

ORIGINAL ARTICLE

# Prior Acute Pancreatitis Is the Most Common Cause of Obstructive Pancreatitis: A Surgical Series of Distal Pancreatectomy

<sup>1</sup>Daniel K Chan, <sup>2</sup>Michael L Kendrick, <sup>1</sup>Michael B Farnell, <sup>2</sup>Santhi Swaroop Vege

Division of <sup>1</sup>Gastroenterology and Hepatology, Department of <sup>2</sup>Surgery, Mayo Clinic, Rochester, Minnesota

## ABSTRACT

**Objectives** The natural history of obstructive pancreatitis is poorly known. We analyzed a consecutive surgical series of distal pancreatectomy to better characterize obstructive pancreatitis. **Methods** We retrospectively reviewed all patients with obstructive pancreatitis undergoing distal pancreatectomy at our institution from 1990-2005 excluding patients with pancreatic cancer. Obstructive pancreatitis was defined as chronic pancreatitis with: (1) stricture of the main pancreatic duct; (2) normal-appearing pancreas downstream to the stricture, and (3) dilatation of the pancreatic duct upstream to the stricture. Clinical charts were reviewed to determine prior history of acute pancreatitis, and patients were grouped by history of acute pancreatitis. Chi-square, Fisher's exact, and student's t-test analysis were used to evaluate differences in demographics and presenting characteristics between groups. **Results** Forty-eight (5.1%) of 946 patients had obstructive pancreatitis with 39 (81.3%) patients with prior acute pancreatitis and 9 (18.8%) without. Necrotizing pancreatitis was reported in 36% of the patients in the acute pancreatitis group. No necrosis was observed in those individuals without history of acute pancreatitis. **Conclusions** Prior acute pancreatitis was the most common cause of obstructive pancreatitis; however, nine patients had isolated strictures of the pancreatic duct without prior acute pancreatitis which can be labeled as focal chronic pancreatitis, distinct from other types of chronic pancreatitis both morphologically and etiologically.

## INTRODUCTION

Obstructive pancreatitis (OP) is a form of chronic pancreatitis (CP) that is characterized by dilatation of the ductal system proximal to an occlusion of the main pancreatic duct [1]. It has been described as a distinct pathologic entity with atrophy of acinar cells and replacement with fibrous tissue in the gland proximal to the obstruction, with varying degrees of calcification [2-7].

The most common cause of obstruction within the pancreatic duct is pancreatic cancer. Less common etiologies include cystic neoplasm including neuroendocrine tumors, posttraumatic scarring of the pancreatic duct, and Sjögren syndrome [1, 2, 8, 9]. While OP has also been described as a sequela of acute pancreatitis (AP), particularly with significant necrosis involving the main pancreatic duct, there have been very few reports about the frequency, clinical description, or the natural history of OP after AP

[10, 11]. It is not clear if some cases of OP are due to focal fibrosis of the main pancreatic duct, and if such types of OP are in fact localized CP or an altogether a different pathologic entity.

With this background, we retrospectively studied consecutive patients undergoing distal pancreatectomy (DP) for OP to identify those with and without prior AP, with the latter group (without prior AP) comprised of patients with focal CP presenting as OP.

## MATERIAL AND METHODS

Inclusion criteria for OP were presence of all of the following: (1) stricture of the pancreatic duct, (2) relatively normal looking pancreas downstream to the stricture, and (3) dilatation of the pancreatic duct upstream to the stricture. Cancers found before, during, or after the surgery on pathology were excluded from the study to focus on OP due to AP or CP. Based on the clinical history from the charts of prior AP, the cohort was divided into two groups: one with (AP group) and the other without a history of prior AP (non-AP group). Demographics, medical co-morbidities, social history, symptoms, etiology, and surgical presentations were compared between the two groups using chi-square, Fisher exact test, and Student's *t*-test analysis (**Table 1**). Analysis was performed using JMP 10.0 software (SAS Institute Inc., Cary, NC). Each patient from this database provided written consent for their records to be reviewed, and this study was performed under Mayo Clinic Institutional Review Board approval (#06-005800) prior to initiation.

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**Correspondence** Santhi Swaroop Vege  
Division of Gastroenterology and Hepatology  
Mayo Clinic

200 First St SW

Rochester, MN 55905

**Phone** +507-284-2175

**Fax** 507-266-0350

**E-mail** vege.santhi@mayo.edu

**Table 1.** Chronic Obstructive Pancreatitis Patient Characteristics Grouped by History of Acute Pancreatitis

	History of Acute Pancreatitis	No History of Acute Pancreatitis <sup>a</sup>
<b>Demographics</b>		
Number of cases	39	9
Male	25 (64.1%)	6 (66.7%)
Female	14 (35.9%)	3 (33.3%)
Age at surgery, mean (SD), years	49.8 (15.5)	48.7 (10.6)
BMI, mean (SD)	27.4 (7.5)	24.1 (5.4)
<b>Co-morbidities</b>		
Diabetes	2* (5.1%)	3* (33.3%)
Gallstones	10 (25.6%)	2 (22.2%)
<b>Social history</b>		
Alcohol Use	25 (64.1%)	8 (88.9%)
Tobacco Use	24 (61.5%)	7 (77.8%)
<b>Symptoms</b>		
Abdominal Pain	38 (97.4%)	7 (77.8%)
Nausea/Vomiting	4 (10.3%)	2 (22.2%)
Weight Loss	4* (10.3%)	6* (66.7%)
<b>Surgical Presentation</b>		
Prior cholecystectomy	29 (74.3%)	7 (77.8%)
Prior necrotizing pancreatitis documented	14* (35.9%)	0* (0.0%)
Pseudocyst	23 (59.0%)	5 (55.6%)
Time in months between initial pancreatitis diagnosis and distal pancreatectomy, mean (SD)	34.7 (56.1)	43.1 (63.1)

BMI body mass index (calculated as weight in kilograms divided by height in meters squared)

<sup>a</sup>Data are presented as number (percentage) of patients unless otherwise indicated.

\*Denotes statistical significance with  $P < 0.05$

## RESULTS

Forty-eight (5.1%) of 946 patients undergoing DP from 1990-2005 had OP. All 48 patients had evidence of CP by operative or surgical pathology report. Thirty-nine (81.3%) patients had a history of AP, and 9 (18.4%) patients had no such history. There were no significant differences in the patient characteristics between the two groups. Of the 39 patients with AP, only 14 (35.9%) patients had documentation of prior pancreatic necrosis in their medical record. In the non-AP group, diabetes and weight loss were seen more than in the AP group (**Table 1**).

## DISCUSSION

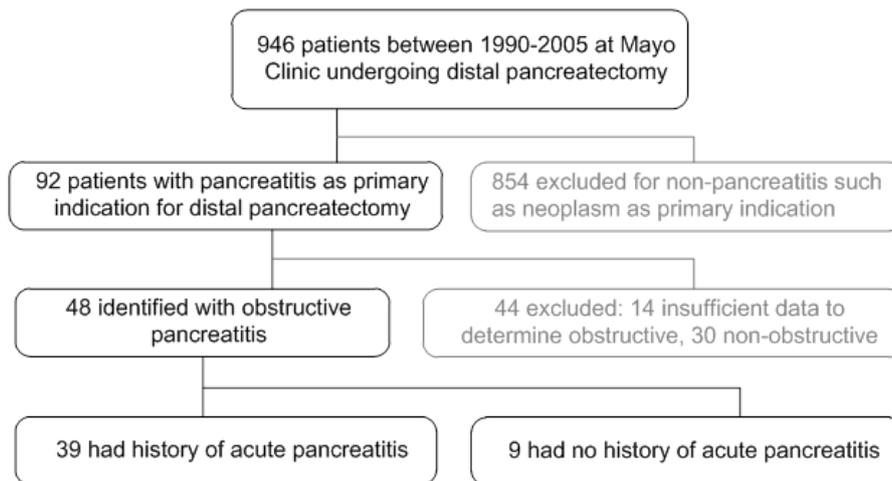
This retrospective review of 48 consecutive DP patients with OP from non-malignant causes revealed that prior AP (81.3%) was the most common cause. The remaining patients, about one-fifth, had isolated strictures of the main pancreatic duct. We hypothesized that these patients had focal CP not associated with prior acute pancreatitis. No other causes such as main duct intraductal papillary mucinous neoplasm (IPMN) or any other benign causes were seen in this surgical cohort. There was no difference in the age, sex, or body mass index between the two groups in our series. Our three diagnostic criteria were established from the few reports describing OP [10]. Besides being clinically distinct from other types of CP, OP is a distinct pathologic entity. The pattern of fibrosis in OP is diffusely inter- and intra-lobular and distinct from alcoholic, hereditary, and autoimmune pancreatitis [2]. A series comparing non-alcoholic duct destructive CP (probable type 2 autoimmune pancreatitis) with OP and alcoholic CP also described the pathologic characteristics of OP that included more diffuse and homogeneous topography of the

pathologic findings, rare calcification (11%), less intense periductal fibrosis, less intense inflammatory infiltrate, and the absence of mast cells [12]. None of our patients had hereditary or autoimmune pancreatitis (**Figure 1**).

After excluding cancers and other malignant tumors, main duct IPMN, and other rare causes, the important question becomes the relationship between OP and AP, and then, whether some cases of OP are due to a disease like CP in a very focal area involving the main pancreatic duct. While OP due to prior necrotizing AP has been reported, a recent review on fibrosis of the pancreas made no mention of severe necrotizing AP as a cause of OP [13]. One series of OP due to prior severe AP reported that severe necrosis may result in disconnected pancreatic duct syndrome, whereas varying degrees of less severe necrosis or even interstitial type of AP can lead to ductal strictures and then to OP [10].

Only a third of those with prior AP in our study had necrotizing pancreatitis. Some patients with prior necrosis could have been missed due to the inability to obtain the old CT scans at the time of AP, and some pseudocysts in this group could have indeed been walled off necrotic collections (thus making those cases as necrotizing AP) and/or the strictures of the pancreatic duct and resultant OP following interstitial AP, as suggested by Howard *et al.* [10].

The more important question of whether a focal type of CP can cause OP needs more discussion. Acquired fibrous strictures of the pancreatic duct were listed as a cause of OP by Klöppel *et al.* A question was raised during discussion on the surgical series of Howard *et al.* whether the OP was indeed a CP that caused AP as part of exacerbations.



**Figure 1.** Case ascertainment of individuals with obstructive pancreatitis from 1990-2005 at Mayo Clinic undergoing distal pancreatectomy.

However, the completely normal proximal pancreas and changes confined to the distal pancreas were the reason why we diagnosed the patients in our study as having OP [3, 10]. While it may be possible that the patients with OP sustained a clinically occult or non-diagnosed AP which led to stricture of the pancreatic duct, the question remains: Can CP start in a focal manner and involve only a limited portion of pancreatic duct? There is no answer to this from the literature. The 9 patients in our series lend support to the fact that such a focal CP did exist. Diabetes and weight loss were more common in this group compared to those with prior AP, suggesting that this may be a chronic process different from alcoholic CP or autoimmune pancreatitis and may be a distinct type of CP due to some unknown cause.

Our study being retrospective has the inherent limitations of such a study. These include missing remote history of AP due to recall problems, inaccurate diagnosis of necrosis due to lack of original CT scans at the time of initial AP, and the biased population of operated patients. However, an event like AP is not often forgotten by a patient because of the significant symptoms and ease of diagnosis.

In spite of the several limitations, we feel the present study demonstrated the following important findings in patients with OP who underwent distal pancreatectomy: (1) prior AP was the most common cause for OP (81.3%); (2) only 36% of patients with prior AP had necrotizing AP; and (3) nine out of 48 patients (18.8%) had isolated strictures of the pancreatic duct without prior AP and can be labeled as focal CP, which is distinct from the other types of CP both morphologically and etiologically. This calls for a prospective study of all cases with focal strictures of pancreatic duct without any obvious explanation, as it may be different disease altogether.

### Conflicting Interest

The authors had no conflicts of interest

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