



Penn Medicine

Topic Review: Acute Pancreatitis

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Introduction

► Etiology

- Chronic alcohol use
- Gallstones
- Hyperlipidemia (types I, IV & V)
- Drugs (eg, didanosine, azathioprine, valproic acid)
- Infections (eg, cytomegalovirus, *Legionella*, *Aspergillus*)
- Trauma
- Iatrogenic (post-ERCP)

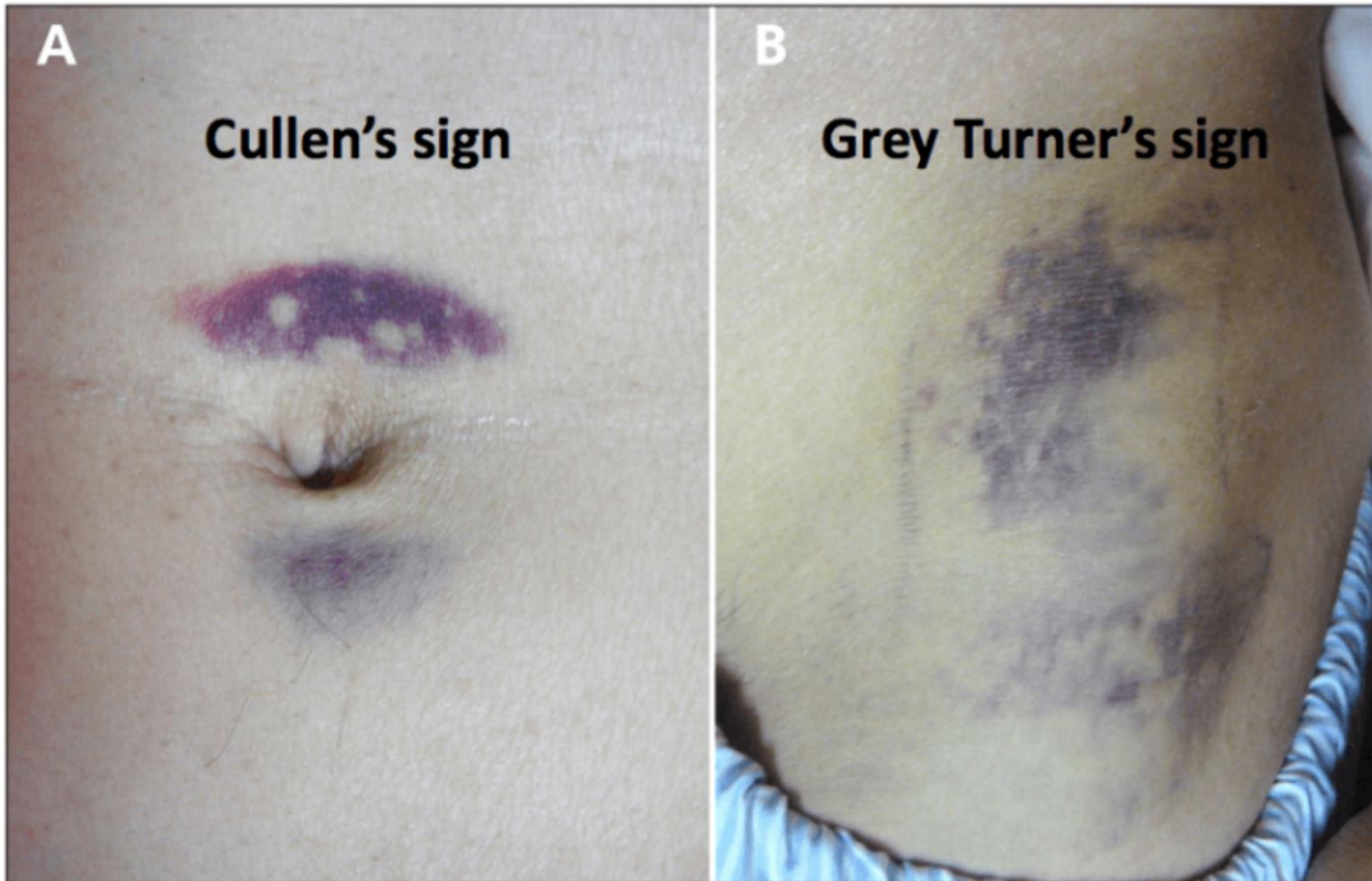
► Complications occur in up to 20%

Initial presentation and physical exam

- ▶ Epigastric pain with radiation
- ▶ Findings of severe pancreatitis
 - Fever, tachycardia, hypotension
 - Dyspnea, tachypnea &/or basilar crackles
 - Abdominal tenderness &/or distension
 - **Cullen sign:** Periumbilical bluish coloration indicating hemoperitoneum
 - **Grey-Turner sign:** Reddish-brown coloration around flanks indicating retroperitoneal bleed

Physical Exam

- Findings of severe pancreatitis



Question 1

A 55-year-old man with no prior medical history presents to the emergency room with 1 day of nausea, vomiting, severe abdominal pain, limited oral intake, and lack of appetite. He recently was on a cruise with his friends and had been drinking 10 to 12 beers daily. He has a temperature of 100.0 F, heart rate of 107 beats/min, blood pressure of 108/62 mm Hg, and respiratory rate of 15 breaths/min. His physical exam is notable for appearing uncomfortable, dry mucus membranes, positive bowel sounds, and epigastric tenderness with no rebound or guarding.

His labs are notable for white blood count (WBC) $16 \times 10^9/L$, hemoglobin 17 g/dL, hematocrit (HCT) 51, platelets $400 \times 10^9/L$, sodium 132 mEq/L, potassium 3.3 mEq/L, blood urea nitrogen (BUN) 32 mg/dL, creatinine (Cr) 1.4 mg/dL, lipase 2,100 u/L, aspartate aminotransferase (AST) 23 u/L, alanine transaminase (ALT) 27 u/L, alkaline phosphatase (ALP) 38 u/L, bilirubin 0.8 mg/dL. Blood cultures are pending.

What is the most appropriate next step for the patient?

- A. Obtain a computed tomography (CT) abdomen/pelvis with intravenous (IV) contrast
- B. Initiate therapy with combination of cefepime and metronidazole
- C. Measure serum triglycerides
- D. Bolus with lactated Ringer's solution now followed by admission to the hospital with IV hydration
- E. Endoscopic retrograde cholangiopancreatography

Learning point #1

- ▶ 2 of the 3 cardinal signs for acute pancreatitis are sufficient for diagnosis
- ▶ Contrast enhanced CT should be reserved for patients with atypical presentations or who fail to improve

Diagnosis

► Requires 2 of the following

- Acute epigastric abdominal pain often radiating to the back
- ↑ Amylase/lipase >3 times normal limit
- Abdominal imaging showing focal or diffuse pancreatic enlargement with heterogeneous enhancement with intravenous contrast (CT) or diffusely enlarged & hypoechoic pancreas (ultrasound)

► Other findings

- Nausea, vomiting, leukocytosis
- Severe disease with possible abdominal tenderness, fever, tachypnea, hypoxemia & hypotension
- ALT level >150 units/L → biliary pancreatitis

Workup recommendations

- ▶ Abdominal ultrasound should be performed in all patients
- ▶ Not gallstones or alcohol? Serum triglycerides
- ▶ Age>40 and no clear cause? Consider pancreatic tumor
- ▶ Age<30 and no clear cause? If family history, obtain genetic testing
- ▶ Evaluate for medications that cause pancreatitis

Severe pancreatitis

► Features associated

- Age >75
- Obesity
- Alcoholism
- C-reactive protein >150 mg/dL at 48 hours after presentation
- Rising blood urea nitrogen & creatinine in the first 48 hours
- Chest x-ray with pulmonary infiltrates or pleural effusion
- Computed tomography scan/magnetic resonance cholangiopancreatography with pancreatic necrosis & extrapancreatic inflammation

► Admit to ICU whenever possible

Question 2

A 55-year-old man was admitted from the emergency department with acute pancreatitis. Shortly after arriving to the inpatient unit, he has temperature 99.6F, HR of 107 bpm, and BP 108/62. His physical exam is notable for appearing uncomfortable, dry mucus membranes, positive bowel sounds, and epigastric tenderness with no rebound or guarding. His labs show lipase 2,100 u/L, aspartate aminotransferase (AST) 23 u/L, alanine transaminase (ALT) 27 u/L, alkaline phosphatase (ALP) 38 u/L, bilirubin 0.8 mg/dL. His current treatment includes aggressive IV fluid hydration, IV anti-emetics, and pain medications. He asks if he can eat and drink.

What is the next best step in the management of this patient?

- A. Initiate a low-fat solid diet
- B. Allow him to drink water only
- C. Strict NPO for 24 hours, then initiate a clear liquid diet
- D. Strict NPO for 48 hours, then initiate a low-fat solid diet
- E. Initiate enteral feeding through a nasogastric tube

Learning points #2

- ▶ In mild pancreatitis, oral feedings can be started immediately
- ▶ In severe pancreatitis, enteral nutrition is recommended to prevent infectious complications

Question 3

A 44-year-old woman is brought to the emergency department with 2 days of abdominal pain. She has had worsening upper abdominal pain associated with nausea and multiple episodes of non-bloody vomiting. She also reports subjective fevers and chills. The patient's past medical history is notable for hypertension. She drinks alcohol socially and does not use tobacco or recreational drugs. Her last drink was a week ago.

Temperature is 38.4 C (101.2 F), blood pressure is 116/60 mm Hg, pulse is 112/min, and respirations are 18/min. BMI is 34 kg/m². Mucous membranes are dry and there is mild scleral icterus. There is tenderness in the mid-epigastrium and right upper quadrant without rebound or guarding. Rectal examination is notable for brown guaiac-negative stool.

CT scan of the abdomen shows diffuse pancreatic enlargement and heterogenous attenuation with peripancreatic inflammation. The liver appears normal. The gallbladder has multiple small gallstones with surrounding gallbladder wall edema. The common bile duct is dilated and measures 12 mm.

The patient is made NPO and is started on analgesics, intravenous hydration, and empiric intravenous antibiotics.

Which of the following is the most appropriate next step in management of this patient?

- A. Continue current management and observe closely
- B. CT-guided percutaneous pancreatic aspiration
- C. Endoscopic retrograde cholangiopancreatography
- D. Hepatobiliary iminodiacetic acid (HIDA) scan
- E. Surgical evaluation for cholecystectomy

Complete blood count		
Hemoglobin		13.0 g/dL
Platelets		320,000/ μ L
Leukocytes		14,500/ μ L
Serum chemistry		
Blood urea nitrogen		28 mg/dL
Creatinine		0.8 mg/dL
Liver function studies		
Albumin		3.1 g/dL
Total bilirubin		3.0 mg/dL
Direct bilirubin		1.9 mg/dL
Alkaline phosphatase		306 U/L
Aspartate aminotransferase		138 U/L
Alanine aminotransferase		218 U/L
Lipase		1292 U/L

Learning points #3

- ▶ In gallstone pancreatitis, cholecystectomy should be performed after recovery before discharge in all operable patients

Management of Gallstone Pancreatitis

Management of gallstone pancreatitis	
Mild	• Supportive care
Moderate without CBD obstruction	• Supportive care • Consider endoscopic ultrasound/MRCP/ERCP if no improvement within 72 hours
Severe with CBD obstruction or cholangitis	• ERCP within 24 hours of admission

Cholecystectomy should be performed **after recovery** in all operable patients.

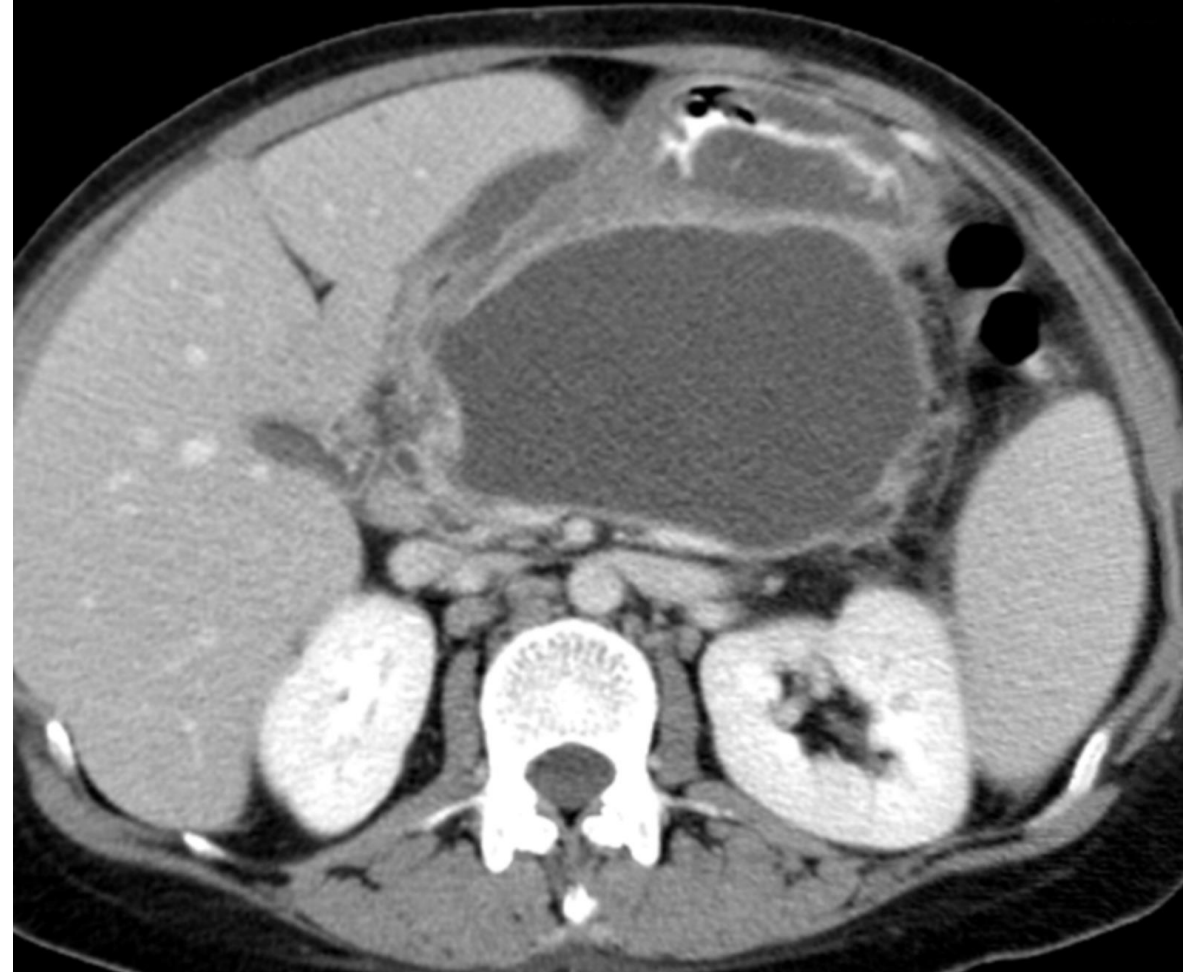
CBD = common bile duct, ERCP = endoscopic retrograde cholangiopancreatography,
MRCP = magnetic resonance cholangiopancreatography.

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Complications

► Include

- Pseudocyst
- Peripancreatic fluid collection
- Necrotizing pancreatitis
- Acute respiratory distress syndrome
- Acute renal failure
- Gastrointestinal bleeding



Question 4

A 38-year-old man admitted with severe, acute alcoholic pancreatitis is evaluated in the intensive care unit for persistent fever. The patient is intubated and on mechanical ventilation. He is receiving nasojejunal tube feeding and intravenous crystalloids.

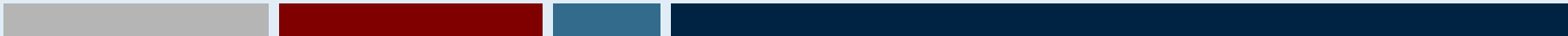
His temperature is 38.3 C (101 F), blood pressure is 90/60 mm Hg, pulse is 104/min, and respirations are 18/min. Respiratory secretions are scant. Breath sounds are decreased at the lung bases. There is epigastric tenderness on deep palpation and mild abdominal distension. 2+ presacral edema is present. A peripherally inserted central catheter in the right arm shows no surrounding skin redness or discharge.

Chest x-ray reveals bilateral, small pleural effusions. A contrast-enhanced abdominal CT scan reveals 40% pancreatic necrosis and moderate-size fluid collections in the retroperitoneum around the pancreas. The gallbladder has some sludge, the common bile duct measures 5 mm, and no intrahepatic ductal dilation is seen.

Which of the following is the best next step in managing this patient?

- A. Ceftriaxone and vancomycin
- B. Endoscopic retrograde cholangiopancreatography
- C. Open necrosectomy
- D. Parenteral nutrition
- E. Percutaneous CT-guided aspiration

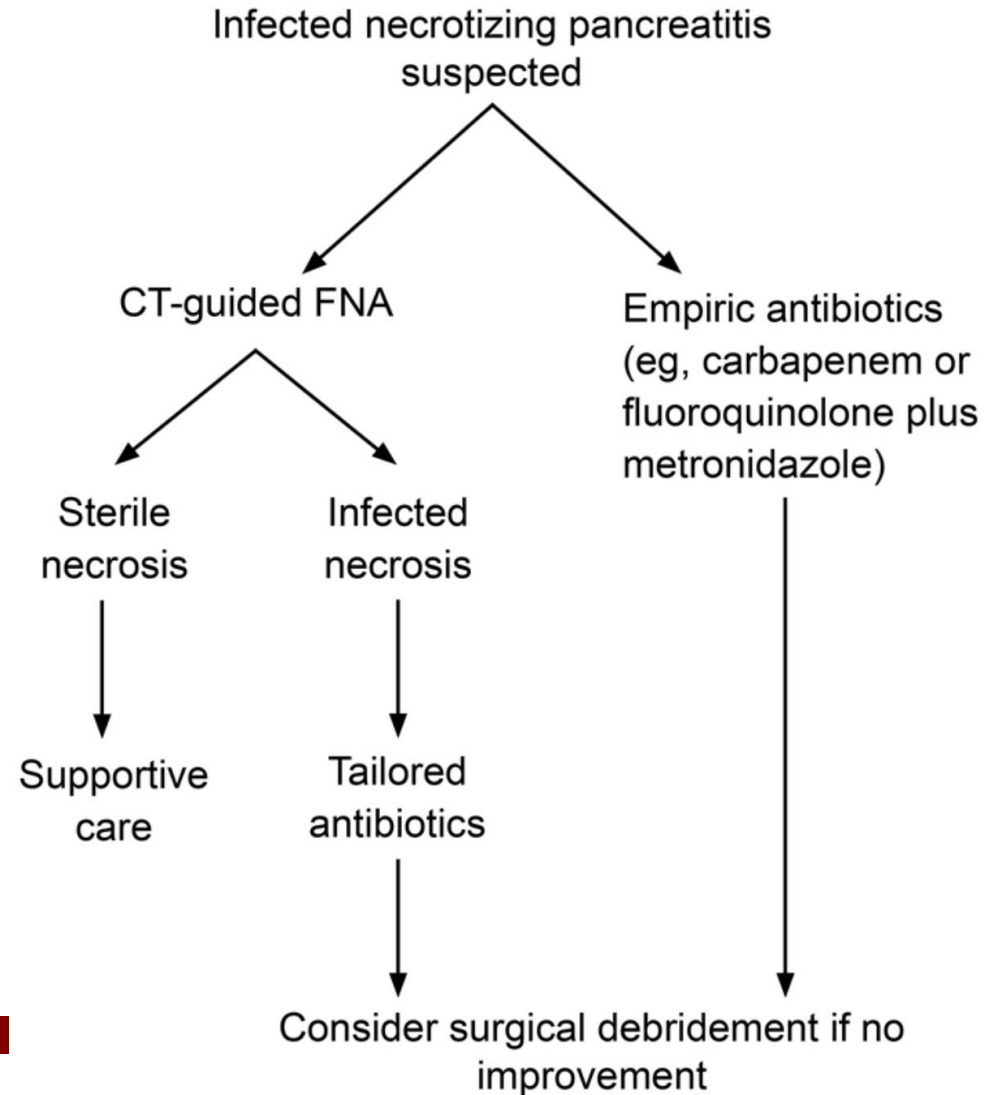
Complete blood count		
Hemoglobin		10.4 g/dL
Platelets		280,000/mm ³
Leukocytes		14,000/mm ³
Serum chemistry		
Blood urea nitrogen		15 mg/dL
Creatinine		1.0 mg/dL
Albumin		3.0 g/dL
Urinalysis		
Red blood cells		1-2/hpf
White blood cells		5-6/hpf
Leukocyte esterase		negative
Bacteria		none
Blood culture		no growth detected
Stool <i>Clostridium difficile</i> , PCR		negative



Learning points #4

- ▶ In suspected infected necrotizing pancreatitis, management should include CT-guided FNA
- ▶ Antibiotics for suspected infected necrotizing pancreatitis include carbapenem or fluoroquinolone+metronidazole

Managing Infected Necrotizing Pancreatitis



Question 5

A 55-year-old man comes to the physician for follow-up after an episode of acute pancreatitis. Four weeks ago, he presented to the hospital with severe epigastric pain and vomiting after an episode of binge drinking. Ultrasound revealed no evidence of gallstones. He was hospitalized for 3 days and tolerated oral feeds on the day of discharge. He currently feels well and has a good appetite. The patient reports mild fullness in the abdomen but no nausea or vomiting. He has refrained from alcohol consumption. His other medical problems include hypertension and gout.

Vital signs are within normal limits. There is mild tenderness in the epigastric region on deep palpation. The remainder of the physical examination is within normal limits.

Which of the following is the most likely diagnosis?

- A. Chronic pancreatitis
- B. Pancreatic cancer
- C. Pancreatic pseudocyst
- D. Peptic ulcer disease
- E. Recurrent acute pancreatitis

Hemoglobin	13.0 g/dL
Platelets	380,000/ μ L
Leukocytes	11,100/ μ L
Blood urea nitrogen	18 mg/dL
Creatinine	0.8 mg/dL
Albumin	4.0 g/dL
Total bilirubin	1.0 mg/dL
Alkaline phosphatase	70 U/L
Aspartate aminotransferase (SGOT)	28 U/L
Alanine aminotransferase (SGPT)	24 U/L
Lipase	1154 U/L



Learning points #5

- ▶ Pancreatic pseudocyst are a later complication of acute pancreatitis that presents with abdominal fullness/mass, mild epigastric pain, and elevated lipase

Question 6

A 55-year-old man is evaluated at a follow-up visit. Two months ago he was admitted to the ICU for severe acute pancreatitis from alcohol use. CT during hospitalization revealed an edematous pancreas with fat stranding and peripancreatic fluid collections. He was discharged after 12 days. Two weeks before follow-up he had abdominal pain, and contrast-enhanced pancreas-protocol CT was performed. The scan demonstrated several hypodense lesions throughout the pancreas, including a 12-cm hypodense structure with a well-defined wall and no solid debris. The pancreatic duct was normal, and no mass was identified.

Today, the patient reports feeling well; he has abstained from alcohol since hospitalization. On physical exam, vital signs and other findings are normal.

Which of the following is the most appropriate management?

- A. Endoscopic cystogastrostomy and necrosectomy
- B. Endoscopic retrograde pancreatography
- C. Endoscopic ultrasonography with fine-needle aspiration
- D. Surgical drainage
- E. Observation

Learning points #6

- ▶ Asymptomatic pancreatic pseudocysts and pancreatic necrosis do not warrant intervention

Learning Points

- 2 of the 3 cardinal signs for acute pancreatitis are sufficient for diagnosis
- Contrast enhanced CT should be reserved for patients with atypical presentations or who fail to improve
- In mild pancreatitis, oral feedings can be started immediately
- In severe pancreatitis, enteral nutrition is recommended to prevent infectious complications
- In gallstone pancreatitis, cholecystectomy should be performed before discharge in all operable patients
- In suspected infective necrotizing pancreatitis, management should include CT-guided FNA
- Antibiotics for suspected infective necrotizing pancreatitis include carbapenem or fluoroquinolone+metronidazole
- Pancreatic pseudocyst are a later complication of acute pancreatitis that presents with abdominal fullness/mass, mild epigastric pain, and elevated lipase
- Asymptomatic pancreatic pseudocysts and pancreatic necrosis do not warrant intervention

References

- ▶ Tenner, Scott MD, MPH, JD, FACP¹; Vege, Santhi Swaroop MD, MACG²; Sheth, Sunil G. MD³; Sauer, Bryan MD, MSc, FACP⁴; Yang, Allison MD, MPH⁵; Conwell, Darwin L. MD, MSc, FACP⁶; Yadlapati, Rena H. MD, MHS, FACP⁷; Gardner, Timothy B. MD, FACP⁸. American College of Gastroenterology Guidelines: Management of Acute Pancreatitis. The American Journal of Gastroenterology 119(3):p 419-437, March 2024. | DOI: 10.14309/ajg.0000000000002645
- ▶ UWorld

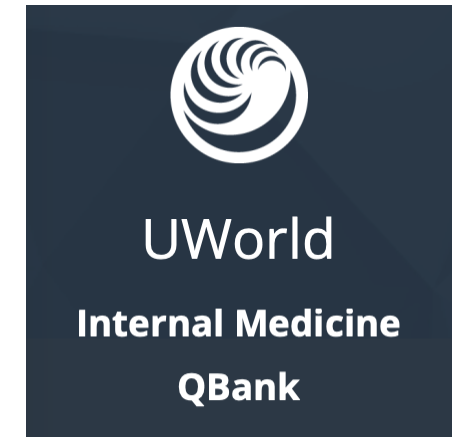
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American College of Gastroenterology Guideline:
Management of Acute Pancreatitis

Scott Tenner, MD, MPH, FACP¹, John Baillie, MB, ChB, FRCP, FACP², John DeWitt, MD, FACP³ and Santhi Swaroop Vege, MD, FACP⁴



Thank You!

