BACKGROUND
An 89-year-old woman who lives with her husband in an assisted-living facility presents to the emergency department with severe abdominal pain. The patient has diabetes mellitus, hypertension, gastroesophageal reflux disease (GORD), and sick sinus syndrome with a pacemaker. She is confused and cannot describe her systems. Her husband provides a limited history of nausea, vomiting, fever, and abdominal pain lasting 3 days. The patient's medications include metformin, indapamide, pantoprazole, and aspirin.

On physical examination, the patient is lethargic but opens her eyes to the sound of her name. The patient is sleepy, but arousable and conversant. She is not oriented to time or place and slips back into sleep when not actively spoken to.

Her vital signs are as follows: temperature, 36.0°C; blood pressure, 100/67 mm Hg; pulse, 100 beats per minute; respirations, 18 breaths per minute; and oxygen saturation, 96% on room air. Findings on head and neck examination are unremarkable. On heart and lungs examination, she has a paced rhythm with a 3/6 pansystolic murmur heard, which is best at the right upper sternal border, and coarse rales in the bilateral lung bases. Abdominal examination reveals distension and tenderness to palpation, mostly in the right upper and lower quadrants. She has guarding but no rebound tenderness. The remaining physical findings are unremarkable.

The patient was given intravenous fluids and triple antibiotics as empiric therapy for sepsis of abdominal etiology while laboratory investigations and chest (see Image 1) and abdominal (see Image 2) radiographs are obtained.

What is the cause of the patient's current condition?

Hint
The radiographs show a pathognomonic finding.
ANSWER & DISCUSSION

Emphysematous cholecystitis

The chest image demonstrates cardiomegaly, congestion of the pulmonary vasculature, bilateral atelectasis, and a pacemaker. The abdominal image demonstrates increased stool content in a nondistended colon and no evidence of small-bowel dilatation or pneumoperitoneum. Careful examination of both images shows an additional finding: a pear-shaped lucency that contains an air-fluid level and crescent-shaped lucency representing air inferior and adjacent to the liver.

Abdominal CT would demonstrate an air-fluid level in a distended gallbladder with no gallstones but with emphysema of the gallbladder wall. These findings are consistent with emphysematous cholecystitis. The fine, pear-shaped lucency was the emphysematous wall of the inflamed gallbladder. Plain radiography has a relatively low yield in the diagnosis of biliary diseases compared with that of sonography or CT, though radiographs can show pathognomonic findings in cases of calcified gallstones, limey bile, porcelain gallbladder, emphysematous cholecystitis, and gallstone ileus. They are also useful for ruling out other abdominal aetiologies of pain, such as small-bowel obstruction, volvulus, and viscus rupture with free intraperitoneal air.

The patient was admitted to the intensive care unit for stabilization and underwent urgent open cholecystectomy within 24 hours of presentation. During surgery, a gangrenous, emphysematous, and infected gallbladder was removed. The patient had a complicated hospital course and prolonged recovery, but she was eventually discharged home in good condition.

Emphysematous cholecystitis is thought to begin with acute cholecystitis followed by ischemia or gangrene of the gallbladder wall and infection by gas-producing organisms. Bacteria most frequently cultured are anaerobes, such as *Clostridium welchii* or *Clostridium perfringens*, or aerobes, such as *Escherichia coli*. This condition occurs most frequently in elderly persons, especially those with diabetes mellitus.

The clinical manifestations are essentially indistinguishable from those of nongaseous cholecystitis. The diagnosis is usually based on the plain radiographic finding of gas in the pericholecystic tissues or in the lumen of the gallbladder, which dissect the gallbladder wall to form a gaseous ring.

The optimal timing of the surgical intervention for acute cholecystitis depends on stabilization of the patient’s condition. The current trend is for early surgery, partly because of requirements to shorten hospital stays. Urgent cholecystectomy or cholecystostomy are probably appropriate in most patients with known or suspected complications of acute cholecystitis, such as empyema, emphysematous cholecystitis, or perforation.

Morbidity and mortality rates of emphysematous cholecystitis are considerable. Prompt surgical intervention and timely administration of appropriate broad-spectrum antibiotics are mandatory. In most centres, mortality rates for emergency cholecystectomy approach 3%, whereas the mortality risk for elective or early cholecystectomy is approximately 0.5% in patients younger than 60 years. Seriously ill or debilitated patients with cholecystitis may be treated with cholecystostomy and tube drainage of the gallbladder, and elective cholecystectomy may be done later.

For more information on emphysematous cholecystitis, see the eMedicine articles Emphysematous Cholecystitis and Clostridial Cholecystitis (within the Internal Medicine specialty) and Cholecystitis, Acute (within the Radiology specialty).