53	
Requirement of analgesics	17.35±3.52	18.75±2.26	
Loss of work	40.44±14.53	45.83±17.9	
Mean score	47.75±6.85	51.38±7.40	
Pancreatic function			
Steatorrhoea	20 (22.22%)	2 (8.33%)	0.28
Diabetes mellitus	40 (44.40%)	2 (8.33%)	0.02
Complications			
Pseudocyst	12 (13.33%)	4 (16.66%)	0.77
Biliary obstruction	10 (11.11%)	2 (8.33%)	0.78
Duodenal obstruction	0 (0.00%)	4 (16.66%)	0.005
Spenic/portal vein thrombosis	8 (8.88%)	2 (8.33%)	0.95
Pleural effusion	2 (2.22%)	4 (16.66%)	0.005
Ascites	2 (2.22%)	4 (16.66%)	0.005
Pancreatic gland characteristics			
MPD diameter (mm) (Mean) (Range)	9 (5-12)	4 (3-5)	0.0001

Imaging showed calcifications in all patients in both groups. Pancreatic ductal diameter was measured on CT scan. Mean ductal diameter in the study was 7.92 mm (Range: 4-12). Mean ductal diameter in the small duct disease group was 4.0 (Range 3-5) and in large duct disease was 9.0 mm (5-12).

Postoperative outcomes

Outcomes measured were pain relief and postoperative complications. Preoperative and postoperative pain scores in two groups are shown in Table 2. Pain relief was

complete in 91.1% in large duct disease and in 87.5% in small duct disease group.

Table 2: Pre and Postoperative pain scores.

	Preoperative pain score	Postoperative pain score	P value
Large duct disease			
Frequency of pain	62.22±15.6	8.33±13.05	<0.001
Visual analog score	70.22±6.90	8.00±12.54	<0.001
Requirement of analgesics	17.35±3.52	4.35±6.86	<0.001
Loss of work	40.44±14.53	12.35±9.89	<0.001
Mean score	40.44±14.53	8.46±4.65	<0.001
Small duct disease			
Frequency of pain	68.75±11.3	14.58±19.82	<0.001
Visual analog score	72.50±7.53	9.17±6.64	<0.001
Requirement of analgesics	18.75±2.26	6.25±4.72	<0.001
Loss of work	45.83±17.9	9.62±7.68	<0.001
Mean score	51.38±7.40	9.47±5.67	<0.001

Post-operative pain scores were significantly lower than preoperative pain scores ($p \leq 0.001$) in both groups.

Table 3: Postoperative complications.

	Large duct disease (n=90)	Small duct disease (n=24)	P value
All complications	13 (14.44%)	4 (16.66%)	0.29
Major	2 (2.22%)	1 (4.16%)	
Bleeding	1 (1.11%)	1 (4.16%)	
Intestinal obstruction	1 (1.11%)	0 (0.00%)	
Minor	11 (12.22%)	3 (12.48%)	
Wound Infection	6 (6.66%)	2 (8.33%)	
Subacute small bowel obstruction	1 (1.11%)	1 (4.16%)	
Pulmonary	2 (2.22%)	0 (0.00%)	
Paralytic ileus	2 (2.22%)	0 (0.00%)	
Mortality	1 (1.11%)	0 (0.00%)	

Postoperative complications in two groups are shown in Table 3. The incidence of overall complications in two groups were similar ($p=0.29$). Two patients in large duct disease and one patient in small duct disease had major complications. Proportion of patients with minor complications in two groups was similar. There was one mortality in large duct disease.

DISCUSSION

The main indication for surgery in chronic pancreatitis is intractable pain. The goals of surgical management are to relieve pain and address complications such as biliary or duodenal obstruction, while preserving as much as possible exocrine and endocrine function. The specific choice of surgical procedure is usually determined by anatomic findings, although there may be several reasonable alternatives. Useful features in considering surgical options are the presence of large duct versus small duct disease as well as the presence and location of an inflammatory mass. Head of pancreas is considered as a pacemaker of disease. Classically for large duct disease decompressive or drainage procedures are preferred. It may be a longitudinal pancreaticojejunostomy (modified Peustow) or a hybrid procedure (Frey – head coring with pancreaticojejunostomy). Whereas for small duct disease resectional procedures are advised. But resectional procedures are associated with worsening of exocrine and endocrine function. More than 50% patients develop exocrine and endocrine insufficiency on follow up with resectional procedures.^{13,14}

Izbicki introduced a procedure for small duct disease which combines excavation of the pancreatic head with a V-shaped longitudinal wedge resection, followed by lateral pancreaticojejunostomy of the pancreatic body and tail. The pain relief and preservation of endocrine and exocrine function during the follow-up period were comparable to those reported in studies of lateral pancreaticojejunostomy in patients with a large duct disease.

The operation has similar morbidity and mortality in comparison to the traditional lateral pancreaticojejunostomy. Complete pain relief was reported in upto 90%.¹⁵ About 40% developed diabetes whereas exocrine function was well preserved in 80%.¹⁶ But this procedure is technically demanding.

Madura et al reported the use of lateral pancreaticojejunostomy after small ducts were enlarged by insertion of a wall stent. The pancreatic duct was progressively dilated with plastic stents and then a 10-mm expandable metal stent was placed. Two weeks after the metal stent was inserted, a mucosa-to mucosa lateral pancreaticojejunostomy was performed with removal of the stent. Even though pain relief was adequate, it cannot be applied to all patients successfully.¹⁷

Hence a surgical procedure with adequate pain relief and without worsening of pancreatic function is needed for patients with small duct disease. We have applied drainage procedure with varying degrees of head coring for patients with small duct disease and compared outcomes with drainage procedures in large duct disease.

In the study, Majority of patients in both groups had complete pain relief with drainage procedures. Pain relief

was complete in 91.1% in large duct disease and in 87.5% in small duct disease group. Mean postoperative pain scores in both small and large duct disease groups were significantly reduced when compared to preoperative scores. Postoperative morbidity was similar in two groups. Similar study by Ramesh H et al included 45 patients with small duct disease and 212 with large duct disease. Drainage procedures relieved pain in 94% in small-duct disease, and 91% with large-duct disease over a median follow-up greater than 30 months. Functional results and morbidity were also comparable in two groups.¹⁸

CONCLUSION

Drainage procedures (lateral pancreaticojejunostomy with head coring) is a feasible option for CP patients with small duct disease with good pain relief.

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