

## Case Report

# Pancreatico-pleural Fistula: Case Series

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### ABSTRACT

Pancreatico-pleural fistula is a rare but serious complication of acute and chronic pancreatitis. The pleural effusion caused by pancreatico-pleural fistula is usually massive and recurrent. It is predominately left-sided but right-sided and bilateral effusion does occur. We report four cases of pancreatico-pleural fistula admitted to our hospital. Their clinical presentation and management aspects are discussed. Two patients were managed by pancreatic endotherapy and two patients were managed conservatively. All four patients improved symptomatically and were discharged and are on regular follow-up. Most of these patients would be evaluated for their breathlessness and pleural effusion delaying the diagnosis of pancreatic pathology and management. Hence, earlier recognition and prompt treatment would help the patients to recover from their illnesses. Pancreatic pleural fistula diagnosis requires a high index of suspicion in patients presenting with chest symptoms or pleural effusion. Extremely high pleural fluid amylase levels are usual but not universally present. A chest X-ray, pleural fluid analysis, and abdominal imaging (magnetic resonance cholangiopancreatography/magnetic resonance imaging abdomen more useful than contrast-enhanced computed tomography abdomen) would clinch the diagnosis. Endoscopic retrograde cholangiopancreatography with stent or sphincterotomy should be considered when pancreatic duct (PD) reveals a stricture or when medical management fails in patients with dilated or irregular PD. Surgical intervention may be indicated in patients with complete disruption of PD or multiple strictures.

**KEYWORDS:** Endoscopic retrograde cholangiopancreatography, pancreatic pseudocyst, pancreatico-pleural fistula, pancreatitis, pleural effusion

## INTRODUCTION

Pancreatico-pleural fistula (PPF) is a rare complication of pancreatitis secondary to posterior disruption of the pancreatic duct (PD). The fistulous tract ascends into the pleural cavity and gives rise to large volumes of pleural fluid. Pleural effusion caused by pancreatico-pleural fistula tends to be massive and recurrent. They are predominately left-sided but right-sided and bilateral effusion can also occur. Here, we discuss the four cases of pancreatico-pleural fistula who were admitted to our hospital.

## CASE REPORTS

### Case 1

A 45-year-old male, a chronic alcoholic was referred to our institute with the complaints of abdominal pain

and breathlessness for the past 20 days. He also had cough and copious watery expectoration which was at times blood stained. On physical examination, he was very tachypneic (respiratory rate was 26/min) and breath sounds were diminished on the right hemithorax. He also had minimal free fluid in the abdomen. There was no organomegaly. The patient was apparently normal 6 months back when he was admitted to a local hospital for ethanol-related acute pancreatitis. He was administered analgesics and intravenous fluids and was managed conservatively. After 3 weeks, he was rehospitalized for severe abdominal pain. Magnetic resonance imaging (MRI) abdomen showed resolving

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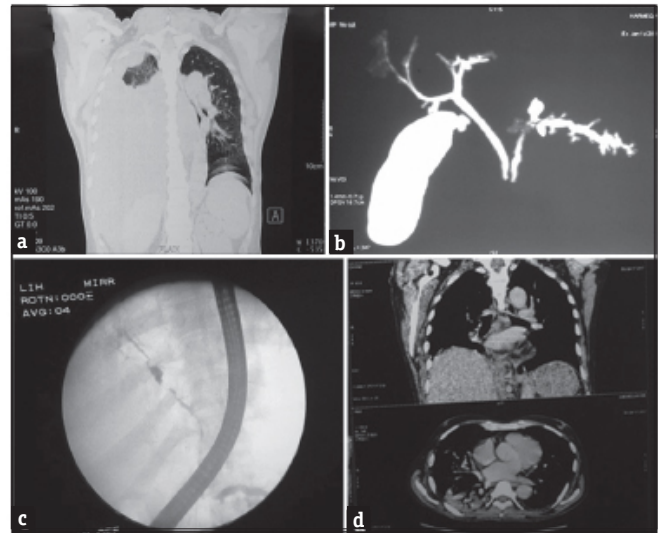
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acute necrotizing pancreatitis with hemorrhagic pseudocyst and pseudoaneurysm with surrounding inflammatory exudates. He was pale with hemoglobin of 4 g% and was transfused with packed red cells. Computed tomography (CT) angiography showed evidence of two irregular pseudoaneurysms, one near the pancreatic neck measuring 2.3 cm × 1.2 cm arising from the gastroduodenal artery and another inferior to the pancreatic bed measuring 1.8 cm × 1.4 cm arising from the splenic artery. A large hematoma was seen in the peripancreatic region extending into the lesser sac, and another large hematoma was seen tracking into the right intrahepatic region. Coil embolization of the aneurysm arising from the gastroduodenal artery and glue embolization of the other aneurysm was done. The patient responded well and was discharged.

A couple of weeks later, he developed abdominal pain and severe breathlessness. He had cough and copious watery expectoration which was at times blood stained. Of the imaging contrast-enhanced computed tomography (CECT), chest revealed massive right-sided pleural effusion and CECT abdomen showed walled off necrosis and multiple fluid collections in the abdomen. A pigtail catheter was placed ultrasonographically, and the abdominal collection was drained. Meanwhile, an intercostal drain was placed in the right-side chest and pleural fluid was removed. He improved symptomatically and was discharged but again developed the same symptoms and was referred to our institution.

We did a complete blood analysis. His serum amylase and lipase were elevated (544 IU/L and 665 IU/L, respectively). The total count was marginally elevated (13,800/cumm). Renal function tests and liver function tests were within normal limits. The pleural fluid analysis showed a high protein (4.8 g/dl) and pleural fluid amylase level of 9865 IU/L. CECT chest [Figure 1a] and abdomen showed massive right-sided pleural effusion with passive collapse of the underlying lung parenchyma, diffuse edema and enlargement of the pancreatic parenchyma with necrosis in the neck region, and pseudocyst formation involving lesser sac and communicating into the posterior mediastinum with rupture into the pleural cavity with pancreatico-pleural fistula. Magnetic resonance cholangiopancreatography (MRCP) also demonstrated the ductal leak [Figure 1b]. The sputum analysis showed very high values of amylase and lipase and plenty of red blood cells confirming the fistulous communication between the pancreas and the right pleura/bronchial tree.

Initially, the patient had nasojejunal tube intubation and was instituted enteral nutrition. He was started on antibiotics and injection octreotide. After initial



**Figure 1:** (a) Computed tomography chest showing massive right-sided pleural effusion. (b) Magnetic resonance cholangiopancreatography picture demonstrating the pancreatic ductal leak and dilated pancreatic duct. (c) Endoscopic retrograde cholangiopancreatography picture demonstrating the contrast entering the right bronchial tree on further injection of the contrast. (d) Computed tomography image showing almost complete resolution of the right pleural effusion at the time of discharge

stabilization, the patient was submitted for endoscopic retrograde cholangiopancreatography (ERCP). PD cannulation was successful and pancreatogram revealed ductal leak at the level of gene. The fistulous tract could be demonstrated in the ERCP [Figure 1c] and was tracking upward to the right pleural space. On further contrast injection, the bronchial tree could be visualized, and the patient had cough probably due to the irritation of the respiratory mucosa. An attempt was made to place the guide wire into the PD across the leak but it was repeatedly entering into the fistulous tract. Hence, pancreatic sphincterotomy alone was done and the pancreatic juice was found draining freely.

Following the procedure, the patient gradually improved. His breathlessness was settled. The expectoration changed from bloody copious amounts to mucoid smaller amounts. The breath sounds in the right hemithorax became audible and was bronchial in quality suggesting associated consolidation. The abdominal pain was reduced. The patient's general condition was improved. He was initially started on liquid feeds and later tolerated solid diet too. A repeat CT [Figure 1d] revealed resolution of the right-sided effusion with the right lower lobe consolidation and resolution of the collections in the abdomen.

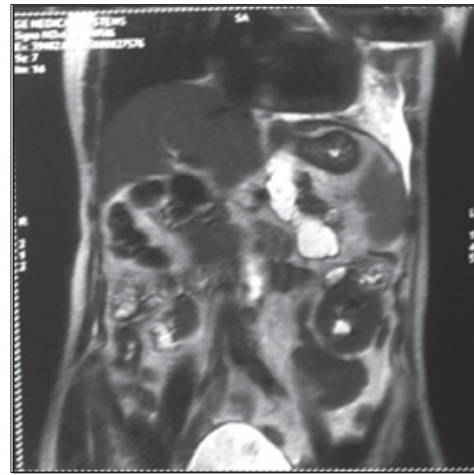
## Case 2

A 70-year-old male was admitted to our hospital with abdominal pain radiating to back and breathlessness following a blunt injury to the abdomen. He was not an alcoholic or smoker. On examination, he had minimal free fluid in the abdomen with epigastric

tenderness. The breath sounds were absent in the lower left hemithorax. A chest X-ray showed moderate left-sided pleural effusion. The serum amylase and lipase were elevated. The pleural fluid analysis revealed elevated amylase and lipase levels. An MRI abdomen/MRCP revealed well-defined fluid collection measuring 10 cm × 3.2 cm × 2.8 cm extending from the region of the tail of pancreas communicating to the left pleural space through a defect in the dome of diaphragm measuring 1.5 cm implicating a PPF [Figure 2]. The patient was started on injection octreotide, and an intercostal drainage (ICD) tube was placed in the left chest for drainage. An ERCP was attempted but there was a large periampullary diverticulum PD cannulation was not successful. However, the patient improved with conservative management. The ICD secretions gradually decreased and it was removed after 10 days. The patient was discharged and is on regular follow-up.

### Case 3

A 28-year-old male was referred to our institute with complaints of severe abdominal pain for the past 2 weeks. The pain was pulling type in the epigastric region radiating to back, increased on food intake, and relieved on stooping forward. There was no abdominal distension. There was no swelling of legs or decreased urine output. He complained of breathlessness on exertion. There was no steatorrhea. There was loss of weight and loss of appetite. There was minimal cough with expectoration. He had similar episodes of abdominal pain in the past, for which he was treated conservatively. He was admitted for acute pancreatitis in a local hospital 3 weeks back and was managed conservatively and discharged. He was a smoker and an alcoholic for the past 5 years. On examination, the patient was tachypneic with a respiratory rate of 24/min, pale. Abdomen examination revealed epigastric tenderness without any organomegaly of significant free fluid in the abdomen. There were absent breath sounds in the right hemithorax and the trachea was shifted to the left. Blood investigations revealed a normal renal function tests and liver function tests. The serum amylase and lipase were elevated. A chest X-ray revealed massive right-sided pleural effusion. A CECT abdomen showed small areas of necrosis in the head of pancreas with body and tail being atrophic. Small peripancreatic fluid collection was seen. The fluid collection seen was extending to the posterior mediastinum through the esophageal hiatus posterior to inferior vena cava and the collection appeared to be continuous with the right pleural space [Figure 3a]. Massive right-sided pleural effusion with collapse of the right lung was seen. These features were suggestive of chronic pancreatitis with posterior mediastinal pseudocyst and right-sided massive pleural effusion with a high possibility of



**Figure 2:** Magnetic resonance cholangiopancreatography demonstrating fluid collection measuring 10 cm × 3.2 cm × 2.8 cm extending from the region of the tail of pancreas communicating to the left pleural space

pancreatico-pleural fistula. An ICD drain was placed in the right chest. An MRCP further confirmed the diagnosis of a PPF [Figure 3b]. The patient was then subjected to ERCP. Pancreatogram demonstrated the leak in the body of the pancreas. PD was stented using 7Fr 8 cm single pigtail stent [Figure 3c]. Free flow of pancreatic juice was noted. The patient improved significantly. The ICD was removed 8<sup>th</sup>-day post ERCP. The patient is on regular follow-up with us.

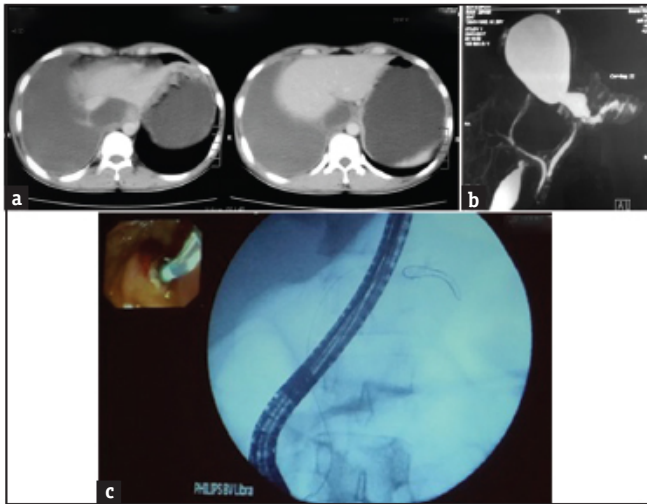
### Case 4

A 37-year-old male who was a chronic alcoholic and smoker presented to us with breathlessness for 4 weeks. On examination, he had decreased breath sounds with crepitations in the right hemithorax. CT chest showed moderate right-sided pleural effusion. Pleural fluid protein was high (4.3 g/dl) suggesting an exudative effusion. The amylase and lipase levels were grossly elevated. An MRCP revealed pancreatic parenchymal atrophy in the distal body and tail of pancreas with prominent main PD (MPD) and side ducts. Well-defined pancreatic fluid collection 3.8 cm × 2.1 cm extends into right pleural space with right pleural effusion [Figure 4]. The patient was treated with antibiotics. Chest drain for pleural effusion and ERCP with sphincterotomy and PD stenting done with a 5Fr × 8 cm single pigtail stent. Pleural effusion resolved and ICD was removed after 7 days. Table 1 illustrates the summary of the four patients with pancreaticopleural fistula.

### Review of literature

PPF is an abnormal communication between the pancreas and other organs due to leakage of pancreatic secretions from the damaged pancreatic ducts. The incidence is about 0.4% in patients presenting with pancreatitis.<sup>[1]</sup> In 70%–90% of cases, they occur as a complication of chronic pancreatitis.<sup>[2–4]</sup>



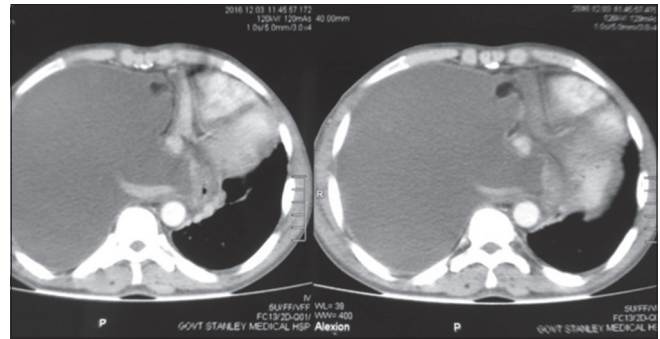


**Figure 3:** (a) Computed tomography picture showing massive right pleural effusion with mediastinal pseudocyst and communication into right pleural cavity. (b) Magnetic resonance cholangiopancreatography demonstrating the ductal leak and the presence of pseudocyst. (c). Endoscopic retrograde cholangiopancreatography picture demonstrating the successful pancreatic duct cannulation and guide wire placement bridging the leak

In 1976, Cameron *et al.* coined the term internal pancreatic fistula where the pancreatic secretions drained into a body cavity rather than into the duodenum.<sup>[5]</sup> Although PPF is rare, it should be considered in the differential diagnosis of patients with pancreatitis who present with recurrent or persistent respiratory symptoms and pleural effusions.<sup>[6]</sup> A high pleural fluid amylase levels usually indicate pancreatitis as a cause, but it can also be seen in esophageal perforation, parapneumonic effusion, and lung or pancreatic malignancy also.<sup>[1,6-8]</sup> However, only PPF causes very high pleural fluid amylase levels  $>50,000$  IU/L<sup>[1,6]</sup>

Patients with PPF may even have recurrent lobar lung consolidation.<sup>[6,9]</sup> If the pancreatic ductal rupture occurs anteriorly and is not walled off, then a pancreatico-peritoneal fistula develops resulting in ascites.<sup>[10]</sup> However, if the ductal disruption occurs posteriorly then the pancreatic collection may dissect through the aortic or esophageal hiatus into the mediastinum to form a pleural fistula or may result in a mediastinal pseudocyst. This mediastinal pseudocyst may further rupture into the pleural cavity leading on to PPF.<sup>[10-12]</sup> Imaging studies and pleural fluid analysis usually aids in diagnosing PPF. A PPF may be missed during ERCP if there is a PD stricture or obstruction proximal to the fistula.<sup>[6,13,14]</sup> Performing CT immediately after ERCP may increase the sensitivity of detecting PPF. MRCP has become an important tool in diagnosing PPF as demonstrated in various studies.<sup>[15-19]</sup>

Medical treatment may be attempted for about 2–3 weeks before any interventional therapy in places where the expertise is not easily available or when the patient is



**Figure 4:** Computed tomography film showing right pleural effusion and mediastinal collection communicating into right pleural space

not very symptomatic or when the demonstrable leak is very small and patient responding to the conservative management.<sup>[3]</sup>

Somatostatin analogs can significantly reduce fistula output and hasten the closure of both internal and external pancreatic fistulas.<sup>[10]</sup> Conservative treatment is reported to have an efficacy of 30%–60%.<sup>[3]</sup>

Endoscopic pancreatic stenting is an effective therapeutic option and in combination with somatostatin analogs such as octreotide, can definitely result in the closure of the fistula and symptomatic improvement.<sup>[12]</sup> Successful resolution of a PPF after pancreatic stenting was first reported by Saeed *et al.*<sup>[20]</sup> Many case reports are available demonstrating the efficacy of the endoscopically placed pancreatic stenting in the treatment of PPF.<sup>[21-26]</sup> Pancreatic ductal stenting leads to a pathway of least resistance for the pancreatic secretions to flow into the duodenum, thereby causing the fistulous tract to heal.<sup>[20]</sup> Applying low intermittent suction through the endoscopic placement of a nasopancreatic drain has also been reported in literature.<sup>[27,28]</sup>

Patients with single strictures may be managed successfully with pancreatic endotherapy, whereas patients of multiple strictures, complete duct disruption, or large cysts may be managed with surgery. The most common surgical procedure reported is distal pancreatectomy followed by pancreaticojejunostomy.<sup>[29,30]</sup> The best therapeutic approach for the management of PPF patients presenting with MPD obstruction is pancreatic endotherapy along with medical management.

## CONCLUSION

Pancreatic-pleural fistula is a rare complication of pancreatitis and requires a high index of suspicion in patients presenting with chest symptoms or pleural effusion. Extremely high pleural fluid amylase levels are usual but not universally present. Chest X-ray, pleural fluid analysis, and abdominal imaging (MRCP/MRI abdomen more useful than CECT abdomen) would clinch

**Table 1: Summary of the four patients with pancreatico-pleural fistula**

Number	History and examination	Investigations	Therapy
1	A 45-year-old male chronic alcoholic breathlessness and abdominal pain for 2 months History of necrotizing pancreatitis with splenic and gastroduodenal artery pseudoaneurysm-embolization done Absent breath sounds right hemithorax	Chest X-ray massive right pleural effusion pleural fluid-high protein (4.8 g/dl) and high amylase level (9865 IU/L) MRI/MRCP-diffuse edema and enlargement of the pancreatic parenchyma with necrosis in the neck region and pseudocyst formation involving lesser sac and extending into the posterior mediastinum with rupture into the right pleural cavity with pancreatico-pleural fistula. PD dilated and leak in the proximal body identified	ERCP demonstrated the leak ascending up toward right lung and guide wire also tiring into the fistulous tract. Pancreatic sphincterotomy done. Stent could not be placed in the PD Patient improved significantly with sphincterotomy alone. Effusion resolved completely
2	A 70-year-old male Nonalcoholic Blunt injury abdomen Abdominal pain, breathlessness 3 weeks Decreased breath sounds left hemithorax	Chest X-ray-moderate left pleural effusion MRI abdomen/MRCP-well-defined fluid collection measuring 10 cm × 3.2 cm × 2.8 cm extending from the region of the tail of pancreas communicating to the left pleural space through a defect in the dome of diaphragm measuring 1.5 cm implicating a pancreatico-pleural fistula	Injection octreotide and an ICD tube were placed in the left chest for drainage An ERCP was attempted but there was a large periaampullary diverticulum and PD cannulation was not successful However, the patient improved with conservative management An ICD drain was placed in the right chest
3	A 28-year-old male severe pancreatic type abdominal pain for the past 2 weeks smoker and an alcoholic tachypneic epigastric tenderness absent breath sounds in the right hemithorax and the trachea was shifted to the left	CECT abdomen-small areas of necrosis in the head of the pancreas with body and tail being atrophic. The peripancreatic fluid collection seen was extending to the posterior mediastinum through the esophageal hiatus posterior to IVC, and the collection appeared to be continuous with the right pleural space-chronic pancreatitis with posterior mediastinal pseudocyst and right-sided massive pleural effusion with a high possibility of pancreatico-pleural fistula	Pancreatogram demonstrated the leak in the body of the pancreas. PD was stented using 7 Fr × 8 cm single pigtail stent Free flow of pancreatic juice was noted. The patient improved significantly. The ICD was removed 8 <sup>th</sup> -day post-ERCP
4	A 37-year-old male Chronic alcoholic and smoker Breathlessness for 4 weeks Decreased breath sounds with crepitations in the right hemithorax	MRCP-pancreatic parenchymal atrophy in the distal body and tail of pancreas with prominent MPD and side ducts. Well-defined pancreatic fluid collection 3.8 cm × 2.1 cm extends into the right pleural space with right pleural effusion	ICD tube drain right chest, antibiotics, ERCP with sphincterotomy, and PD stenting done with a 5 Fr × 8 cm single pigtail stent. Pleural effusion was resolved. ICD removed after 7 days

MRI=Magnetic resonance imaging, MRCP=Magnetic resonance cholangiopancreatography, PD=Pancreatic duct, CECT=Contrast-enhanced computed tomography, IVC=Inferior vena cava, MPD=Main pancreatic duct, ERCP=Endoscopic retrograde cholangiopancreatography, ICD=Intercostal drainage

the diagnosis. ERCP with stent/sphincterotomy should be considered when PD reveals a stricture or when medical management fails in patients with dilated or irregular PD. Surgical intervention may be indicated in patients with complete disruption of PD or multiple strictures.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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