Acute Pancreatitis
How Can MR Imaging Help

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KEYWORDS

• Acute pancreatitis • Pancreas • MR imaging
• Magnetic resonance cholangiopancreatography (MRCP)

KEY POINTS

- Imaging is often needed to diagnose acute pancreatitis when the clinical situation is unclear, to determine the underlying cause of acute pancreatitis, to evaluate complications and disease severity, and to guide intervention.
- MR imaging allows for noninvasive evaluation of the pancreatic parenchyma, biliary and pancreatic ducts, exocrine function, peripancreatic soft tissues, and vascular structures in a single examination.
- MR imaging is at least comparable and arguably superior to CT for the diagnosis and assessment of acute pancreatitis.

INTRODUCTION

Acute pancreatitis is the most frequent gastrointestinal cause of hospital admissions in the United States, with approximately 275,000 admissions each year.[1] The incidence of acute pancreatitis is increasing and has been linked with the increasing incidence of obesity. Obesity is known to contribute to gallstone formation, and gallstones are the most common cause of acute pancreatitis in the United States.[1] The most common cause worldwide is alcohol consumption.[2] Acute pancreatitis affects men and women in similar proportion; however, the etiology is different. Alcohol-related pancreatitis is more common in men, whereas women are more likely to develop pancreatitis related to gallstones, autoimmune diseases, endoscopic retrograde cholangiopancreatography (ERCP), or an idiopathic origin.[1]

DIAGNOSING ACUTE PANCREATITIS

Patients with acute pancreatitis typically present with epigastric abdominal pain that may radiate to the back. The abdominal pain is often associated with nausea and vomiting and physical examination reveals severe upper abdominal tenderness, sometimes with guarding. Laboratory abnormalities indicating acute pancreatitis are elevated serum amylase and lipase and, if the origin is biliary, elevated alanine aminotransferase (ALT).

The clinical diagnosis of acute pancreatitis requires 2 of these 3 features: (1) abdominal pain consistent with acute pancreatitis (acute onset of persistent, severe, epigastric pain often radiating to the back); (2) serum lipase or amylase levels at least 3 times greater than the upper limits of normal; and (3) characteristic findings of acute pancreatitis on contrast-enhanced CT, MR imaging, or transabdominal ultrasonography (US).[3] As such, if the abdominal pain is characteristic of pancreatitis and the amylase and/or lipase levels are not elevated to at least 3 times above normal, imaging is required for diagnosis.

TYPES AND SEVERITY OF PANCREATITIS

Acute pancreatitis is divided into 2 types: interstitial edematous pancreatitis and necrotizing pancreatitis (**Table 1**). Interstitial edematous pancreatitis is characterized by diffuse (or sometimes localized)

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Table 1
Classification terms

1992 Atlanta Classification	2013 Revised Atlanta Terms
Within 4 weeks onset of acute pancreatitis: Acute fluid collection Sterile pancreatic necrosis Infected pancreatic necrosis	**Within 4 weeks onset of acute pancreatitis:** Acute fluid collection Acute necrotic collection[a]: Sterile acute necrotic collection Infected acute necrotic collection
After 4 weeks onset of acute pancreatitis: Pancreatic pseudocyst Pancreatic abscess	**After 4 weeks onset of acute pancreatitis:** Sterile pseudocyst (arises from interstitial edematous pancreatitis) Infected pseudocyst (arises from interstitial edematous pancreatitis) Walled-off necrosis (arises from acute necrotic collection)
Notes: There was no terminology in the Atlanta classification for the evolving collections arising from necrotizing pancreatitis that are now known as walled-off necrosis.	**Notes:** On presentation for each patient, the diagnosis of either interstitial edematous pancreatitis OR acute necrotizing pancreatitis should be made. Walled-off necrosis arises from acute necrotizing pancreatitis and, therefore, should not be confused with a pancreatic pseudocyst, which arises from interstitial edematous pancreatitis (or later from disconnected duct syndrome).

[a] Sterile or infected acute necrotic collection may be pancreatic, extrapancreatic, or both (most common).

inflammatory enlargement of the pancreas, typically with inflammatory changes of the peripancreatic fat and usually some peripancreatic fluid (Fig. 1). Most patients hospitalized with acute pancreatitis (85%) have interstitial edematous pancreatitis[4] and the symptoms of interstitial edematous pancreatitis usually resolve within 1 week.[3] The other 5% to 15% of patients develop necrotizing pancreatitis (Fig. 2), which is further subdivided by whether the necrosis involves the

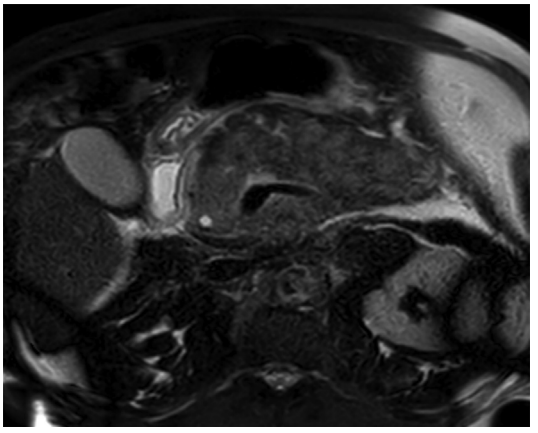

Fig. 1. A 37-year-old man with hypertriglyceridemia and history of recurrent acute pancreatitis presents with epigastric pain of 2 days' duration and elevated lipase. Axial T2-weighted fat-saturated MR image of the abdomen demonstrates inflammation within the pancreatic parenchyma and peripancreatic soft tissues, consistent with interstitial edematous pancreatitis.

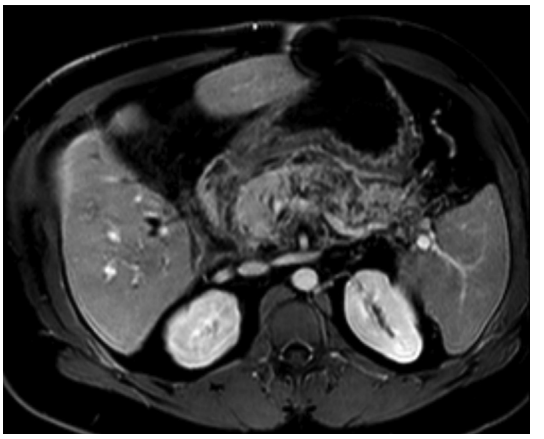

Fig. 2. A 37-year-old man with history of recurrent alcohol-induced acute pancreatitis presents with severe epigastric pain with associated nausea and vomiting of 3 days' duration and elevated lipase. Axial T1-weighted fat-saturated postcontrast MR image demonstrates hypoenhancement of the pancreatic body and tail, consistent with pancreatic necrosis. No acute necrotic collection was seen.