**Clostridium perfringens** Bacteremia in an 85-Year-Old Diabetic Man

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**Key Words**
Emphysematous cholecystitis · Abdominal discomfort · **Clostridium perfringens**

**Abstract**
Emphysematous cholecystitis is an uncommon and dangerous complication of acute cholecystitis. Common risk factors for this disease include male gender, old age, presence of diabetes mellitus and cholelithiasis. The disease is best treated with emergent surgery and parenteral antibiotics. We present the case of an 85-year-old nursing home resident who presented to our institution with a 3-day history of gradually worsening abdominal discomfort.

**Introduction**
Acute cholecystitis is an inflammatory condition of the gallbladder [1]. The vast majority of cases are due to gallstone occlusion of the cystic duct with secondary biliary stasis and resultant inflammation and ischemia. Few cases are due to acalculous cholecystitis, which is classically seen in critical illness [1]. The classic risk factors for the development of pancreatitis include ageing, female gender and obesity [1]. Patients with acute cholecystitis typically present with right upper quadrant or epigastric pain, nausea, vomiting and fever. On physical examination it is important to assess the patient's clinical stability. The clinician may appreciate Murphy's sign, i.e. tenderness in the right upper quadrant (just beneath the liver) upon palpation elicited during inspiration [1]. Laboratory data may show leukocytosis with left-sided shift and mild abnormalities in liver enzymes [1]. The diagnosis of acute cholecystitis is usually easily confirmed with right upper quadrant ultrasonography and in uncertain cases with cholescintigraphy [1]. In cases where an alternative diagnosis warrants
to be ruled out or when one is looking for a complication of cholecystitis, abdominal computed tomography (CT) scan is the modality to choose.

There are several complications of acute cholecystitis which should be mentioned. Emphysematous cholecystitis is an infection of the gallbladder caused by gas-producing microorganisms [2]. Complicated cases of acute cholecystitis classically affect elderly patients, patients with diabetes mellitus or individuals who present late in their course [1]. Emphysematous cholecystitis often precedes the occurrence of necrotizing cholecystitis and perforation. Emphysematous cholecystitis is an uncommon but dangerous complication of acute cholecystitis [2]. Patients with emphysematous cholecystitis should be treated promptly with emergent surgery or gallbladder decompression (in high-risk surgical patients) and intravenous antibiotics. Below we present the case of an elderly nursing home resident who was sent to the hospital because of gradually worsening abdominal discomfort.

**Case Presentation**

An 85-year-old nursing home resident was sent to our institution because of a 3-day history of gradually worsening abdominal discomfort. His past medical history was significant for coronary artery disease, congestive heart failure, paroxysmal atrial fibrillation, colon cancer status post colostomy placement (10 years earlier) and dementia. According to the nursing home documentation the patient also had intermittent low-grade fevers (up to 100°F) and non-bloody emesis several times on the day of presentation.

Upon arrival, the patient was found to be awake and in mild to moderate distress, with periodic moaning. He was oriented to persons only and according to the documentation this was his cognitive baseline. Clinical history was significantly limited by underlying dementia.

Vital signs upon presentation were blood pressure 92/55, heart rate 84, respiratory rate 18, temperature 98.5°F (36.9°C) and oxygen saturation 96% on room air. Physical examination was remarkable for mild tenderness in the right upper quadrant with positive Murphy’s sign and guarding, but no rebound. Bowel sounds were present, but diminished throughout. The colostomy area was free of erythema, leak and feculent material. Cardiac examination revealed normal and regular rate, with no murmurs. Pulmonary examination was unremarkable. Extremities were of equal length, showing bilaterally present pulses and no edema. A 12-lead electrocardiogram revealed normal sinus rhythm, normal axis, normal intervals and no evidence of ST segment or T wave abnormalities.

Complete blood count, comprehensive metabolic panel, amylase, lipase, prothrombin time/INR, troponin and blood cultures were done. White blood cell count was 10.2 × 10^3/mm^3 (normal range 4–11) with a slight increase in neutrophil number, platelet count was normal and hemoglobin was slightly decreased at 11.2 g/dl (normal range 13–17). Creatinine was found to be elevated at 1.99 mg/dl (normal range 0.6–1.3), increasing from his baseline of 0.92 mg/dl. Aspartate aminotransferase was 58 IU/l (normal range 13–39), total bilirubin was 1.5 mg/dl (normal range 0.3–1.0), glucose 292 mg/dl (normal range 70–99) and INR 1.7 (normal range 0.9–1.1). Amylase, lipase, troponin, lactic acid and other parameters were within normal limits. Right upper quadrant ultrasound was done and showed gallbladder wall thickening consistent with cholecystitis. The patient was given 1 l of lactated Ringer’s solution and started on combination of intravenous levofloxacin and metronidazole, which were later changed to piperacillin-tazobactam. Approximately 2 h later the patient complained of worsening abdominal pain, including the right lower quadrant. Abdominal and pelvic CT scan with oral contrast was ordered to look for causes of his deterioration. CT scan showed emphysematous cholecystitis with perforation and pneumo-
peritoneum (fig. 1). The surgical team was asked to evaluate the patient. He was taken directly to the operating room the same day for emergent cholecystectomy. In the operating room evidence of gangrenous transformation of the gallbladder and biliary leak into the peritoneum was noted. The patient tolerated the surgery well. On the fifth day of his stay, blood cultures result came back positive for β-lactamase-negative *Clostridium perfringens* sensitive to amoxicillin-clavulanic acid. The patient was discharged back to his nursing home on postoperative day 14 in stable condition to continue oral amoxicillin-clavulanic acid for 14 more days.

**Discussion**

Emphysematous cholecystitis is a notorious complication of acute cholecystitis [2, 3]. On clinical grounds it is difficult to discern emphysematous cholecystitis from uncomplicated cholecystitis due to significant overlap in presentation. Furthermore, patients with emphysematous cholecystitis lack findings of acute surgical abdomen during the initial presentation.

Due to its rarity, no randomized clinical studies are available to guide its management, and all of our current knowledge is based on empiric data, published case reports and case series. A typical patient with emphysematous cholecystitis is a male aged above 50 years with a history of diabetes mellitus and cholelithiasis [2, 3]. However, it is essential to keep in mind that on some occasions a patient with proven emphysematous cholecystitis may not fit to the above-mentioned characteristics. Therefore, it is important to keep a high index of suspicion for complicated cholecystitis in an appropriate clinical setting.

The microbiology of emphysematous cholecystitis differs from that of uncomplicated cholecystitis and includes Clostridium species, Klebsiella species and *Escherichia coli* [2–4]. Emphysematous cholecystitis is a prerequisite for gallbladder gangrene and perforation, which all occurred in our patient. The disease should be managed with emergent surgery and prompt administration of intravenous antibiotics active against Gram-negative and anaerobic organisms (common choices are levofloxacin or ciprofloxacin plus metronidazole or piperacillin-tazobactam). Rapid recognition and treatment is a key factor of a positive outcome; however, emphysematous cholecystitis is associated with high mortality due to old age, multiple comorbidities and the emergent nature of the surgery [4].

**Disclosure Statement**

The authors have no conflict of interest.

**References**

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Fig. 1. Abdominal CT scan showing emphysematous cholecystitis with gas within its wall (white arrow) and lumen (yellow arrow) as well as free gas adjacent to the liver (red arrow) due to gallbladder perforation.