Case Report

Interventional management and diagnostic follow-up of a large pancreatic pseudocyst: A case report∗

Derek Groskreutz, MResa,∗, Yasir Ahmad, MDb, Jose Vargas, MDc, Richard Assaker, MDb

a Frank H. Netter MD School of Medicine, Quinnipiac University, 370 Bassett Rd, North Haven, CT 06473, USA
b Department of Radiology, St. Vincent’s Medical Center, Bridgeport, CT, USA

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a B S T R A C T

We present a case of a large pancreatic pseudocyst in a 69-year-old man following post biopsy pancreatitis. Radiological findings revealed a thick-walled, fluid filled mass in proximity to the pancreas. Although pancreatic pseudocysts generally self-resolve, extensive or complicated cysts may require surgical or interventional management. Pseudocyst size >6 cm, compression of the inferior vena cava or biliary duct, and severe symptoms often prognosticate the need for intervention.

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Introduction

A pancreatic pseudocyst is a fluid collection encapsulated by a non-epithelial, fibrous granulation tissue without necrosis. It is a common complication of chronic pancreatitis and, to a lesser extent, acute pancreatitis, alcohol, and gallstones. Pancreatic pseudocysts form when damage to the pancreatic duct leads to extravasation and subsequent collection of pancreatic fluid and enzymes within the parenchyma.

Since pancreatic pseudocysts most commonly follow pancreatitis, their etiology and epidemiology are similar. As with pancreatitis, the incidence of pseudocysts is higher in men, with alcohol consumption linked to over 70% of cases [1]. Pseudocysts develop more often from chronic pancreatitis (incidence rates of 20%-40%) than from acute pancreatitis (5%-16%), likely due to the increased chance of duct damage with increased duration of pancreatic inflammation [2]. Regardless of etiology, the incidence of pseudocysts is 0.5-1 per 100,000 per year [2].

Without complications, pseudocysts are usually asymptomatic and resolve spontaneously. If intervention is warranted, analgesics, antiemetics, and low fat diet can be effective. If symptoms persist, more invasive treatment may be necessary. We present such a case with the clinical and radiological findings and a review of the literature.

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∗ Corresponding author.
E-mail address: derek.groskreutz@quinnipiac.edu (D. Groskreutz).
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A 69-year-old male with a past medical history of COPD, tobacco use disorder, and hyperlipidemia came to the VA on 12/30/2021 to undergo routine lung cancer screening. Computed tomography (CT) scan incidentally revealed a pancreatic mass that was subsequently biopsied and found negative for malignancy.

One month later (1/29), the patient presented to the ED with abdominal pain, nausea, and anorexia. CT of the abdomen revealed a fluid collection around the head of the pancreas, which, along with the patient’s symptoms, were presumed to be secondary to post biopsy pancreatitis. The patient was admitted and follow up CT 2 weeks later showed a 10 × 10 cm fluid collection extending from the pancreatic head downward retroperitoneally to the right inguinal canal with signs of biliary compression, right sided hydronephrosis, and IVC compression. Interventional radiology was consulted and suggested initial medical management, which consisted of low fat diet and pain management. The patient was discharged on 3/8 after meeting nutritional and caloric goals.

The patient returned to the ED on 3/21 again with anorexia, nausea, vomiting, worsening abdominal pain and right lower flank pain radiating to the right thigh. CT scan of the abdomen and pelvis revealed a 10.2 × 10 cm multiloculated fluid collection extending from the head of the pancreas to the lower right psoas muscle, deviating the right colon (Fig. 1). Interventional radiology placed a 12 F drain that drained 1.5 L of fluid.

Subsequent magnetic resonance cholangiopancreatography (MRCP) showed evidence of potential pancreatic fistula, confirming multiple loculated fluid collections within and around the pancreatic head extending to the right anterior pararenal space (Fig. 2). The collection’s irregular shape limited measurement but the overall size and appearance appeared grossly unchanged.

Following MRCP findings, Gastroenterology (GI) was consulted and the patient underwent endoscopic retrograde cholangiopancreatography (ERCP) to attempt placement of a pancreatic duct stent. Stent placement was unsuccessful due to duodenal ulceration and extensive pancreatic inflammation without hemorrhage. Injection of contrast revealed disrupted filling in the region of the pancreatic head with partial filling of the common bile duct with visualization of bile and contrast exiting the ampullary orifice. Given unsuccessful stent placement, conservative management was recommended.

Two days after ERCP, the patient developed a fever of 102.7°F and leukocytosis, concerning for infected pancreatic pseudocyst or walled off necrosis. The patient was started on antibiotics and parenteral feeding due to continued weight loss and malnutrition. The drain continued to output 700-1300 mL every 24 hours. Over the next few days, blood cultures were negative and interventional radiology conducted a CT guided abscess drainage after subsequent CT scan reported that the pseudocyst had increased in size, measuring 14.8 × 13.1 cm compared to the previous 10.2 × 10.0 cm. A second 14 F drain was placed. CT imaging confirmed drain placement in the RUQ and RLQ. Subsequently, after lack of clinical improvement, increased right thigh swelling, and drain cloggage, both drains were eventually exchanged and upsized to 16F, after which 1100 mL was drained over the next 24 hours.

Drain flushes were continued every 4 hours and the patient began to clinically improve over the next few days. By 4/25, almost 3 months after initial presentation, the patient was able to tolerate diet without nausea and had bowel function. The patient was given instructions on diet, activity, medications, and follow-up and was discharged without further complications.

**Discussion**

A pancreatic pseudocyst is a non-epithelialized fluid collection comprised of pancreatic enzymes, blood, and non-

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**Fig. 1** 51 days after initial presentation (A) coronal, (B) sagittal, and (C) axial contrast-enhanced CT of the abdomen and pelvis demonstrating a 10.2 × 10.0 cm multiloculated fluid collection (arrows) extending from the region of the pancreatic head inferiorly along the anterior pararenal space and lower right retroperitoneum abutting the psoas muscle (arrow head) and deviating the right colon anteriorly.
necrotic tissue. Pancreatic pseudocysts occur when damage to pancreatic ducts results in leakage and accumulation of pancreatic fluid. They are often a complication of chronic pancreatitis and less often acute pancreatitis. Symptoms generally include anorexia; nausea; and vomiting (50%), weight loss (20%-51%) and abdominal pain (76%-94%) [3].

While clinical presentation is usually non-specific, a history of acute or chronic pancreatitis with radiological findings of a thick-walled, fluid filled mass in proximity to the pancreas is highly characteristic. Additional supportive imaging characteristics include the presence of pancreatic or peripancreatic inflammation and fat stranding, atrophy or calcification of the pancreatic parenchyma, and dilated irregular pancreatic duct with calcifications [4].

If a diagnosis of pancreatic pseudocyst is suspected, ultrasound and CT are the most common imaging modalities, though magnetic resonance imaging (MRI) is more specific. The use of ultrasound is limited by patient habitus and the anatomical localization of the pancreas lying posterior to the gas-filled stomach which can obstruct visualization [5]. CT is considered the gold standard for both initial assessment and follow up [6]. The use of MRI allows for visualization of the internal structure of the pseudocyst, the presence of bleeding, and the specific relationship between pancreatic ducts and the pseudocyst, but cost and availability limit its use as a first line diagnostic tool [7].

Imaging typically reveals a round, well-defined cyst with clear debris. It must be noted, however, that if the pseudocyst is complicated by infection or hemorrhage, the imaging presentation can be more complex [8]. While a pseudocyst can present similarly to pancreatic necrosis, CT provides the ability to differentiate by recognition of solid components and/or heterogeneous solid debris. MRI is the most sensitive for detecting hemorrhage. Pancreatic pseudocysts typically exhibit T1 hypointensity and T2 hyperintensity, while bleeding and the accumulation of proteinaceous fluid will display T1 hyperintensity [8].

A 1995 study of 50 pancreatic cystic lesions found that amylase levels >5000 U/mL had a 94% sensitivity rate and 74% specificity rate for differentiation pseudocysts from other pancreatic cystic lesions [9]. Low levels of carcinoembryonic antigen (CEA) were found to be characteristic of both serous cystadenomas and pseudocysts. Additional studies have shown that combined tumor markers were able to differentiate pre-malignant lesions from pseudocysts with 95% accuracy and 3.6% false positive rate [10]. Thus, drainage and assessment of cystic fluid can be effective at differentiating a true pancreatic pseudocyst from other malignant or pre-malignant cysts.

Once diagnostic work up is complete, initial management is primarily concerned with avoiding complications. Most pseudocysts will spontaneously resolve within 6 weeks [11,12]. During this time asymptomatic patients and those with mild symptoms are given supportive care with nasogastric feeding, proton pump inhibitors, and octreotide to reduce pancreatic secretions. Pseudocysts that cause symptoms or persist beyond 6 weeks have a higher risk of complication and require intervention. Endoscopic drainage is the preferred drainage method but can lead to bleeding, perforation, and secondary infection. Percutaneous drainage is associated with higher morbidity, longer hospital stays, and longer placement of drains compared to endoscopic methods [12-14]. When a pancreatic pseudocyst is infected, however, percutaneous drainage has been shown to have a 95% success rate [15]. Surgical management is considered third line as it can have similar efficacy rates to less invasive methods but higher complication rates. Surgery is, however, is indicated in cases of chronic cysts or infected pancreatic necrosis and sterile necrosis with symptoms [12-14]. Studies suggest that patients with the following characteristics were more likely to require interventional management: pseudocyst compression of the duo-

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**Fig. 2 – 52 days after initial presentation (A) coronal and (B) axial MRCP show continued fluid collection extending from the dorsal aspect of the pancreatic body along the posterior aspect of the superior mesenteric artery and anterior margin of the right renal vein.**
denum; vasculature; or bile ducts, the presence of pancreatic ascites or a pancreatic-pleural fistula, infection of the pseudocyst, hemorrhage, severe symptoms, and asymptomatic pseudocysts measuring >6 cm [16–18].

**Conclusion**

We present the case of a patient with an extensive pancreatic pseudocyst following presumed post-EGD biopsy pancreatitis. The pseudocyst documented size of 14.8 × 13.1 cm. Medical management and supportive measures were initially selected due to the patient’s medical history and high risk status. A review of the literature, however, suggests that the eventual need for interventional measures was likely prognosticated by IVC and biliary duct compression, pseudocyst size >6 cm, and severe symptoms of anorexia, nausea, vomiting, worsening abdominal pain and right lower flank pain radiating to the right thigh.

**Patient consent**

This statement confirms that written, informed consent for publication of their case was obtained from the patient(s).

**REFERENCES**

[1] Habashi S, Draganov PV. Pancreatic pseudocyst. World J Gastroenterol 2009;15(1):38. doi:10.3748/wjg.15.38.

[2] Misra D, Sood T. Pancreatic pseudocyst. StatPearls [Updated 2021 Nov 17]. Treasure Island (FL): StatPearls Publishing; 2022. [Internet]Available from: https://www.ncbi.nlm.nih.gov/books/NBK557594/.

[3] Vignesh S, Brugge WR. Endoscopic diagnosis and treatment of pancreatic cysts. J Clin Gastroenterol 2008;42(5):493–506. doi:10.1097/mcg.0b013e3181616159.

[4] Busireddy K, AlObaidy M, Ramalho M, Kalubowila J, Baodong L, Santagostino I, et al. Pancreatitis-imaging approach. World J Gastrointest Endosc 2014;6(3):252–70.

[5] Aghdassi AA, Mayerle J, Kraft M, Sielenkämper AW, Heidecke C-D, Lerch MM. Pancreatic pseudocysts—when and how to treat? HPB 2006;8(6):432–41. doi:10.1080/13651820600748012.

[6] Aghdassi A, Mayerle J, Kraft M, Sielenkämper AW, Heidecke C-D, Lerch MM. Diagnosis and treatment of pancreatic pseudocysts in chronic pancreatitis. Pancreas 2008;36(2):105–12. doi:10.1097/mpa.0b013e31815a8887.

[7] Khanna AK, Tiwary SK, Kumar P. Pancreatic pseudocyst: therapeutic dilemma. Int J Inflamm 2012;2012:1–7. doi:10.1155/2012/279476.

[8] Tan JH, Chin W, Shaikh AL, Zheng S. Pancreatic pseudocyst: Dilemma of its recent management (review). Exp Ther Med 2020;21(2):159. doi:10.3892/etm.2020.9590.

[9] Hammel P, Levy P, Voitot H, Levy M, Vilgrain V, Zins M, et al. Preoperative cyst fluid analysis is useful for the differential diagnosis of cystic lesions of the pancreas. Gastroenterology 1995;108(4):1230–5. doi:10.1016/S0016-5085(95)90224-4.

[10] Sperti C, Pasquale C, Guolo P, Polverosi R, Liessi G, Pedrazzoli S. Serum tumor markers and cyst fluid analysis are useful for the diagnosis of pancreatic cystic tumors. Cancer 1996;78(2):237–43. doi:10.1002/(SICI)1097-0142(19960715)78:2::AID-CNCR3.0.CO;2-1.

[11] Yeo CJ, Bastidas JA, Lynch-Nyhan A, Fishman EK, Zinner MJ, Cameron JL. The natural history of pancreatic pseudocysts documented by computed tomography. Clin Imaging 1990;14(4):350. doi:10.1016/0899-7011(90)90066-k.

[12] Rahemtai-Azar AA, Sutter C, Hayat U, Glessing B, Ammom I, Tavri S. Multidisciplinary management of complicated pancreatitis: what every interventional radiologist should know. Am J Roentgenol 2021;217(4):921–32. doi:10.2214/ajr.20.25168.

[13] Nair RJ, Lawler L, Miller MR. Chronic pancreatitis. Am Fam Physician 2007;76(11):1679–88.

[14] Chauhan SS, Forsmark CE. Evidence-based treatment of pancreatic pseudocysts. Gastroenterology 2013;145(3):511–13. doi:10.1053/j.gastro.2013.07.016.

[15] Cantasdemir M, Kara B, Kantarcı F, Mihmanli I, Numan F, Erguney S. Percutaneous drainage for treatment of infected pancreatic pseudocysts. Southern Med J 2003;96(2):136–40. doi:10.1097/01.SMJ.0000050682.65270.38.

[16] D’Egidio A, Schein M. Pancreatic pseudocysts: a proposed classification and its management implications. Br J Surg 1991;78(8):881–4. doi:10.1096/bjs.180078029.

[17] Magyar A, Tibanyi T, Szlávik R, Flautner L. Pancreatic pseudocysts causing compression symptoms. Acta Chir Hung 1994;34(1-2):59–67.

[18] Alhajji W, Nour-ElDin NA, Naguib NN, Lehnert T, Koitka K, Vogt TJ. Pancreatic pseudocyst eroding into the splenoportal venous confluence and mimicking an arterial aneurysm. Radiol Case Rep 2016;4(1):234. doi:10.2484/racr.v4i1.234.