

# Fusion Drainage of Pseudocyst and Pancreatic Duct in Chronic Pancreatitis with Pseudocyst: A Case Report and Literature Review

Ke Z<sup>#</sup>, Xiong J<sup>#</sup> and Li Y<sup>\*</sup>

Department of Vascular Surgery, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, P.R. China

<sup>#</sup>Equal Contribution

## Abstract

Pseudocyst is a common complication of acute and chronic pancreatitis, which occurs in about 30-40% of adult patients with chronic pancreatitis. We present the case of a 43-year-old male diagnosed with chronic pancreatitis (alcohol related) complicated by a pseudocyst located in the head of the pancreas and manifested with abdominal pain and loss of weight. Management of chronic pancreatitis with pseudocyst depends on pancreatic pathology, diameter of the main pancreatic duct, size of the pseudocyst, and the expertise of the department. Non-surgical treatment, which is the basic therapy, is inferior to endotherapy and operation. The obstruction of the main pancreatic duct being resolved, the abdominal pain and insufficiency of exocrine and endocrine function could be alleviated. Our drainage procedure described herein, making the pseudocyst and main pancreatic duct fusion and function like a hollow organ, may be a useful, even a simpler surgical technique, that could relieve symptoms and offer quality of life to patients.

**Keywords:** Chronic pancreatitis; Pseudocyst; Cystojejunostomy; Pancreaticojejunostomy; Fusion drainage

**Abbreviations:** CP: Chronic Pancreatitis; CECT: Contrast Enhanced Computed Tomography; CT: Computed Tomography; MRCP: Magnetic Resonance Cholangiopancreatography; ISGPs: International Study Group on Pancreatic Surgery; MPD: Main Pancreatic Duct; POD: Postoperative Day

## Introduction

Recent epidemiological studies have reported an increased incidence of chronic pancreatitis [1]. Chronic Pancreatitis (CP) manifests as an irreversible inflammatory disease of the pancreas, leading to growing destruction of pancreatic parenchyma and progressive fibrosis [2]. It presents upper abdominal pain with or without weight loss, and steatorrhea or diabetes mellitus, caused by exocrine and endocrine insufficiency, respectively. The primary diagnosis is based on clinical features and radiographic findings and laboratory tests of pancreatic function, especially the abdominal Contrast Enhanced Computed Tomography (CECT). Common complications in patients with long-time CP include pseudocyst, common bile duct stenosis, duodenal stricture, ascites, pleural effusion, portal hypertension and pancreatic cancer, in which pseudocyst can be detected in about 30-40% of patients [3]. Common indications for surgical intervention include refractory pain that cannot be relieved by conservative therapy, pancreatic duct dilation for its stenosis and stone, duodenal and biliary obstruction, pancreatogenous portal hypertension, pleural effusion and ascites, symptomatic pseudocyst and suspected cancer. Surgical operation is the major treatment at present, and the methods may be different according to the pathology of the pancreas.

In this case, the patient had long-standing abdominal pain and loss of weight that indicated the exocrine insufficiency of the pancreas. This presentation made a key contribution to the lower quality of his life. Abdominal CECT showed calcification of the pancreatic parenchyma, intraductal stones in the head and tail of the pancreas and a dilated main pancreatic duct (about 10 mm). The pseudocyst, with a diameter as large as 10 cm, was in the head of the pancreas. Conservative therapy, such as alcohol abstinence, pancreatic enzyme replacement and analgesia, produced no obvious effect, so that it was imperative for the patient to undergo an operation. The operation we conducted was different from the conventional drainage procedure. In general, past practice had been

to do a cystojejunostomy or a pancreaticojejunostomy in most patients. But in this case, both aspects were taken into consideration, and therein lay our difference. First, we cut the wall of the pancreatic pseudocyst and took a sample piece for intraoperative quick pathological examination. Then, we cut the main pancreatic duct and took all of the stones out. Finally, we integrated the main pancreatic and pseudocyst into a whole like a tubular organ for fusion drainage, this being the key point. In this way, pressure in the main pancreatic duct was decreased and the abdominal pain alleviated. In addition, as the cyst fluid drained into the jejunum, the pseudocyst vanished, which was beneficial in preventing from the biliary stricture, duodenal stenosis with the cyst growing. There was only one anastomosis using above method, and it was easy to finish.

## Case Report

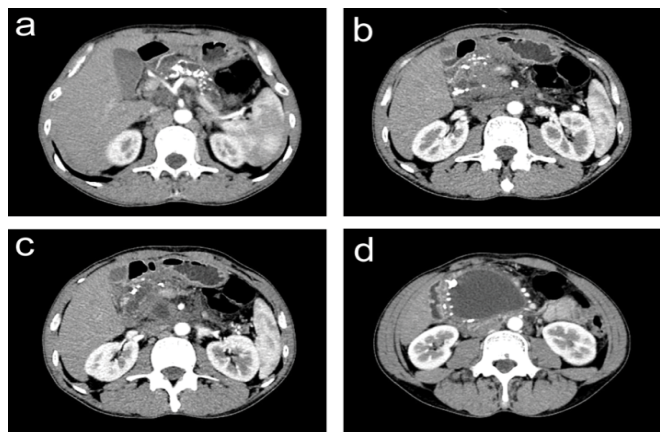
A 43-year-old male patient, who was diagnosed with chronic pancreatitis elsewhere, was admitted with abdominal pain and weight loss lasting for about eight months to our department. He had a long-time consumption of alcohol about 300 milliliters per day and of cigarettes, about half package every day. Physical examination revealed no abnormality. Laboratory tests showed an elevated level of amylase and lipase, 474 U/L and 207 U/L, respectively. The plasma albumin, CA-199 and IgG4 were at a normal level. Abdominal CECT showed a low-density cyst with no enhancement, measuring about 8 × 8 cm, located in the pancreatic head, main pancreatic duct stones with dilatation of the distal pancreatic duct, and calcification and atrophy of the pancreas (Figure 1). Abdominal contrast enhanced Magnetic Resonance Cholangiopancreatography (MRCP) showed intraductal stones, a

**\*Corresponding author:** Li Y, Department of Vascular Surgery, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, P.R. China, Tel: +86-13808689898; E-mail: [Liyiqing599@163.com](mailto:Liyiqing599@163.com)

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**Figure 1:** Abdominal CECT showed main pancreatic duct stones with dilatation of distal pancreatic duct, calcification and atrophy of pancreas (a, b, c). A cyst, measuring about 8 × 8 cm, was located in the head of pancreas (d).

dilated main pancreatic duct and pseudocyst (Figure 2). A diagnosis of chronic pancreatitis with pseudocyst was made based on the above clinical and morphological criteria. Preoperative octreotide was given at a dose of 100 milligram per 8 hours subcutaneously for 5 days considering the high level of amylase and the obstructive pancreatitis.

### Surgical procedure

Under general anesthesia, an upper midline incision was made. A cystic lesion was in the head of the pancreas and pancreatic atrophy was confirmed. We could touch the calcification of the pancreas and MPD stones. First, we took a piece of the pseudocyst wall and sent it for intraoperative fast pathologic examination. There was no cystic hemorrhage or cystic wall noddles and the cyst fluid was clear. Thirty minutes later, the intraoperative fast pathologic examination showed fibrous tissue with no epithelium, confirming the correct preoperative judgment. Second, the main pancreatic duct was cut from the pancreatic neck near the bottom of the pseudocyst to the tail of the pancreas, and all the stones were taken out. Also, we enlarged the incision of the cyst wall in the direction of the pancreatic neck and joined this into the main pancreatic duct (Figure 3). Finishing the procedures mentioned above, the new technique we recommend in this article was achieved, which was the fusion of the main pancreatic duct and pancreatic pseudocyst as a tubular structure like a gastrointestinal tract for the later anastomosis. Third, the proximal jejunum was divided by almost 20 cm from the Treitz ligament. The distal jejunum was lifted through the antecolic route to make a side-to-side pancreaticojejunostomy and cystojejunostomy with interrupted suture (Figure 4), but what should be stressed is that there was just one anastomosis for internal drainage considering the fusion mentioned above. Finally, a Roux-en-Y enteroenterostomy was made at approximately 50 cm from the pancreaticojejunostomy. Two drains were placed routinely superior and inferior to the anastomosis and exteriorized via the lateral abdominal wall.

### Postoperative course

Postoperatively, the drainage amylase was measured postoperative day 1, day 2 and day 3. No pancreatic fistula was detected according to the International Study Group on Pancreatic Surgery (ISGPS) definition [4]. In addition, octreotide was continued (dose 100 mg every 8 hours) for 5 days. At POD 4, an abdominal CECT was done

for postoperative reexamination. No peripancreatic collection was detected and the pseudocyst was almost vanished (Figure 5).

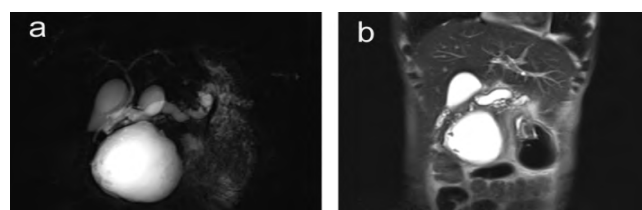
### Discussion

#### Histomorphology

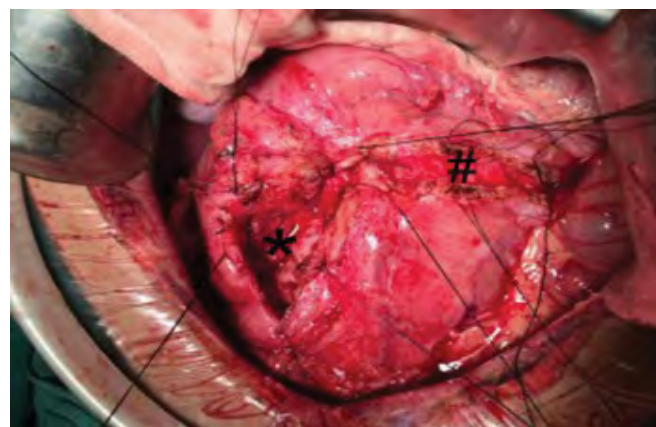
Histologically, CP is characterized by mononuclear cell infiltration and the activation of pancreatic stellate cells with subsequent fibrosis and acinar and islet cell loss [5-7]. Morphologically, it is characterized by irregular dilation of the main pancreatic duct and branch pancreatic ducts, calcification of ducts and parenchyma, irregularly shaped parenchyma and glandular atrophy [8]. A pseudocyst is a sac rich in pancreatic juice and is surrounded by a wall of fibrous tissue without epithelium. Most chronic pseudocysts occur in patients with alcoholic chronic pancreatitis and are in the body of the pancreas [9,10].

#### Etiology

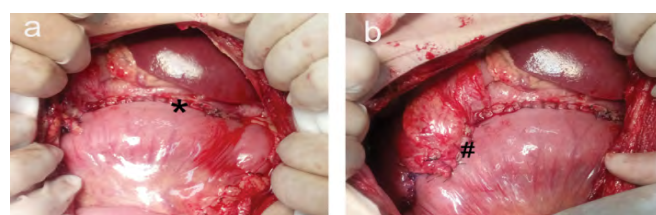
The etiology of CP is complex and has been traditionally classified as alcohol, hereditary, obstruction, hyperlipidemia, and idiopathic



**Figure 2:** Abdominal MRCP showed intraductal stones, dilated main pancreatic duct and pseudocyst in the head of pancreas.



**Figure 3:** The main pancreatic duct (#) and pseudocyst (\*) was fused as a whole according to its relative position.



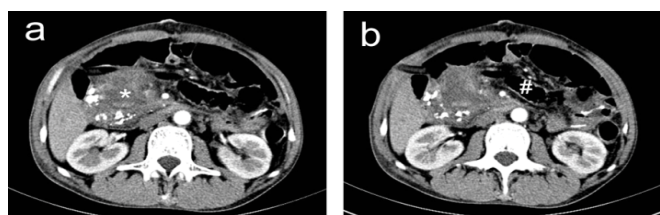
**Figure 4:** Pancreaticojejunostomy (a, \*) and cystojejunostomy (b, #) was performed with interrupted sutures. There was just one anastomosis.

(Table 1) [11]. The TIGAR-O risk factor classification system [12] has been developed with the premise that the risk of developing CP in an individual is determined by the presence of one or more risk factors. Alcohol and smoking contribute greatly to the development of CP. Alcohol is the most common risk factor and accounts for 44% to 65% of cases [13-16]. Most of the pseudocysts are complications of pancreas-related diseases, for example, acute and chronic pancreatitis, pancreas injuries and postoperative pancreatic fistula.

### Disease presentation and diagnosis

The clinical presentation of CP includes abdominal pain, steatorrhea, and diabetes, as well as numerous acute and chronic complications [17-19]. Most pseudocysts remain asymptomatic and uncomplicated. Abdominal pain and distension are the predominant clinical manifestations. Other clinical presentations include gastric dysmotility, cyst infection [20], acute gastrointestinal bleeding [21], splenic vein thrombosis [22], pancreatic ascites and pleural effusion.

The definitive diagnosis of CP is sometimes difficult, especially in the early stages. CP is usually diagnosed with historical clinical information, radiographic findings and laboratory tests of pancreatic function. In current practice, a Computed Tomography (CT) scan of the pancreas is often the initial investigation when CP is suspected, because it has relatively good sensitivity for diagnosing moderate-to-severe CP [23-25]. In advanced cases, a CT scan can reveal calcifications, atrophy, pancreatic duct stones and ductal dilation. The diagnosis of pseudocyst is usually based on historical clinical information and the results of radiographic studies. The CT findings of pseudocyst are round or oval lesions, with water-like density, smooth cystic border and a thin cystic wall with no enhancement in the contrast scan. Moreover, CT is useful in distinguishing the diagnosis between pseudocyst and cystic tumors. On the contrary, cystic tumors are lesions with micro-capsules, wall nodules protruding into the cavity and sometimes a calcified cystic wall with slight enhancement [26,27].



**Figure 5:** Abdominal CECT showed no peripancreatic collection was detected and the pseudocyst was almost vanished (a, \*). Proximal jejunum (b, #), which was used for pancreatojejunostomy, lied in front of the superior mesenteric artery.

Traditional Classification
Alcohol, hereditary, obstruction, hyperlipidemia, idiopathic.
TIGAR-O
Toxic-metabolic: Alcohol, Tobacco smoking, Hypercalcemia, Hyperlipidemia, Chronic renal failure, Medications, Toxins
Idiopathic: Early onset, Late onset, Tropical
Genetic mutations: <i>PRSS1</i> , <i>CFTR</i> , <i>SPINK1</i> , Others
Autoimmune: Isolated, Syndromic
Recurrent and severe AP-associated CP: Postnecrotic (severe AP), Vascular disease/ischemic, Postirradiation
Obstructive: Pancreas divisum, Sphincter of Oddi disorders, Duct obstruction (eg: tumor), Posttraumatic pancreatic duct scars

**Table 1:** Classification system for etiology and risk factors for CP<sup>12</sup>.

### Treatment

The etiology and pathology of chronic pancreatitis are complicated, and the medical management differs depending on individual stages, which are classified into compensated, transitional and uncompensated phases [28]. Lifestyle guidance, such as alcohol and smoking abstinence, should be pursued the first time a person is diagnosed with chronic pancreatitis, for it is the basis of a successful management plan. With the exacerbation of exocrine and endocrine function, and the emergence of complications, not only conservative therapy, but also more aggressive treatments, such as endoscopic therapy and surgery may be carried out during the disease. Upper abdominal pain, presenting in most patients, poses the major challenge in chronic pancreatitis. With its progress, drugs, even nerve blocks cannot come into play. On the other hand, long-time use of opioids leads to tolerance and dependence. It is suggested that with the obstruction of the pancreatic duct resolved, abdominal pain in most patients can be controlled. Endoscopic and surgical interventions can play a role in some selected patients. A Dutch study reported complete or near complete resolution of pain in patients who underwent surgery [29]. One of the randomized controlled trials comparing surgery with endotherapy reported better pain-easement in the surgery cohort [30]. Research showed that endoscopic therapy was inferior to surgery for pain relief in patients with a dilated pancreatic duct. However, we are also aware that, while the optimal timing of surgery in chronic pancreatitis is comprehensively debated, evidence supports early intervention before diabetes mellitus occurred [31].

With the development of technology, endoscopic techniques have already been applied in some carefully selected patients with chronic pancreatitis. The general clinical conditions that indicate endotherapy reasonable occur in patients with chronic pancreatitis with symptomatic pseudocysts, main pancreatic duct stenosis, and main pancreatic duct stones in the pancreatic head. There is no doubt that endoscopic treatment should be performed in high-volume medical centers with expertise in this operation. However, if it cannot be accomplished using an endoscope or procedure-related complications occur such as bleeding and perforation, arterial embolization and surgical operation must be carried out immediately. As for dominant strictures in the Wirsung, duct stent placement by endoscope is an effective treatment. The European guideline supports long-time use of a single stent in the above clinical situation [32]. In all, it is vital to master the indications for carrying out the endoscopic technique, as only then patients with chronic pancreatitis can profit from this minimally invasive therapy. We all realize that surgical therapy can be conducted in almost any medical situation.

Pancreatic pseudocyst is the most common complication of chronic pancreatitis, which can be detected at a rate of 30-40%. A pseudocyst is not a true cyst that is lined with an epithelium, instead, is surrounded by chronic reactive fibrous tissue [33]. Generally, a pseudocyst is defined at least after 4-6 weeks. A direct connection between the pancreatic pseudocyst and the main pancreatic duct may be demonstrated in 40-66% of all pseudocysts due to increased pancreatic ductal pressure [34]. Such communication makes it possible to do transpapillary drainage in cases where the pseudocyst is located in the head and body of the pancreas, which is accomplished with a stent inserted into the pseudocyst. Also, in pancreatic pseudocysts which cannot be resolved through papilla but are near the hollow organs, such as the stomach or jejunum, drainage may be carried out by endoscopic ultrasonography. In conclusion, endotherapy, unlike a surgical operation, should be done in some carefully selected patients. A small randomized controlled trial recommended that endoscopic drainage should be the first-line treatment

of accessible uncomplicated pseudocysts [35]. Pseudocysts of more than 6 cm or with clinical symptoms usually require endoscopic drainage or surgical intervention.

Surgical intervention has been the mainstay of treatment in most patients with chronic pancreatitis. In general, we divide surgery for chronic pancreatitis into three categories: pancreatic duct drainage, pancreas resection, combination of drainage and resection. In the drainage procedure, the dilated main pancreatic duct is cut transversely first. Then, a Roux-en-Y pancreaticojejunostomy is performed. For pancreas resection, the choice depends on pancreatic pathology and may include Whipple or pylorus-preserving pancreaticoduodenectomy, distal pancreatectomy with or without splenectomy, segmental pancreatectomy or total pancreatectomy (rarely performed). In a combined operation, duodenum-preserving pancreatic head resection (Beger), Frey procedure and their modified surgical techniques are applied. The result of surgery in improving the patient's quality of life is explicit. Further discussion is needed concerning when and how to perform operations.

## Conclusion

In the case mentioned above, with the main pancreatic duct dilation, calculus located in the head and tail of pancreas and pseudocyst located in the head of pancreas, all aspects should be taken into consideration. In view of the complexity, endotherapy could not be well done to relieve the stricture and finish the drainage of the pseudocyst simultaneously. The operation we recommend may be carried out in similar cases. Of course, in some cases where the pseudocyst is not adhered to the pancreas, absorbable sutures should be used to make a joint between pseudocyst and main pancreatic duct. In summary, we described a surgical technique of fusion drainage of a pseudocyst and pancreatic duct in chronic pancreatitis with pseudocyst. This procedure was useful and simple in patients with chronic pancreatitis with main pancreatic duct stones, dilated main pancreatic duct and pseudocyst, but only one anastomosis was needed.

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