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**Dr. Samir Kathale**  
Assistant Professor,  
Department of Radiodiagnosis,  
Chandulal Chandrakar  
Memorial Medical College,  
Durg, Chhattisgarh, India

**Dr. Manish K Khare**  
Associate Professor, GI and  
Hepatobiliarypancreatic  
Surgeon, Department of  
Surgery, Shri Shankaracharya  
Institute of Medical Science  
Hospital, Durg, Chhattisgarh,  
India

## Pleural effusion with rapid refill: A diagnostic dilemma-series of five cases

**Dr. Samir Kathale and Dr. Manish K Khare**

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### Abstract

**Background:** A rare complication of acute or chronic pancreatitis is the formation of a mediastinal pancreatic pseudocyst (MPP). Inflammatory injury causes pancreatic ductal disruption leading to leakage of amylase rich pancreatic secretions along the paths of minimum resistance. Thoracopancreatic fistulae are caused by the posterior disruptions while anterior disruptions can cause pancreatic ascites. Patients of pancreatitis can present with symptoms like chest pain, respiratory distress, dysphagia and in extreme cases with pericardial effusion and tamponade. High index of suspicion is needed in diagnosing this condition. Here, we report the imaging characteristics of five such cases. Our results revealed three features in common: (i) extension of pancreatic pseudocyst into the mediastinum; (ii) rapid refill of pleural effusions; and (iii) imaging findings consistent with pancreatitis.

**Aims:** 1) To evaluate the cause of rapid refill of pleural effusion in cases of acute or chronic pancreatitis with pseudocysts. 2) To evaluate the mediastinal extension of the pseudocyst.

**Materials and Methods:** Patients with rapid refill of pleural effusion were sent to the department of surgery and subsequently to radiology for further evaluation. Chest radiographs, diagnostic and therapeutic tap, abdominal ultrasonography, barium swallow and contrast enhanced CT scans of thorax and abdomen were done.

**Result:** All our five patients of pancreatitis with rapid refill of pleural collection were found to have mediastinal extension of the pancreatic pseudocyst with pancreatopleural fistula.

**Conclusion:** Mediastinal extension of the pancreatic pseudocyst with pancreatopleural fistula is a rare complication following acute or chronic pancreatitis. Detailed radiological investigations are a useful adjunct to surgical management.

**Keywords:** Pancreatitis, pancreatic pseudocyst, mediastinal extension, pancreatopleural fistula, computed tomography (ct), mediastinal pancreatic pseudocyst, pleural effusion

### Introduction

Pancreatic pseudocysts are the most common cystic lesions of the pancreas and are the common sequelae of acute or chronic pancreatitis. All other cystic lesions including cystic neoplasms represent only 10%–15% of pancreatic cysts [1]. Pancreatic pseudocysts are defined as localized amylase-rich fluid collections within or adjacent to the pancreatic tissues and are surrounded by a fibrous wall that does not possess an epithelial lining [2, 3]. They are important both in terms of management and differentiation from other cystic processes or masses in this region. Extension of the pancreatic pseudocyst into the posterior mediastinum is uncommon. Pancreatic thoracic pseudocysts and pancreatopleural fistulas are rare complications of acute and chronic pancreatitis and have symptoms that are often misleading. Inflammatory injury causes pancreatic ductal disruption leading to leakage of amylase rich pancreatic secretions along the paths of minimum resistance. Thoracopancreatic fistulae are caused by the posterior disruptions while anterior disruptions can cause pancreatic ascites. Left sided pleural effusion secondary to pancreatic etiology is more common due to its anatomic relation [4, 5]. Right-sided pleural effusion secondary to pancreatitis is rare, and so far only few cases have been reported [6, 7, 8]. On the basis of termination site of the fistulae, thoracopancreatic fistulae have been classified into four types: pancreatopleural, mediastinal pseudocyst, pancreatobronchial and pancreatopericardial. On computed tomography, a pseudocyst appears as a round or oval fluid collection with a thin, barely perceptible wall or thick wall that shows contrast enhancement.

**Corresponding Author:**  
**Dr. Manish K Khare**  
Associate Professor, GI and  
Hepatobiliarypancreatic  
Surgeon, Department of  
Surgery, Shri Shankaracharya  
Institute of Medical Science  
Hospital, Durg, Chhattisgarh,  
India

**Materials and method:** This prospective study was conducted in the Department of Radiodiagnosis, Chandulal Chandrakar Memorial Medical College, Durg (Chattisgarh). Chest radiographs, abdominal ultrasound, diagnostic and therapeutic tap, barium swallow and contrast enhanced CT scans of thorax and abdomen were done.

### Patient selection

#### Inclusion criteria

- All clinically suspected patients with pain in abdomen, chest pain, respiratory distress, dysphagia.
- All known cases of pancreatitis.
- Patients with rapid refill of pleural effusion were included in the study.

#### Exclusion criteria

- The cases in which pancreatitis was ruled out were eliminated from the study.
- Patients who did not have radiographs were excluded

from the study.

- Patients with history of contrast reaction.
- Claustrophobic patients were also excluded from the study.

#### Instrumentation

- Conventional radiography and Barium study was performed with Allenger 500 mA X-ray machine.
- Ultrasonography of the abdomen were performed using GE Voluson P8 machine.
- Contrast enhanced CT scan of abdomen and thorax were done using Toshiba 16 slice machine.

#### Observation

Here we present five adult patients with clinical complaints of abdominal pain, chest pain, dyspnea, dysphagia, respiratory distress and abdominal pain. All the five patients were chronic alcoholics and had history of loss of appetite with mild weight loss.

**Table 1.**

Patients	Chest Pain	Dyspnoea	Dysphagia	Abd. Pain and Fullness
1st	since 3 weeks	20 days	15 days	1 month
2nd	since 15 days	10 days	7 days	25 days
3rd	since 2 weeks	15 days	10 days	20 days
4th	since 15 days	10 days	7 days	3 weeks
5th	since 10 days	1 week	1 week	14 days

Vitals were stable. All the patients were conscious, oriented. There were no neurological deficits. CVS examination was grossly normal. Routine blood investigations were within normal limits. An extensive workup was performed,

including frontal radiographs and ultrasonography of chest and abdomen, barium swallow, bronchoscopy, gastroscopy, chest and upper abdomen computed tomography (CT) scans. Routine blood investigations revealed –

**Table 2.**

Parameters	Patient 1	Patient 2	Patient 3	Patient 4	Patient 5
Haemoglobin	12.6 mg/dl	11.5mg/dl	10.8mg/dl	13.1 mg/dl	10.5 mg/dl
Total count (cells / cu.mm)	12, 900	13, 800	13, 200	11, 800	12, 500
Blood Sugar	non-diabetic	non-diabetic	non-diabetic	diabetic	non-diabetic
Serum amylase	high	high	high	high	high
Serum Lipase	high	high	high	high	high

**Chest PA radiographs** revealed left sided pleural collection in four patients and right sided pleural collection in one of our patients. Abdominal ultrasound revealed features of chronic pancreatitis in all our five patients (pancreatic

calcifications, parenchymal atrophy, dilatation of main pancreatic duct, pseudocyst). Diagnostic as well as therapeutic pleural tapping was done in all the patients that demonstrated the following findings –

**Table 3.**

Pleural Fluid	
Quantity	20 ml
Colour	Reddish Brown
Appearance	Turbid
Bio-chemistry	Protein > 3 gm/dl, Sugar 30-40 ml/dl, ADA < 30
Microscopy / cell count	TLC raised, DLC - predominant lymphocytes
Cytology	No malignant cells
Gram stain & zn stain	Negative
Ada	Less than 30 lu/L
Culture	Sterile
Lipase and amylase	high

Chest X ray (PA view)



Left sided massive pleural effusion



Left sided mild effusion



Left sided moderate pleural collection

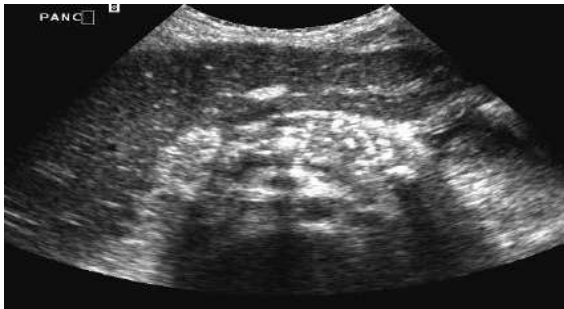


Right sided mild pleural effusion



Post-op changes

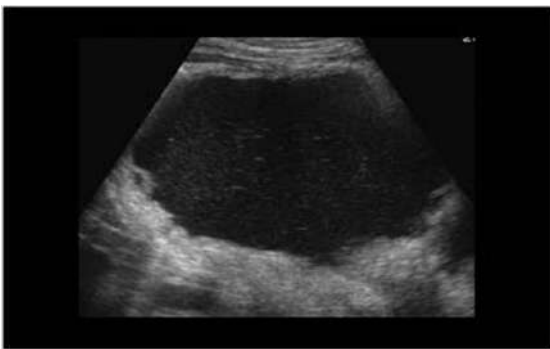
Ultrasound of the abdomen revealed features of chronic pancreatitis (pancreatic calcifications, parenchymal atrophy, dilatation of main pancreatic duct, pseudocyst)



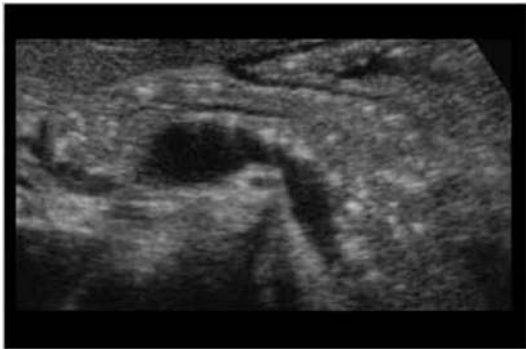
Abdominal ultrasound showing pancreatic calcifications (chronic pancreatitis)



Pancreatic pseudocyst



Pancreatic pseudocyst

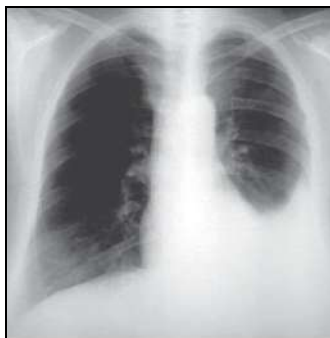


Chronic pancreatitis with pancreatic calcifications and dilated MPD

Barium swallow study revealed mild extrinsic compression over the lower thoracic esophagus.

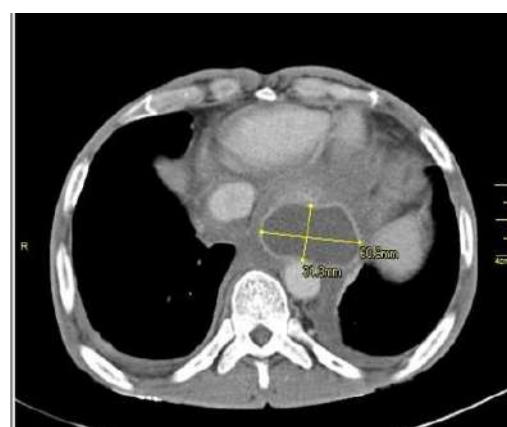
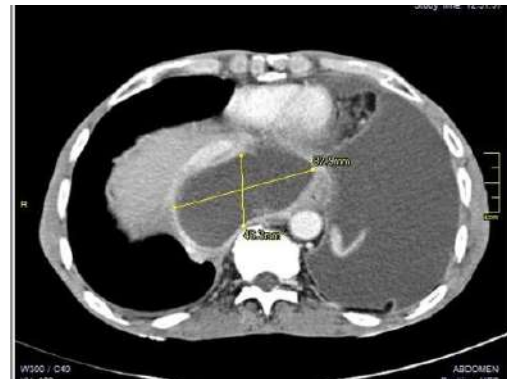


Repeat PA radiographs of the chest were performed 48 hours after the therapeutic pleural tap. To our surprise, they revealed rapid refill of the pleural collection within 48 hours.



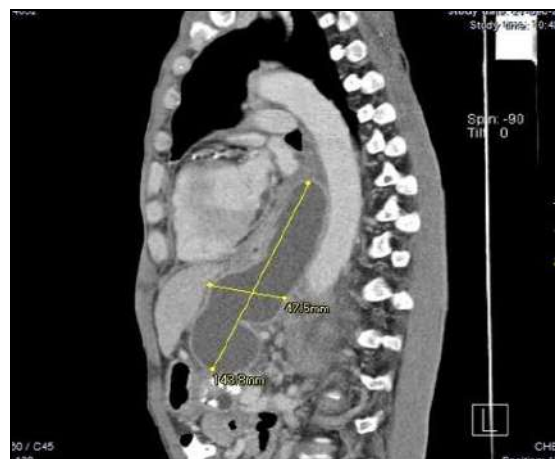
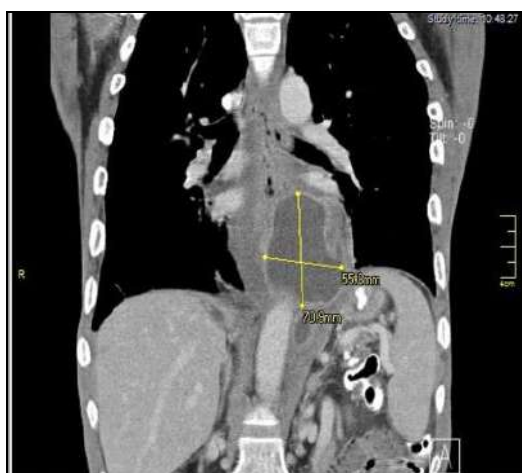
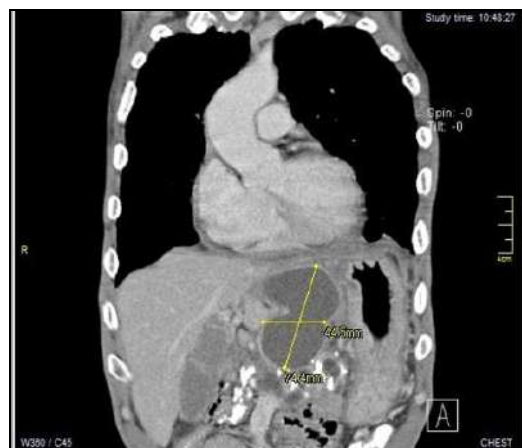
Contrast enhanced CT scans of abdomen and thorax were performed for further evaluation. On chest and abdominal contrast enhanced CT scans, cystic lesion was seen extending from the abdomen into the mediastinum along the

esophagus and aorta, presumably via the esophageal and aortic hiatus. Other findings were pleural effusions, dilatation of the main pancreatic duct and pancreatic calcifications along with parenchymal atrophy of pancreas, ascites. The connection between the mediastinal and abdominal lesions was well identified on sagittal images. Hence, the diagnosis of *chronic pancreatitis with pancreatic pseudocyst with mediastinal extension of the cyst* was made in all our five patients.





Axial CECT images showing hypodense cystic lesions of various sizes in the upper abdomen.



Coronal and Sagittal CECT images revealed features of chronic pancreatitis with pancreatic pseudocysts with mediastinal extension of the pseudocysts.

### Discussion

Pseudocysts of pancreas are a major complication resulting from chronic or acute pancreatitis. Majority of pancreatic pseudocysts (approximately 80%) are located within the head and body of the pancreas, and 20% are extra pancreatic in location seen within the pleura, mediastinum, liver, spleen, and pelvis [9]. Mediastinal pancreatic cyst (MPPs) fall into the category of thoracopancreatic fistula and occur as a result of posterior rupture of the pancreatic duct into the retroperitoneal space. Upward extension of pancreatic fluids is seen through anatomical openings of the diaphragm into the mediastinum. The fluids typically travel through the esophageal and aortic hiatus into the posterior mediastinum [10, 11]. If the diaphragm is penetrated through the inferior vena cava hiatus or the foramen of Morgagni, the fluid extends into the middle and anterior mediastinum, respectively [12]. Other symptoms like chest pain, dysphagia, dyspnea secondary to an accompanying pleural effusion, and weight loss secondary to dysphagia were seen in our patients. A history of pancreatitis or alcoholism may help in the diagnostic workup. The definitive diagnosis is based on imaging studies showing cystic lesions extending from the pancreas into the mediastinum. CT is most commonly used to establish the diagnosis, and it also helps to depict pancreatitis and the connection between the mediastinal cystic structures and the pancreas [13-14]. In all of our cases, chest and abdominal CT showed posterior mediastinal cystic lesions connected with pancreatic or peripancreatic cystic lesions via anatomical openings in the diaphragm. Pleural

effusions were also seen in all cases. Pancreatic calcifications, atrophy of pancreas, dilatation of the main pancreatic duct, pancreatic pseudocysts, the key findings of chronic pancreatitis, were seen in all cases in abdominal CT scans. The connection between mediastinal and abdominal lesions and the extension routes of pancreatic fluids through the diaphragm into the mediastinum were well identified on axial thin slice images and on coronal and/or sagittal reconstructed images.

The management of a mediastinal pancreatic pseudocyst is a difficult task. Relapses are common and procedural complications are many. A literature review revealed only a few scant reports of spontaneous resolution<sup>[15, 16]</sup>, but in the vast majority of cases intervention was mandatory. Conservative treatment with strict diet, enzyme supplementation and complete abstinence from alcohol is indicated to all stable patients. In addition, bromhexine hydrochloride and somatostatin analogues have been used in a few cases. Somatostatin and its analog octreotide are peptide hormones that inhibit the release of insulin, glucagon, gastrin, secretin, pancreaticozym and pepsin.

**Surgical inputs:** Having diagnosed as pancreatopleural fistula with chronic pancreatitis the approach from pleura to drain the effusion was futile as there was a side duct pancreatic leak and it would have given more vent and more drainage of juice from pleura and it would have created a pancreatopleuro-cutaneous fistula. So our surgeon thought that the establishment of a prograde drainage would be the best answer. It would have relieved pleural effusion if there was a patent tract and pancreatic ascites as well. Retrograde drainage would stop.

So, in all the five cases, Frey's procedure was done. It entails to Lateral Pancreaticojunostomy. Surgical details are really not warranted here. All the patients were discharged home within 6 to 9 days with no complications whatsoever.



## Conclusion

Mediastinal pancreatic pseudocysts are a rare complication of acute or chronic pancreatitis. Pancreatic ductal disruption due to inflammatory injury leads to leakage of amylase rich pancreatic secretions along the paths of least resistance or the anatomical openings of the diaphragm into the mediastinum. Posterior disruptions can lead to thoracopancreatic fistulae while anterior disruptions produce pancreatic ascites. All the five patients of pancreatitis with rapid refill of pleural collection were found to have

*mediastinal extension of the pancreatic pseudocyst with pancreatopleural fistula.*

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