Case Report

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Pneumoperitoneum in Ruptured Pancreatic Pseudocyst without Hollow Viscus Organ Perforation: A Case Report

Surgery Section

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ABSTRACT

Pancreatic pseudocysts are a recognised complication of pancreatitis, often resolving with conservative management. However, spontaneous rupture of a pseudocyst into the peritoneal cavity is a rare and life-threatening event. This is a case of a 64-year-old female with a history of diabetes mellitus, hypertension, Chronic Kidney Disease (CKD), systemic amyloidosis, and recurrent pancreatitis who presented with epigastric pain, shortness of breath, vomiting, and fever. Clinical evaluation revealed peritonitis, leukocytosis, markedly elevated inflammatory markers, and renal dysfunction. Elevated serum amylase and lipase levels supported the suspicion of pancreatitis. A plain Computed Tomography (CT) abdomen, performed due to renal impairment, revealed pneumoperitoneum with suspected gastric perforation and a large intra-abdominal collection. Exploratory laparotomy revealed no hollow viscus perforation but rupture of a pancreatic pseudocyst with approximately 450 mL of purulent fluid in the peritoneal cavity. The pseudocyst wall was partially excised, and intra-abdominal lavage was performed. Drain fluid analysis confirmed high amylase and lipase content. Histopathological examination of the cyst wall confirmed the diagnosis of a pancreatic pseudocyst with acute necrotising inflammation. The patient was managed with octreotide, haemodialysis, and Vacuum-Assisted Closure (VAC) dressing for wound complications. She recovered and was discharged on postoperative day 25 with instruction for follow-up. This case highlights the importance of considering ruptured pseudocyst in patients with a history of pancreatitis presenting with acute abdomen and pneumoperitoneum, especially when imaging mimics gastrointestinal perforation. Prompt surgical intervention and supportive care are crucial for favourable outcomes in such complex cases.

Keywords: Chronic kidney disease, Drainage, Laparotomy, Pancreatitis, Vacuum-assisted closure

CASE REPORT

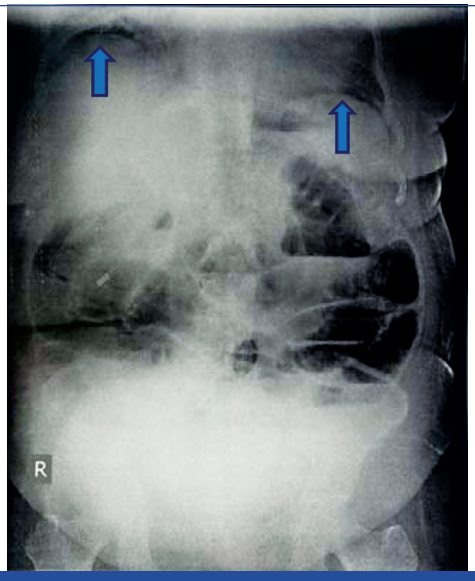
A 64-year-old female presented to the hospital with complaints of epigastric pain, which was insidious in onset, gradually progressive, dull aching, non-radiating, continuous in nature with no aggravating and relieving factors, shortness of breath, three episodes of non-bilious, non-projectile vomiting, and two episodes of fever over the past three days. Her past medical history was significant for diabetes mellitus, hypertension, CKD, and systemic amyloidosis, all diagnosed 10 years ago. She had undergone six sessions of haemodialysis over the last two years. The patient also had a history of recurrent episodes of pancreatitis, which had been managed conservatively.

On physical examination, the abdomen was distended with guarding, and bowel sounds were absent. Laboratory investigations revealed leukocytosis, elevated C-Reactive Protein (CRP), and renal dysfunction. Liver function tests were within normal limits. Serum amylase and lipase were elevated [Table/Fig-1].

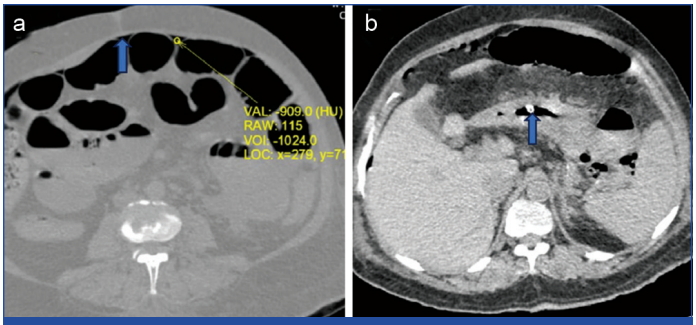
Parameter	Value	Normal range (approx.) [1]	Interpretation
WBC count	16,700/µL	4,000-11,000/µL	Elevated (Leukocytosis)
C-Reactive Protein (CRP)	250.63 mg/dL	< 1.0 mg/dL	Markedly elevated (Inflammation)
Urea	72 mg/dL	10-50 mg/dL	Elevated (Renal dysfunction)
Creatinine	5.63 mg/dL	0.6-1.2 mg/dL	Elevated (Renal dysfunction)
AST (SGOT)	11 IU/L	10-40 IU/L	Normal
ALT (SGPT)	10 IU/L	7-56 IU/L	Normal
Total bilirubin	0.66 mg/dL	0.3-1.2 mg/dL	Normal
Serum amylase	188 U/L	30-110 U/L	Elevated
Serum lipase	273 U/L	23-300 U/L	Mildly elevated

[Table/Fig-1]: Laboratory investigation.
WBC: White blood cell; AST: Aspartate aminotransferase; SGOT: Serum glutamic-oxaloacetic transaminase; ALT: Alanine transaminase; SGPT: Serum glutamic-pyruvic transaminase

On admission, X-ray of the erect abdomen showed air under the diaphragm with distended small bowel loops [Table/Fig-2]. Given the patient's impaired renal function, a plain Computed Tomography (CT) scan of the abdomen and pelvis was performed instead of a contrast-enhanced scan. Imaging revealed pneumoperitoneum [Table/Fig-3a] with suspected gastric perforation along the proximal greater curvature, multiple extraluminal gas pockets in the left upper quadrant, and a gas-fluid level collection measuring 104×68×66 mm [Table/Fig-3b]. The jejunum and proximal ileum were dilated, while the distal ileum and colon were not. The gallbladder was distended with a mildly radiodense calculus. The pancreas appeared atrophic, with a dilated main pancreatic duct and multiple radiodense calculi noted in the head and body.



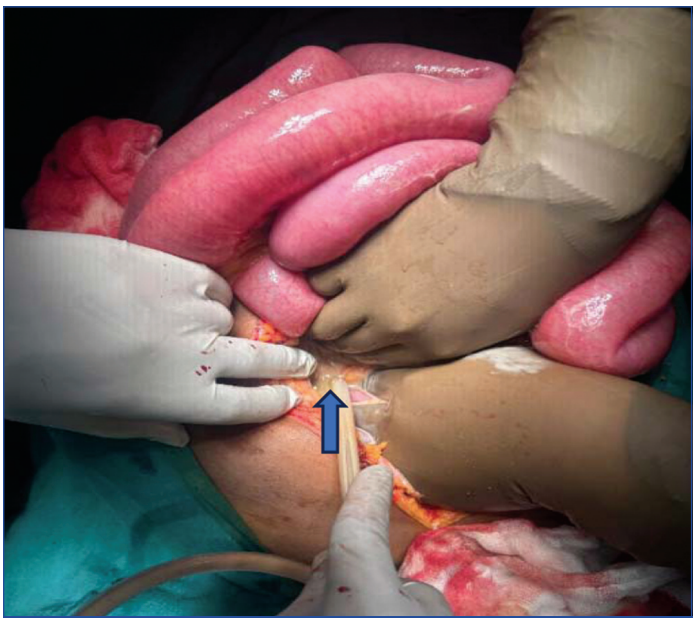
[Table/Fig-2]: X-ray of the erect abdomen showing air under the diaphragm.



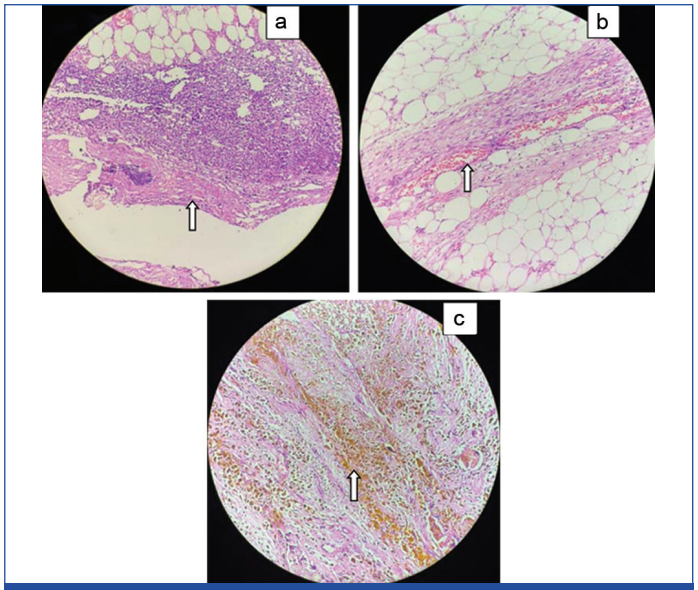
[Table/Fig-3]: CT imaging: a) Pneumoperitoneum; b) Ruptured pseudocyst of pancreas.

The patient underwent an exploratory laparotomy [Table/Fig-4]. Approximately, 450 mL of purulent fluid was aspirated from the upper abdominal cavity. Contrary to the CT findings, no gastrointestinal perforation was identified. Instead, rupture of a pancreatic pseudocyst was discovered, with the pseudocyst containing turbid fluid resembling the intra-abdominal fluid. Partial excision of the pseudocyst wall was performed, and the peritoneal cavity was irrigated with 5 L of warm normal saline. A 28Fr abdominal drain was placed in the lesser sac. The excised pseudocyst wall was sent for histopathological evaluation [Table/Fig-5a-c]. Gross examination revealed a thickened cyst wall with fibrofatty and necrotic areas. Microscopic analysis showed fibroadipose tissue with granulation tissue, acute inflammatory infiltrates, and foci of bile pigmentation, but no epithelial lining, granulomas, dysplasia, or malignancy. These features confirmed the diagnosis of a pancreatic pseudocyst with acute necrotising inflammation.

Postoperatively, brownish turbid fluid was noted in the drain on day 4 [Table/Fig-6]. Analysis of the drain fluid revealed significantly elevated enzyme levels (amylase: 13,417 U/L; lipase: >35,000 U/L). The patient was started on subcutaneous octreotide (100 mcg three times daily). She required haemodialysis on postoperative days 8 and 22. On day 8, wound soakage and suture line dehiscence were observed, for which Vacuum-Assisted Closure (VAC) dressing was applied. The abdominal drain was removed on postoperative day 24. The patient was discharged on day 25 in stable condition with instructions for follow-up in nephrology and general surgery outpatient clinics for ongoing management of CKD and wound care. Four weeks after discharge, patient was planned for secondary suturing of the abdominal wound. Suture removal was done two weeks after the secondary suturing, wound was healthy and healed. Patient was followed up at three and six months, which was uneventful.



[Table/Fig-4]: Intraoperative image showing purulent discharge from ruptured pseudocyst of pancreas.



[Table/Fig-5]: Histopathological (HPE) Images. (Haematoxylin and Eosin [H&E] staining, 20x) a) Showing cyst wall with no lining epithelium; b) Section showing congested blood vessels; c) Section showing foci of bile pigmentation.

[Table/Fig-6]: Showing brownish turbid fluid in the drain bag.

DISCUSSION

Pancreatic pseudocysts are a recognised complication of pancreatitis, typically arising following acute or chronic inflammation of the pancreas [2]. They are encapsulated collections of pancreatic fluid, rich in enzymes such as amylase and lipase, surrounded by a non-epithelial fibrous wall [3]. The incidence varies according to the underlying type of pancreatitis, with approximately 14% following acute pancreatitis and up to 41% in cases of chronic pancreatitis [4]. It generally develops several weeks after the onset of pancreatitis and may remain asymptomatic or present with non-specific symptoms such as abdominal pain, nausea, vomiting, or early satiety [2,5]. While many pseudocysts resolve spontaneously, some may persist or increase in size, necessitating intervention due to complications such as infection, haemorrhage, compression of adjacent organs, or, more rarely, rupture [2].

Spontaneous perforation of a pancreatic pseudocyst is a rare but a potentially fatal complication, particularly when rupture occurs into the peritoneal cavity rather than the gastrointestinal tract [6,7].

A case report by Koseki M and Hashimoto Y from New York, USA in September 2023 reported a similar spontaneous perforation of a pancreatic pseudocyst, where a 54-year-old man with chronic pancreatitis was found to have a large (90 mm) pancreatic pseudocyst with haemorrhagic ascites on CT [6]. He underwent Endoscopic Ultrasound (EUS) guided cystogastrostomy using

a Lumen-Apposing Metal Stent (LAMS) with balloon dilation and lavage. Initially, he improved, but a week later developed worsening symptoms. Imaging revealed a new large (20 cm) fluid collection and free air in the peritoneum, indicating pseudocyst perforation and peritonitis. Emergent endoscopy confirmed a large pseudocyst perforation into the peritoneal cavity. Percutaneous drainage was performed, leading to improvement. After conservative management, the patient was discharged on day 25, and the LAMS and percutaneous drain were removed uneventfully on day 46.

A case report by Chtourou MF et al., from Tunisia, North Africa in March 2023 reported a similar spontaneous perforation of a pancreatic pseudocyst, where a 46-year-old woman with chronic pancreatitis and a known 3 cm pancreatic pseudocyst presented with 24 hours of vomiting, severe abdominal pain, fever, tachycardia, hypotension, and diffuse abdominal tenderness [4]. Laboratory investigations showed leukocytosis, high CRP, and renal dysfunction. CT revealed a 7 cm infected pseudocyst with extra-luminal gas and free fluid, indicating rupture. Following resuscitation, she underwent a midline laparotomy revealing generalised purulent peritonitis due to a ruptured infected pseudocyst. Surgery included thorough lavage and drainage with two Redon drains. Postoperatively, she developed pneumonia, treated successfully. She was discharged after 25 days with no complications at the one month follow-up.

While rupture into the Gastroinstestinal (GI) tract may lead to spontaneous decompression of the pseudocyst via natural drainage, perforation into the peritoneal space can result in severe outcomes, including peritonitis, haemorrhagic ascites, and pneumoperitoneum [7,8]. The pathophysiology of spontaneous rupture is not entirely understood, though it is believed to be driven by the enzymatic degradation of the cyst wall due to activated proteolytic enzymes such as elastase and trypsin [8]. It has also been reported that diagnostic interventions like endoscopy can also contribute to the rupture as reported by Robbins G et al., [9].

Early diagnosis remains a challenge; however, imaging modalities like CT scans typically reveal features such as free peritoneal fluid, air, and pseudocyst collapse [10]. In some recent case reports, EUS and upper endoscopy have even enabled direct visualisation of the rupture site and associated peritoneal collections, offering critical insights into disease progression and informing targeted intervention strategies [5,11]. Surgical treatment for a ruptured and infected pancreatic pseudocyst should be initiated as early as possible following brief but effective resuscitation [4]. Delay in intervention can lead to severe complications such as peritonitis, sepsis, or multiorgan dysfunction due to the spread of infected pancreatic fluid into the peritoneal cavity. Laparotomy remains the gold standard approach, especially in patients presenting with signs of generalised peritonitis, haemodynamic instability, or when imaging suggests extensive intra-abdominal contamination. However, in the absence of peritonitis and when the condition permits, internal drainage of the pseudocyst into the gastrointestinal tract is the preferred surgical option [12]. Rocha R et al., reported two cases and concluded that optimal surgical approach is internal drainage of the cyst into the gastrointestinal tract; however, in certain situations, external drainage may be the only viable option. Postoperatively, the patient was managed with subcutaneous octreotide, a synthetic somatostatin analogue that plays a crucial role in reducing pancreatic exocrine secretions [13].

CONCLUSION(S)

Spontaneous rupture of a pancreatic pseudocyst into the peritoneal cavity is a rare but serious complication that can mimic gastrointestinal perforation. Prompt surgical exploration is essential, especially when imaging and clinical findings suggest peritonitis. This case underscores the need for high clinical suspicion in patients with prior pancreatitis and pneumoperitoneum. Early diagnosis and timely intervention are crucial to prevent morbidity and mortality. A multidisciplinary approach ensures optimal recovery and long-term management.

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