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Complex pleural effusions in pancreatitis: A case series of pancreaticopleural fistulas

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Abstract

Background: Pancreaticopleural fistula (PPF) is a rare complication of pancreatitis resulting from pancreatic duct disruption, leading to recurrent and often massive pleural effusions.

Case Presentation: We report three cases of pancreaticopleural fistula presenting with variable clinical and radiological features. Patients presented predominantly with respiratory symptoms and minimal abdominal complaints. Detailed imaging using contrast-enhanced computed tomography (CECT) demonstrated pancreatic ductal dilatation, parenchymal calcifications, necrotic collections, and well-defined fistulous tracts extending from the pancreas into the pleural cavity. Pleural fluid analysis confirmed elevated amylase levels.

Management and Outcome: Management included intercostal drainage, antibiotics, analgesics, and endoscopic pancreatic duct stenting. All patients showed clinical improvement with resolution of pleural effusion.

Keywords: Pancreaticopleural fistula, Chronic pancreatitis, pleural effusion, hydropneumothorax, ERCP, pancreatic duct stenting, necrotizing pancreatitis

Introduction

Pancreaticopleural fistula is an uncommon but clinically significant complication of pancreatitis, occurring in less than 1% of cases. It arises due to disruption of the pancreatic duct, allowing enzyme-rich pancreatic secretions to track along retroperitoneal planes and traverse diaphragmatic hiatuses into the thoracic cavity [1, 2]

Patients typically present with respiratory symptoms such as dyspnea and chest pain, often overshadowing abdominal complaints, leading to delayed diagnosis. The pleural effusions are typically large, recurrent, and may be associated with underlying pancreatic ductal abnormalities, pseudocysts, or necrotic collections that communicate with the thoracic cavity [1, 4]

Advanced imaging modalities such as contrast-enhanced computed tomography (CECT) provide detailed visualization of pancreatic parenchymal changes including ductal dilatation, intraductal calculi, necrosis, and peripancreatic collections. Magnetic resonance cholangiopancreatography (MRCP) further delineates ductal anatomy and fistulous tracts, while ERCP provides both diagnostic confirmation and therapeutic intervention [1, 6]

Case Series

Case 1

A 50-year-old male presented with complaints of insidious onset, progressively worsening upper abdominal pain without associated vomiting or fever. There was no history of similar complaints in the past. On examination, the patient was vitally stable.

Chest radiograph [Fig 1] demonstrated a markedly hyperlucent left hemithorax with near-complete absence of bronchovascular markings, suggesting underlying pneumothorax component. A medially displaced, collapsed left lung was visualized along with a distinct air-fluid level, consistent with hydropneumothorax and associated massive pleural effusion.

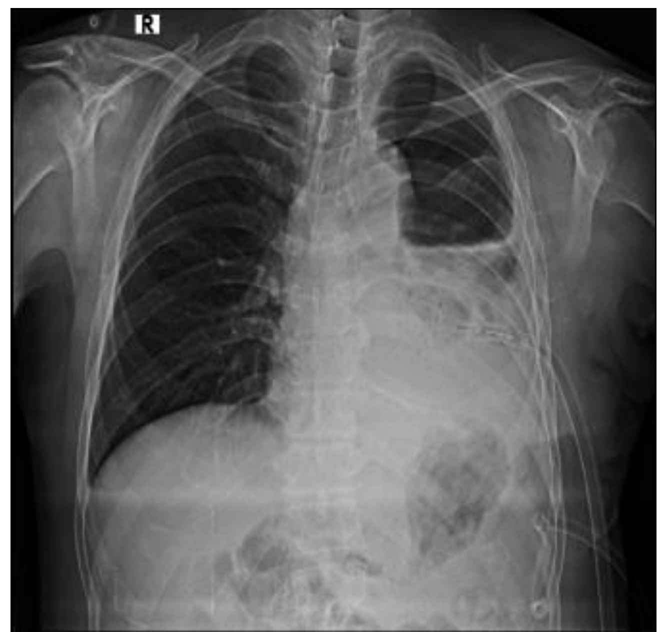


Fig 1

Fig 1: Erect chest radiograph shows Left sided pleural effusion causing blunting of the left Costophrenic angle and fluid is seen tracking along the left lateral chest wall. ICD insitu with tip at 7th ICS. Hyper lucent area with absence of bronchovascular markings with air fluid level in the left hemithorax.

Contrast-enhanced CT of the abdomen and thorax [Fig 2] revealed diffuse dilatation of the main pancreatic duct measuring approximately 5.4 mm involving the head, uncinate process, and proximal body. Multiple

intraparenchymal calcifications were noted within the head and uncinate process, consistent with chronic pancreatitis. A well-defined hypodense necrotic collection measuring 1.8 × 1.7 × 1.9 cm was identified in the proximal body of the pancreas, showing direct communication with the pancreatic duct.

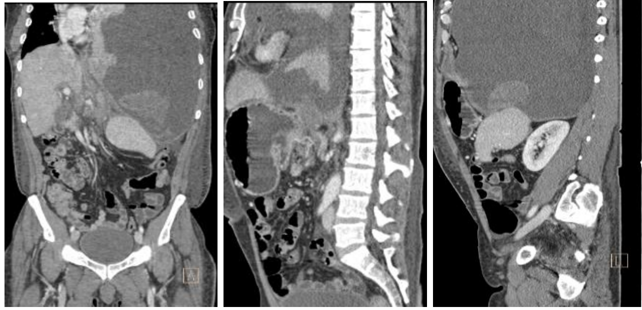


Fig 2

Fig 2: Coronal and sagittal CECT images: Massive left pleural effusion is seen with collapse of the visualised lung towards the hilum and inversion of left dome of diaphragm and Mediastinal shift to the right. Visualised right lung parenchyma is normal. Mass effect is seen on the abdominal contents – spleen, stomach, duodenum, pancreas, small bowel loops which are pushed inferomedially. Left kidney, splenic flexure of colon and transverse colon are pushed inferiorly. Body and tail of pancreas is atrophic. Pancreatic duct is dilated (5.4mm) in the head, uncinate process and proximal body of pancreas. Calcifications are seen in the head and uncinate process. A fistulous track with mild enhancing walls is seen extending superiorly into the left pleural cavity from this area of necrosis approximately measuring 2cm in length and 5mm in diameter.

From this necrotic focus, a linear, mildly enhancing fistulous tract was seen extending superiorly through the retroperitoneum, traversing the diaphragmatic hiatus, and entering the left pleural cavity. The tract measured approximately 2 cm in length and 5 mm in diameter. The left pleural cavity contained a large volume of fluid with internal air, causing compressive atelectasis of the adjacent lung parenchyma.

Comparison with prior imaging (not shown) performed five months earlier demonstrated a walled-off pancreatic necrosis without evidence of thoracic extension, confirming interval development of the pancreaticopleural fistula.

Pleural fluid analysis confirmed pancreatic origin. The patient improved with intercostal drainage, antibiotics, and analgesics.

Case 2

A 53 year old male patient with known chronic pancreatitis presented with postprandial abdominal pain relieved by medication. Examination was unremarkable.

Chest radiograph [Fig 3] reveled right sided pleural effusion and further imaging evaluation with contrast-enhanced CT [Fig 4] demonstrated features of chronic pancreatitis including irregular dilatation of the main pancreatic duct and associated side branches. The common bile duct (CBD) was also dilated, along with central intrahepatic biliary radicle dilatation, suggestive of biliary obstruction or compression.

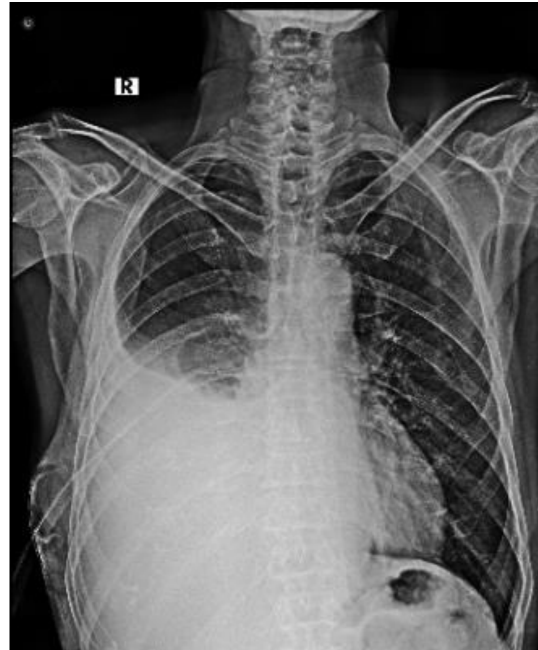
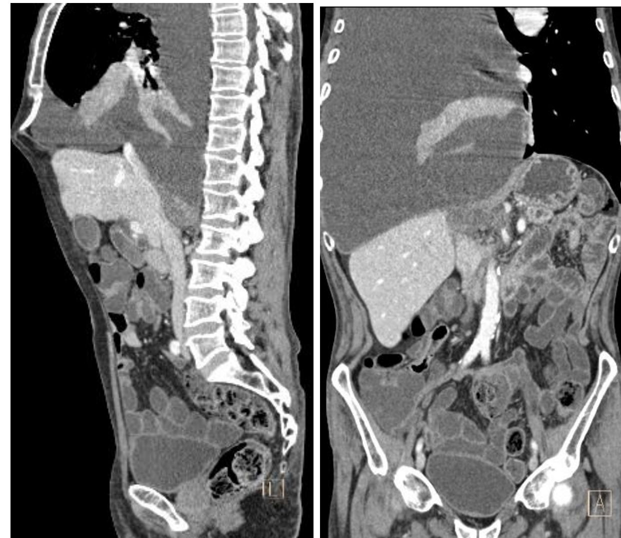
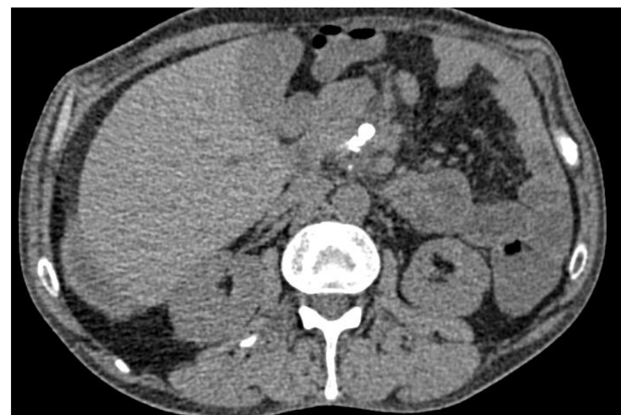


Fig 3

Fig 3: CHEST radiograph PA view shows Homogenous opacity is noted in the right mid and lower zone obscuring right dome of diaphragm causing blunting of the right Costophrenic angle and fluid is seen tracking along the right lateral chest wall. ICD tube tip noted on the right 7th intercostal space.





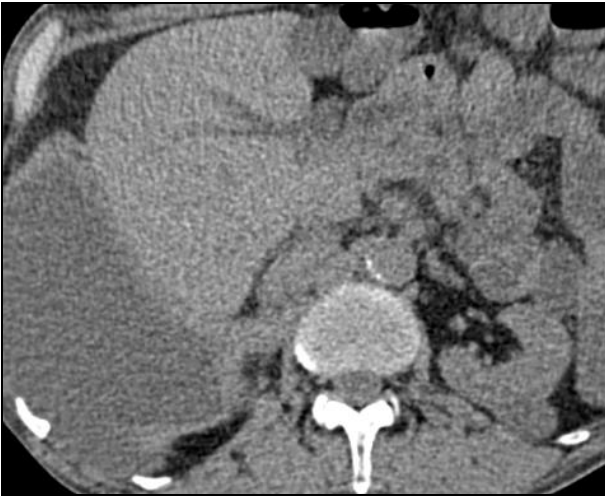


Fig 4

Fig 4: CECT abdomen and pelvis in sagittal, coronal and plain CT axial sections show

Massive right-sided pleural effusion causing passive collapse and consolidation of the underlying lung segments and causing mediastinal shift towards the left side and with inferior displacement and inversion of the right hemidiaphragm. Also the liver is displaced anteromedially. Mass effect is also seen on the pancreas, stomach, duodenum and proximal small bowel loops which are displaced to the left. A suspicious fluid track with mild enhancing margins is seen on the right lateral aspect of the abdominal aorta at the level of diaphragmatic crus which appears contiguous with the dilated pancreatic duct in the uncinate process extending posterosuperiorly into the right pleural cavity likely pancreatico-pleural fistula. Pancreatic parenchyma is diffusely atrophic with coarse calcifications predominantly in the head and uncinate process. There is significant dilatation of the entire main pancreatic duct and common bile duct with abrupt cut-off, causing central IHBRD.

Thoracic imaging revealed a massive right-sided pleural effusion with near-complete opacification of the right hemithorax and mediastinal shift toward the contralateral side. The underlying lung parenchyma showed compressive atelectasis.

Further evaluation suggested a fistulous communication between the pancreatic ductal system and the right pleural cavity, likely via retroperitoneal tracking of pancreatic secretions. Although the tract was not as clearly delineated as in Case 1, the combination of ductal abnormalities, massive effusion, and clinical context strongly supported the diagnosis.

Following confirmation with pleural fluid analysis, the patient underwent intercostal drainage with removal of approximately 1.5 liters of fluid. ERCP demonstrated ductal irregularity and allowed placement of a CBD stent, facilitating decompression of the pancreaticobiliary system. Clinical improvement was noted.

Case 3

A 23-year-old male presented with chronic abdominal pain, bilateral chest pain, and recent onset breathlessness with fever.

Chest radiograph [Fig 5] reveled right sided mild pleural effusion with underlying basal lung consolidatory changes.

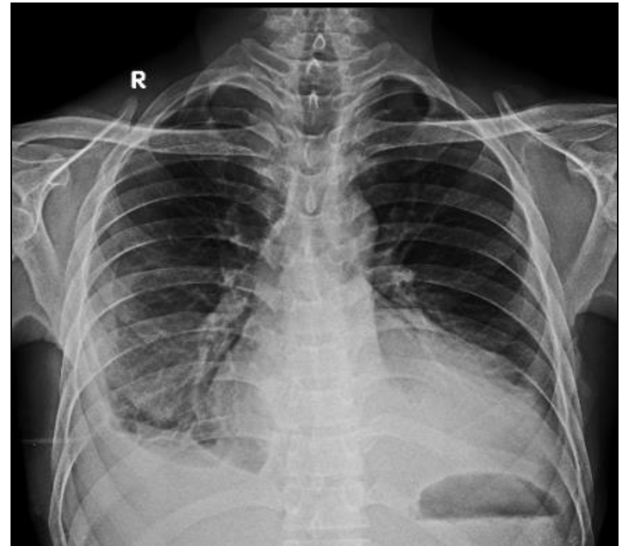
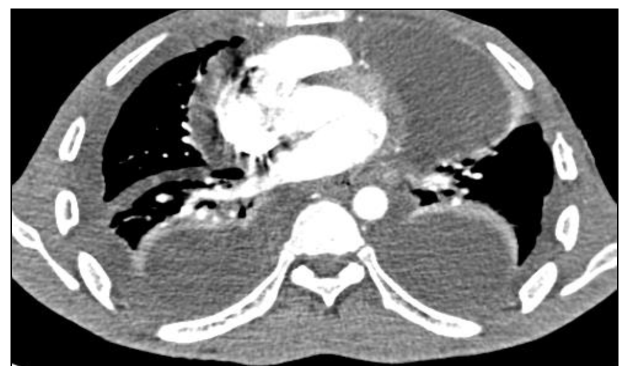


Fig 5

Fig 5: Chest radiograph in PA view shows, Homogenous opacity noted in the right lower zone tracking along the right lateral wall. Obscuration of right CP angle, right hemidiaphragm, lower right cardiac border. Consolidatory changes in adjacent right lower zone and Cardiomegaly.

Contrast-enhanced CT [Fig 6] imaging revealed features of necrotizing pancreatitis, including heterogeneous pancreatic parenchymal enhancement with areas of non-enhancement suggestive of necrosis. A well-defined pseudocystic collection was identified adjacent to the pancreas.



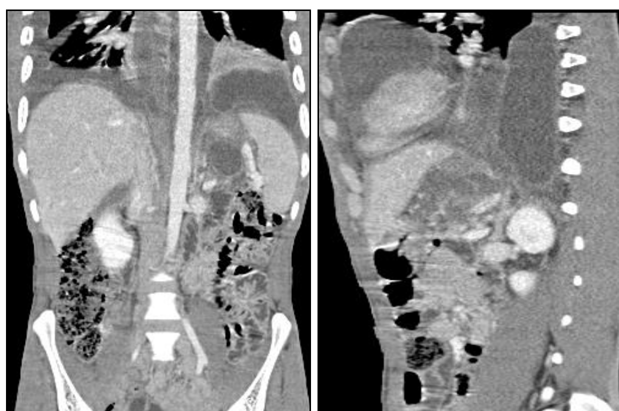


Fig 6

Fig 6: Pancreas: Appears mildly atrophic with necrotic changes in the distal body. A well defined thin (about 1 mm) walled cystic lesion with peripherally enhancing walls noted adjacent and superior to the tail of pancreas. Mild

right pleural effusion and moderate left pleural effusion in visualised lungs with associated adjacent lower lobe atelectasis. A peripherally enhancing tract is seen traversing along the posterior mediastinum posterior to the IVC and esophagus and reaching below the diaphragm. Minimal free fluid in abdomen and pelvis.

The main pancreatic duct appeared irregular with possible disruption. Bilateral pleural effusions were noted, more prominent on the left side, with associated basal atelectasis. The pleural collections appeared free-flowing without septations.

A fistulous communication was identified between the pancreatic collection and the pleural cavity, likely via transdiaphragmatic extension. Although the fistulous tract was subtle, indirect signs such as continuity of fluid collections, ductal disruption, and bilateral pleural involvement supported the diagnosis of pancreaticopleural fistula.

The patient underwent pancreatic duct stenting along with conservative management, resulting in symptomatic and radiological improvement.

Discussion

Pancreaticopleural fistula is a rare but important complication of pancreatitis that often presents with thoracic symptoms rather than abdominal complaints, leading to diagnostic delays [1]

Consistent with previous reports, including the study by Khadka *et al*., patients commonly present with massive pleural effusions and significantly elevated pleural fluid amylase levels, which serve as a key diagnostic marker [1]

The underlying mechanism involves pancreatic duct disruption with leakage of enzyme-rich fluid into the retroperitoneum, which then ascends through diaphragmatic openings into the pleural cavity. Imaging often reveals ductal dilatation, intraductal calculi, necrotic collections, and direct or indirect evidence of fistulous tracts [2, 4]

CECT plays a central role in identifying pancreatic pathology, including calcifications, ductal abnormalities, and necrosis, while MRCP provides superior delineation of ductal anatomy and fistulous communication. ERCP remains both diagnostic and therapeutic by enabling ductal stenting and decompression [1, 6]

The variability in imaging findings—from clearly visualized tracts to indirect signs such as pleural effusion with ductal disruption—highlights the importance of correlating clinical, biochemical, and radiological data. Management strategies have evolved toward minimally invasive approaches. Endoscopic pancreatic duct stenting reduces intraductal pressure and facilitates closure of the fistula, while intercostal drainage addresses symptomatic pleural collections. Surgical intervention is reserved for refractory cases [1, 3]

Conclusion

Conclusion: Pancreaticopleural fistula should be suspected in patients with recurrent or massive pleural effusions, particularly in the context of pancreatitis. Detailed imaging evaluation plays a crucial role in identifying pancreatic duct disruption and fistulous tracts. Early diagnosis followed by appropriate endoscopic and supportive management leads to favorable clinical outcomes.

Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Ethical Approval

This study was conducted in accordance with the ethical standards of the institutional research committee. Ethical approval was obtained from the Institutional Ethics Committee.

Consent

Written informed consent was obtained from all individual participants included in the study for publication of clinical data and imaging findings.

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