Clinical Vignettes**Foreign Body-Induced Abscess Resembling Pancreatic Neoplasia**

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We report the case of a 44-year-old man presenting with abdominal pain and leukocytosis. His initial computed tomography demonstrated a pancreatic head mass concerning for pancreatic adenocarcinoma. However, on further review of the patient's imaging, the mass was determined to be an abscess caused by foreign body ingestion and gastric perforation rather than cancer. This report describes the clinical and radiographic distinctions between pancreatic neoplasia and abscess. It also reviews the pertinent medical literature on how such viscus perforations affect subsequent prognostication and clinical management.

KEY WORDS: pancreatic neoplasia; pancreatic cancer; foreign body; abscess.

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CASE REPORT

A 44-year-old man presented to the emergency room late one evening with five days of abdominal pain. He described the pain as a sharp and burning sensation throughout his abdomen; it did not improve or worsen with food and did not radiate to his back. He denied fevers, nausea, vomiting, hematochezia, melena or clay-colored stools. He had experienced a similar pain three months prior that resolved within days without intervention. His primary care physician had treated him for gastroesophageal reflux disease and *Helicobacter pylori* several years prior to presentation. He had no history of abdominal surgeries. He took no medications; specifically, he did not take non-steroidal anti-inflammatory drugs or aspirin.

On physical examination, the patient was an overweight, normotensive and afebrile man in obvious discomfort. His abdominal exam was notable for epigastric tenderness and voluntary guarding but without rebound,

palpable masses or a Murphy's sign. His WBC count was elevated at 19.4 mg/dL (82 % neutrophils), and his liver and pancreatic serologic panels were normal. A computed tomography (CT) of the abdomen and pelvis with oral and intravenous contrast demonstrated a 2.0×1.4×2.0 cm mass in the pancreatic head, which was interpreted by the overnight radiologist as a possible pancreatic adenocarcinoma (Fig. 1). Sagittal views on the CT demonstrated a linear density between the mass and the stomach (Fig. 2) consistent with retained suture material per that preliminary report. To further characterize the concerning mass, follow-up magnetic resonance imaging (MRI) and magnetic resonance cholangiopancreatography (MRCP) were performed several hours later: they showed that the mass was in fact not an outgrowth of the pancreas but rather a distinct phlegmonous collection superior and lateral to the pancreas and that the linear density seen on CT was more consistent with an ingested bone that had perforated through the stomach wall to the peripancreatic region (Fig. 3).

The patient was admitted to the medicine service and underwent endoscopy for possible extraction of the foreign body from the lumen of the stomach; however, no foreign body was visualized by this modality. The patient was subsequently transferred to the surgery service for an exploratory laparotomy, abscess drainage, foreign body removal and partial gastrectomy, which he tolerated well. The final pathology showed a 3.0×0.1×0.1 cm piece of translucent white material consistent with a bone, and the portion of the stomach wall excised demonstrated mucosal hemorrhage with both acute and chronic mural inflammation.

A gram stain collected from the abscess showed sparse gram-positive cocci with few white blood cells, and wound cultures grew out *Streptococcus mitis* and *Streptococcus constellatus*, both mouth flora and the latter being frequently associated with abscess formation. The patient was initially treated with vancomycin, to which both organisms were sensitive, but his persistently elevated white blood cell count (which may have been caused by organisms that had not grown out from the abscess culture or by a subclinical hospital acquired infection) prompted the surgical team to broaden his antibiotics empirically to levofloxacin and metronidazole,

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Figure 1. Contrast enhanced abdominal CT demonstrating (a) a low-density mass at the pancreatic head with peripheral enhancement. Note that there is no dilatation of the pancreatic duct. Other structures: (b) the stomach, (c) the pancreas, (d) the gallbladder, (e) the portal vein, (f) the inferior vena cava.

at which point his leukocytosis resolved. He was ultimately discharged on hospital day thirteen. By three months after his surgery he had made a full recovery and was pain free.

DISCUSSION

This patient's CT was initially concerning for and interpreted as a pancreatic neoplasm. However, the mass'

Figure 2. Contrast enhanced abdominal CT (sagittal view) demonstrating (a) a linear hyperdensity communicating between (b) the stomach and (c) the mass of concern.

Figure 3. Contrast enhanced abdominal MRI (fat-saturated, T1-weighted) demonstrating (a) two parallel hyperintensities surrounding a linear hypointensity tracking from (b) the stomach to (c) a phlegmonous collection adjacent to the pancreatic head.

relationship to surrounding tissue, its signal intensity on CT and MRI and the presence of a foreign body consistent with bone made pancreatic abscess the far more likely diagnosis (Table 1).

A typical pancreatic head adenocarcinoma obstructs and causes dilatation of the pancreatic duct, which was not seen on this patient's CT (Fig. 1). In addition, pancreatic tumors, unlike renal masses, are typically confluent with normal pancreatic tissue and are rarely exophytic, thereby making the observed abnormality even less likely to be cancer. This was confirmed by the subsequent MRI/MRCP, in which the thin slice protocol distinguished the mass as adjacent to rather than contiguous with the pancreas.

One could then further characterize the mass in question by evaluating the signal intensity on both CT and MRI. Of the four main types of pancreatic tumors, two are cystic (mucinous and serous) and two are solid (adenocarcinoma and neuroendocrine). The mass seen on imaging in this case was not cystic, which ruled out mucinous and serous pancreatic tumors and made the differential diagnosis of a pancreatic pseudocyst unlikely. Neuroendocrine pancreatic tumors are hypervascular and therefore hyperenhance on CT and MRI, unlike the mass in this case. Adenocarcinomas are hypovascular and therefore enhance to a lesser degree than adjacent pancreatic parenchyma on CT and MRI; thus the mass in this case would be most consistent with an adenocarcinoma if the mass were a pancreatic tumor. However, the mass in this case was also peripherally enhancing, which is

Table 1. Pancreatic Neoplasia versus Pancreatic Abscess

	Neoplasia	Abscess
Clinical findings		
Fever, leukocytosis	Infrequent	Frequent
Abdominal pain	Infrequent (head)* Frequent (body, tail)*	Frequent
Nausea, vomiting	Frequent	Frequent
Weight loss	Frequent	Infrequent
Jaundice, pruritis, alcoholic stools, steatorrhea	Frequent (head) Infrequent (body, tail)	Infrequent
Radiographic findings		
Relationship to normal pancreatic tissue	Confluent with normal tissue	Adjacent to or embedded within normal tissue
Pancreatic duct dilatation	Frequent (head) Infrequent (body, tail)	Infrequent
Enhancement	Hyperenhancing (neuroendocrine) Hypoenhancing (serous, mucinous, adenocarcinoma)	Hypoenhancing with peripheral hyperenhancement
Treatment		
Surgery	Based on staging	Required**
Antibiotics	Not required	Required
Chemotherapy / Radiation	Based on staging	Not required

*Both pancreatic head and body/tail tumors are usually painless early on and become more painful with progression of disease; however, pain typically occurs earlier when a tumor is in the pancreatic body/tail than head.

**Though there are reports of pancreatic tumors being treated conservatively with antibiotics alone, definitive drainage is considered the standard of care.

uncharacteristic of pancreatic adenocarcinoma and far more consistent with abscess.

A linear hyperattenuating structure in the lesser curvature wall of the gastric antrum was present on CT, which was originally interpreted as consistent with suture material; however, the patient had never undergone abdominal surgery, and this is an important point that the overnight admitting team should have discussed with the radiologist. The subsequent MRI showed the same linear structure to be hypointense with flanking linear hyperintensities (Fig. 3). A linear substance that is bright on CT, dark on MRI and surrounded by brightness on MRI is consistent with a foreign body lacking hydrogen protons, such as a calcium-containing bone or a metal pin, surrounded by edema and hyperemia. The patient probably swallowed a foreign body months prior, though he had no recollection of having done so. That object likely perforated the stomach, which could explain his initial transient abdominal pain, and subsequently induced a peripancreatic inflammatory process.

While approximately 80 % of ingested foreign bodies pass through the gastrointestinal tract without complica-

tion,¹ up to 20 % require non-operative management with endoscopic extraction, and fewer than 1 % ultimately warrant surgical intervention.² However, sharp or pointed ingested objects can cause complications in up to 35 % of cases.³ Though most foreign bodies perforate at angulated areas of the tract such as the ileocecal or rectosigmoid regions, those that do perforate in the upper tract often remain occult, sometimes without fever or leukocytosis, until an abscess forms and causes pain.⁴ Numerous case reports have described viscus-perforating bones that result in intraperitoneal and liver abscesses,⁵⁻⁷ and one such report described an abscess that appeared to be a pancreatic tumor on original imaging similar to the case described above.⁸ Fish bones specifically can be challenging to diagnose reliably by CT because of their varying amounts of calcification (as opposed to chicken bones, which are more consistently heavily calcified).

The initial treatment for pancreatic abscess, with or without associated foreign body, is definitive drainage (either percutaneous or surgical).⁹ Though there is great variation in which antibiotics are administered, typically practitioners treat empirically for potential aerobic and anaerobic pathogens (as these abscesses are often polymicrobial) and subsequently tailor the antibiotic regimen if a specific organism is isolated in culture.

CONCLUSION

Considering the dire prognostic implications when diagnosing cancer, this case highlights the importance of early distinction between pancreatic abscess and neoplasia. Although the overnight radiologist was particularly concerned that the mass in question was cancer, the internist should be able to synthesize the history, physical and radiography to recognize when abscess is in fact more likely than neoplasia. Though both can present with similar symptoms (nausea, vomiting, abdominal pain), fever, leukocytosis and the absence of biliary obstruction signs favor the diagnosis of abscess. It can be difficult to ascertain a history of remote foreign body ingestion leading to viscous perforation, but this mechanism is important to remember because foreign bodies, after complicated pancreatitis, are one of the more common causes of pancreatic abscesses. Imaging can further distinguish abscess from neoplasia when the interpreters consider key radiographic differences. When imaging interpretation is incongruent with the patient's medical history, it is important that the different teams directly discuss the case with each other, as such conversations can facilitate diagnosis and avoid unnecessary follow-up

testing. The discovery of a pancreatic abscess should prompt early collaboration between surgical and medical

specialties for drainage or excision and subsequent antibiotic treatment.

Text Box 1. Key Points

- Fever, leukocytosis and the absence of biliary obstruction signs support the diagnosis of pancreatic abscess over neoplasia.
- Radiographic findings that favor neoplasia include confluence with pancreatic tissue and pancreatic duct dilatation; peripheral hyperenhancement favors abscess.
- Physicians should maintain a high clinical suspicion for foreign body ingestion when managing pancreatic abscesses because such ingestion is relatively common and because patients often do not recall the inciting event.
- When a radiographic interpretation is inconsistent with a patient's history or presentation, it is essential that the primary team directly discuss the case with radiology.
- The initial management of a pancreatic abscess includes definitive drainage or excision and broad-spectrum antibiotics.

Conflict of Interest: The authors declare that they do not have a conflict of interest.

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