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Case Report

Abdominal sepsis due to rupture of a giant pancreatic pseudocyst: a life-threatening complication

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ABSTRACT

Giant pancreatic pseudocysts (>10 cm) are uncommon sequelae of severe pancreatitis and are associated with a higher risk of complications, including infection, hemorrhage, and, rarely, spontaneous rupture. This latter complication is life-threatening and requires urgent diagnosis and intervention. Although endoscopic approaches have become standard in stable patients, the role of surgical management remains pivotal in critically ill individuals. We report the case of a 22-year-old female with a history of severe acute pancreatitis and a previously drained pancreatic pseudocyst who presented with clinical signs of sepsis and acute peritonitis. Imaging revealed rupture of a large infected pseudocyst into the lesser sac with associated intra-abdominal collections. Emergency exploratory laparotomy was performed, followed by transgastric drainage and open cystogastrostomy. A comprehensive review of the current literature on diagnosis and management strategies for ruptured pseudocysts was also conducted. Intraoperative findings confirmed the presence of purulent intra-abdominal collections secondary to rupture of the giant pseudocyst. Approximately 450 ml of infected fluid was drained, and a cystogastrostomy was successfully created. The patient's postoperative course was favorable, with resolution of sepsis, gradual recovery of gastrointestinal function, and discharge with complete clinical improvement. The review highlights the importance of early imaging-based diagnosis and the selection of appropriate intervention based on clinical severity. Spontaneous rupture of giant pancreatic pseudocysts is a rare but life-threatening event that necessitates high clinical suspicion and prompt surgical management, particularly in unstable patients. While minimally invasive techniques are first-line for selected cases, open surgical drainage remains essential for effective source control in critical scenarios. This case contributes to the limited literature on surgical resolution of ruptured pseudocysts and underscores the importance of individualized, multidisciplinary approaches in optimizing outcomes.

Keywords: Pancreatic pseudocyst, Giant pseudocyst, Acute pancreatitis, Cystogastrostomy, Infected pseudocyst, Peritonitis, Critical care, Abdominal sepsis

INTRODUCTION

Pancreatic pseudocysts are encapsulated collections of pancreatic fluid lacking an epithelial lining and represent a well-recognized complication of both acute and chronic pancreatitis. While most small pseudocysts (<4 cm) tend to resolve spontaneously, larger ones—particularly those exceeding 10 cm, referred to as "giant pseudocysts"—are associated with a higher risk of complications such as infection, hemorrhage, compression of adjacent structures, and, in rare cases, spontaneous rupture.[1,2] This latter event is an uncommon but potentially fatal condition that may rapidly progress to chemical or septic peritonitis and hypovolemic shock.[3-14,15]

The clinical presentation of spontaneous rupture varies depending on the site of leakage and may include acute abdominal pain, peritoneal signs, fever, nausea, hemodynamic instability, or gastrointestinal hemorrhage.[6]

Diagnosis is primarily based on imaging studies, with contrast-enhanced computed tomography being the modality of choice to characterize the collection, determine its size and contents, and identify associated complications. Endoscopic ultrasound and fine-needle aspiration of cyst fluid can be valuable for confirming the benign nature of the pseudocyst and excluding cystic neoplasms.[16,17]

In this article, we present the clinical case of a patient with spontaneous rupture of a giant pancreatic pseudocyst as an unusual manifestation of chronic pancreatitis, progressing to septic peritonitis. We discuss the diagnostic and therapeutic approach and provide an updated review of the literature, with emphasis on clinical, endoscopic, and surgical management strategies in this challenging scenario.

CASE REPORT

A 22-year-old female patient with a recent diagnosis of diabetes mellitus initially presented four months earlier with a hyperglycemic crisis complicated by severe acute pancreatitis, which required management in the intensive care unit. Her clinical course was further complicated by the development of a pancreatic pseudocyst, which was managed with percutaneous drainage eight weeks after the initial event.

She presented to the emergency department with complaints of fever, abdominal pain, nausea, vomiting, and oral intolerance. On physical examination, she was found to be hypotensive and tachycardic, with marked abdominal distension and clear signs of peritoneal irritation. Initial management included intravenous crystalloids and empiric broad-spectrum antibiotic therapy, without clinical improvement. The patient was admitted to the intensive care unit, where she required vasopressor support and supplemental oxygen. Laboratory tests revealed leukocytosis (15,000/µl).

Contrast-enhanced abdominal computed tomography revealed a pancreatic pseudocyst measuring 12 × 11 × 10 cm (estimated volume: 632 ml) containing heterogeneous material and gas, with evidence of rupture into the lesser sac, which showed significant intraluminal gas and scant fluid. Multiple intra-abdominal collections were identified, including a 13 × 11 × 7 cm collection (approximately 523 ml) extending toward the space of Retzius, also containing fluid and gas. (Figure 1 and 2)

A decision was made to proceed with exploratory laparotomy. Multiple adhesions between intestinal loops and between loops and the abdominal wall were identified. An incision was made on the anterior gastric wall, allowing visualization of the posterior gastric mucosa. Through palpation, the location of the pseudocyst was identified, punctured, and approximately 450 cc of foul-smelling purulent fluid was drained. A posterior gastrotomy was then performed to access the pseudocyst cavity, followed by the creation of a cystogastrostomy. The abdominal cavity was thoroughly irrigated, and adhesiolysis was performed.

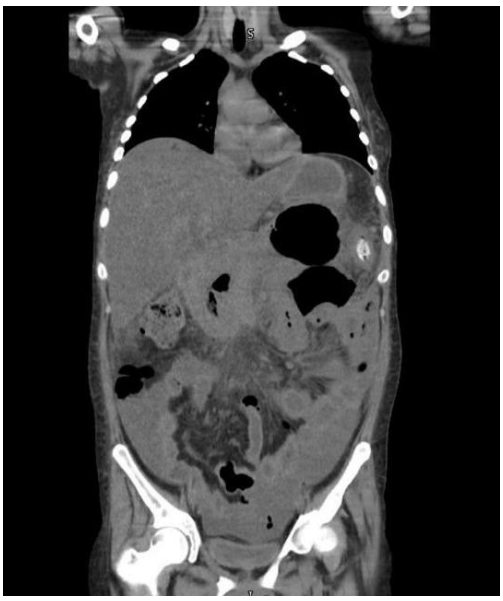

Figure 1: Coronal section of a CT scan revealed a pancreatic pseudocyst measuring 12 × 11 × 10 cm (estimated volume: 632 ml) containing heterogeneous material and gas, with evidence of rupture into the lesser sac.

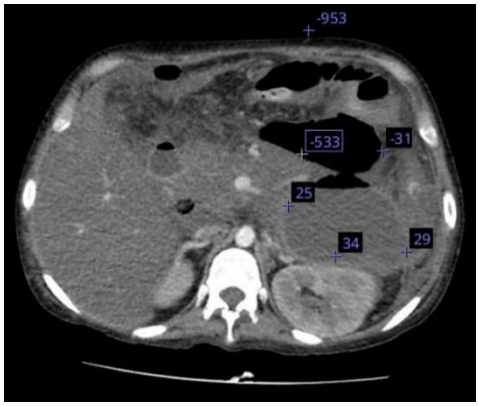

Figure 2: Axial section of our patient's tomography showing a pancreatic pseudocyst containing heterogeneous material and gas, with evidence of rupture into the lesser sac.

Postoperatively, the patient remained in the intensive care unit for close monitoring. She showed favorable clinical evolution, with stable vital signs, no further need for vasopressors or supplemental oxygen, and was initiated on progressive parenteral nutrition. A nasogastric tube drained biliary output, while abdominal drains had minimal serosanguineous output. Broad-spectrum antibiotics were continued, with noted improvement in systemic inflammatory response parameters. The patient was eventually transitioned to an oral diet, which was well tolerated.

DISCUSSION

Pancreatic pseudocysts are a recognized complication of both acute and chronic pancreatitis. Their development involves the formation of an encapsulated collection of pancreatic fluid, without solid components, surrounded by a non-epithelialized fibrous wall. They are considered "giant" when exceeding 10 cm in diameter, although cases of up to 25–30 cm have been reported.[1,2] Spontaneous rupture of a giant pancreatic pseudocyst (≥10 cm) is a rare but devastating complication, associated with a high risk of abdominal sepsis and mortality. While the Atlanta classification recommends conservative management of pancreatic collections in the absence of complications, rupture constitutes a surgical emergency that requires prompt and effective intervention.[8,9]

Up to 40–50% of cases are associated with chronic alcoholic pancreatitis, although giant pseudocysts can also develop in severe forms of acute pancreatitis, such as necrotizing pancreatitis, and in cases of significant pancreatic trauma. They are more common in men, primarily due to the higher prevalence of alcoholic pancreatitis in males.[10] Small pseudocysts (<4 cm) resolve spontaneously in 50–70% of cases within 6–12 weeks; however, those larger than 6 cm have a spontaneous resolution rate of only 10–20% without intervention.[11]

The pathogenesis of sepsis secondary to a pancreatic pseudocyst involves several mechanisms, including bacterial translocation from the intestine, fistulous communication with hollow viscera, and hematogenous spread.[3,4] Once a pseudocyst becomes infected, it evolves into a pancreatic abscess, releasing systemic inflammatory mediators that trigger sepsis. This progression occurs more frequently and rapidly in giant pseudocysts due to their size and poor spontaneous drainage.[1,5]

Spontaneous rupture of a pancreatic pseudocyst is rare but potentially fatal. The clinical presentation varies depending on the rupture site. If the pseudocyst ruptures into the peritoneal cavity, it can cause acute peritonitis characterized by sudden abdominal pain, peritoneal signs, and septic shock. Involvement of vascular structures may result in massive intra-abdominal or gastrointestinal hemorrhage, presenting with hematemesis, melena, and hemodynamic collapse. In more insidious cases, rupture into the retroperitoneum or adjacent organs may lead to persistent abdominal pain, fever, diarrhea, or low-grade chronic bleeding.[9,14,15]

Among the leading causes of spontaneous rupture are progressive cyst growth—particularly when exceeding 10 cm—generating internal pressure that weakens the fibrous wall. This is the most common mechanism.[12] Infection leads to necrosis and wall weakening, increasing the risk of rupture into the peritoneal or retroperitoneal space or adjacent structures.[10] The leakage of digestive enzymes (e.g., trypsin, elastase) into the cyst cavity may autodigest the wall and precipitate rupture.[13]

Patients with infected pseudocysts may present with persistent abdominal pain, distension, nausea, fever, leukocytosis, and clinical signs of sepsis. The presence of intralesional gas (air-fluid levels) on contrast-enhanced computed tomography (CT) is pathognomonic for infection.[6] Other findings may include displacement of adjacent organs, gastric outlet obstruction, and splenic or portal vein thrombosis.

The diagnosis of pancreatic pseudocysts is based on a combination of clinical history, imaging studies, and cyst fluid analysis. They should be suspected in patients with a history of acute or chronic pancreatitis, pancreatic surgery, or trauma who present with persistent abdominal pain, nausea, or a palpable mass. Contrast-enhanced CT is the imaging modality of choice, with nearly 100% sensitivity. It typically reveals well-defined fluid collections with homogeneous content and non-enhancing walls, and it can also identify complications such as infection, hemorrhage, or rupture.[16,17] Magnetic resonance imaging (MRI) and MR cholangiopancreatography (MRCP) are useful for assessing ductal communication and the presence of debris or solid components.[17]

Endoscopic ultrasound (EUS), highly sensitive and specific, distinguishes pseudocysts from cystic neoplasms via fine-needle aspiration (FNA). Analysis of cyst fluid shows elevated amylase levels (>5,000 U/l) and low carcinoembryonic antigen (CEA<5 ng/ml), findings typical of pseudocysts and useful for ruling out mucinous lesions.[17,18] This comprehensive approach facilitates accurate diagnosis and optimal treatment planning.

Initial treatment requires ICU admission with aggressive fluid resuscitation, broad-spectrum antibiotics (e.g., piperacillin-tazobactam or carbapenems), and organ support as needed.[4,6] Source control through endoscopic transgastric drainage under EUS guidance using lumen-apposing metal stents (LAMS) is the first-line treatment for infected pseudocysts >10 cm, particularly if the cyst is located <10 mm from the gastric wall.[2,6] Clinical success exceeds 90%. The additional placement of double pigtail stents (DPS) within the LAMS has been shown to reduce secondary infectious complications.[7]

Percutaneous drainage is an alternative in cases not amenable to endoscopic access or in unstable patients, though it carries a higher rate of reintervention and prolonged external fistula formation.[4] Surgical interventions (open or laparoscopic cystogastrostomy) is reserved for failures of minimally invasive approaches, the presence of pancreatic necrosis, active hemorrhage, or splenic vein thrombosis.[5]

In cases of intraperitoneal rupture with peritonitis, infection, gastrointestinal obstruction, or symptomatic collections, drainage is mandatory. Options include: Endoscopic drainage (EUS-guided cystogastrostomy or transpapillary drainage): suitable when the cyst wall is mature and accessible; it offers 70–95% success, lower

morbidity, and shorter hospitalization compared to percutaneous or surgical approaches. Surgical drainage (laparoscopic/open cystogastrostomy or cystojejunostomy): effective in complex anatomies or recurrences, with >98% success but longer recovery. Percutaneous drainage: preferred in critically ill patients or immature cysts; however, its success rate is ~31%, and it has a higher risk of external fistula and prolonged hospital stay.[19]

Post-drainage follow-up should include serial imaging (CT or EUS), clinical monitoring for sepsis, and removal of LAMS within 4–6 weeks to prevent stent migration, bleeding, or gastric ulceration.[6,7]

CONCLUSION

Spontaneous rupture of a giant pancreatic pseudocyst is a rare but life-threatening complication that demands prompt diagnosis and surgical intervention. This case highlights the clinical relevance of early recognition of sepsis and peritoneal signs in patients with a known history of severe acute pancreatitis and previously diagnosed pseudocysts. The presence of gas within the collection and the progression to systemic inflammatory response underscore the importance of imaging in guiding timely therapeutic decisions.

While endoscopic drainage remains the first-line approach in stable patients, this case illustrates that open surgical cystogastrostomy continues to be a life-saving option in critically ill patients with rupture and generalized peritonitis. A multidisciplinary approach, including intensive care support, source control, and close postoperative monitoring, is essential to ensure favorable outcomes in these high-risk scenarios.

This report reinforces existing evidence regarding the behavior and complications of giant pseudocysts and adds to the limited body of literature describing successful surgical management of spontaneous rupture. Continued awareness and prompt surgical evaluation remain critical in improving patient survival in this rare but severe condition.

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