Chapter 7
Emphysematous Cholecystitis

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Précis

Emphysematous cholecystitis:

1. Clinical setting: The clinical picture of cholecystitis in a diabetic patient is usually a male over 50 years of age. Two-thirds of the patients have gallstones compared to 90% in typical cholecystitis. Crepitus of the abdominal wall over the gallbladder can occur. The most common symptoms are right upper quadrant pain, nausea, and vomiting. Fever is the rule.
2. Diagnosis: All diabetic patients with a problematic or confirmed diagnosis of cholecystitis must be suspected of having emphysematous disease:
   (a) History: The severity of the diabetes, history of control, and presence or absence of diabetic complications do not influence the probability of this condition in a diabetic patient.
   (b) Imaging: The diagnosis of emphysematous cholecystitis is made radiographically or at the time of surgery. Gas in the gallbladder wall, lumen, or pericholecystic space can be seen on plain film and ultrasonography. CT, however, is the test of choice in this setting.
3. Management: The recommended approach is parenteral antibiotics with surgical intervention within 48–72 hours.
   Empiric antibiotic therapy includes regimens for complicated acute cholecystitis such as piperacillin-tazobactam or cefepime plus metronidazole.

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Emphysematous Cholecystitis

Emphysematous cholecystitis is a rare, severe form of acute cholecystitis in which infection leads to gas formation in the gallbladder wall or pericholecystic space. The risk of gallbladder perforation in emphysematous cholecystitis is up to five times that of ordinary acute cholecystitis [1]. Timely recognition and treatment are crucial, and clinicians should be aware that ultrasound may fail to detect gas formation. Patients who develop emphysematous cholecystitis differ from typical cholecystitis patients as well: 38–50% are diabetics, males outnumber females 2:1, and the majority are 50 to 70 years old [2, 3]. It is thought that these patients have vascular disease and that the distinct characteristics of emphysematous cholecystitis result from vascular occlusion and ischemia.

Pathogenesis and Microbiology

The bacterial pathogens and gallbladder pathology found in emphysematous cholecystitis differ from typical cholecystitis. Gallstones are found in 40–70% of patients with emphysematous cholecystitis, as opposed to 90% of typical cholecystitis cases. The anaerobic bacterium *Clostridium perfringens* is the most frequently reported pathogen [1–4]. In a review of 109 cases, *Clostridium* species made up of 46% of positive cultures and *E. coli* which was present in 33%, often with *Clostridia*, *Klebsiella*, *Bacteroides*, *Staphylococcus*, *Streptococcus, Pseudomonas*, and *Salmonella*, have also been reported [1–4]. Examinations of gallbladder pathology frequently reveal occlusion of the cystic artery or pericholecystic abscess [1, 5].

Clinical Presentation

The clinical presentation of emphysematous cholecystitis is very similar to typical acute cholecystitis. However, crepitus in the abdominal wall over the gallbladder may rarely be detected and should raise suspicion for emphysematous infection. Otherwise, patients typically complain of right upper quadrant pain and fever. Half of patients report nausea and vomiting.

Diagnosis

The diagnosis of emphysematous cholecystitis is made at the time of surgery. The first preoperative diagnosis of emphysematous cholecystitis was made in 1931. This led to recognition of emphysematous cholecystitis as a distinct clinical entity [2]. The gallbladder lumen and pericholecystic space may be seen on plain films, ultrasound, or CT (Figs. 7.1 and 7.2). CT is the most sensitive and specific imaging modality. Ultrasonography can demonstrate highly echogenic reflections with

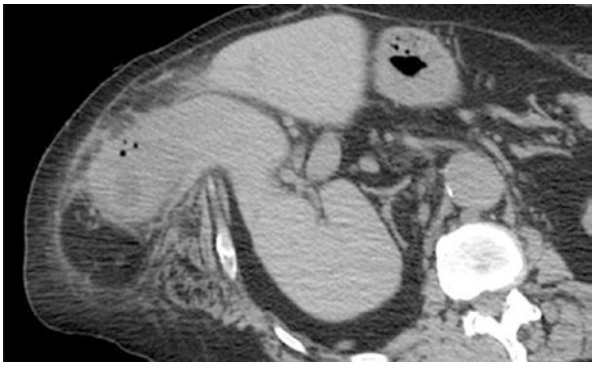

Fig. 7.1 Noncontrast axial CT image demonstrating a thick-walled gallbladder prolapsing into a large abdominal wall hernia. There is pericholecystic inflammation and three small locules of gas in the wall

Fig. 7.2 Abdominal radiograph demonstrating mottled gas outlining the wall of the gallbladder as well as lucency within the gallbladder lumen also representing gas

posterior shadowing and reverberation artifacts. The "champagne" sign shows bubbles rising up from the dependent portions of the gallbladder lumen, often misinterpreted as bowel gas [6–8]. Inability to visualize the gallbladder with ultrasound is an indication for CT scan.

Treatment

Traditionally, the recommended approach uses parenteral antibiotics and surgical intervention within 48 to 72 hours. Emphysematous cholecystitis can progress rapidly, as illustrated in the report of a patient who developed radiographic findings of emphysematous cholecystitis within 24 hours after a normal CT [9]. This is

consistent with older reports of patients with gangrene and perforation who presented with fewer than 72 hours of symptoms [1]. In contrast, some authors argue that the use of CT has led to increased detection of a milder spectrum of disease. These authors report several patients who did well after delaying surgical intervention for 2–4 weeks, suggesting that delayed surgical intervention has a role in the management of emphysematous cholecystitis [7]. While there may be a subset of patients that do not require urgent surgery, the majority of the literature supports cholecystectomy within 48 to 72 hours. When surgery is contraindicated, percutaneous drainage with cholecystostomy tubes can be used. There is limited literature to determine whether open or laparoscopic cholecystectomy is superior. However, a recent small series has shown equivalent results with laparoscopic cholecystectomy [10].

Prognosis

Heightened awareness and timely diagnosis of emphysematous cholecystitis are important because of the need for urgent surgical evaluation. The mortality of emphysematous cholecystitis was 15% compared to 4% of acute cholecystitis in a large series in 1975 [1]. A more recent series in 1999 found a mortality rate of 25% in emphysematous cholecystitis [4]. Increased mortality is related to higher rates of perforation or complicated infection. In a review of 20 patients with emphysematous cholecystitis, seven patients had gallbladder perforation, nine had pericholecystic abscess, and three had bile peritonitis [4].

Summary

Emphysematous cholecystitis is a distinct form of cholecystitis that should be considered in diabetics who present with symptoms of typical cholecystitis. Emphysematous cholecystitis carries a greater risk of complication. The increased rates of complications are thought to be related to vascular occlusion and gallbladder ischemia. Treatment consists of parenteral antibiotics and cholecystectomy within 48 to 72 hours:

- Emphysematous cholecystitis may progress more quickly than typical cholecystitis and has higher rates of complication.
- CT is the preferred diagnostic test for emphysematous cholecystitis.
- Treatment of emphysematous cholecystitis consists of parenteral antibiotics and cholecystectomy within 48–72 hours.

References

1. Mentzer RM Jr, Golden GT, Chandler JG, Horsley JS 3rd. A comparative appraisal of emphysematous cholecystitis. Am J Surg. 1975;129(1):10–5.
2. Sarmiento RV. Emphysematous cholecystitis. Report of four cases and review of the literature. Arch Surg. 1966;93(6):1009–14.
3. Moanna A, Bajaj R, del Rio C. Emphysematous cholecystitis due to Salmonella derby. Lancet Infect Dis. 2006;6(2):118–20.
4. Garcia-Sancho Tellez L, Rodriguez-Montes JA. Fernandez de Lis S, Garcia-Sancho Martin L. Acute emphysematous cholecystitis. Report of twenty cases. Hepato-Gastroenterology. 1999;46(28):2144–8.
5. Edinburgh A, Geffen A. Acute emphysematous cholecystitis; a case report and review of the world literature. Am J Surg. 1958;96(1):66–75.
6. Grayson DE, Abbott RM, Levy AD, Sherman PM. Emphysematous infections of the abdomen and pelvis: a pictorial review. Radiographics. 2002;22(3):543–61.
7. Gill KS, Chapman AH, Weston MJ. The changing face of emphysematous cholecystitis. Br J Radiol. 1997;70(838):986–91.
8. Sunnapwar A, Raut AA, Nagar AM, Katre R. Emphysematous cholecystitis: imaging findings in nine patients. Indian J Radiol Imaging. 2011;21(2):142–6.
9. Seow VK, Lin CM, Wang TL, Chong CF, Lin IY. Acute emphysematous cholecystitis with initial normal radiological evaluation: a fatal diagnostic pitfall in the ED. Am J Emerg Med. 2007;25(4):488 e483-485.
10. Hazey JW, Brody FJ, Rosenblatt SM, Brodsky J, Malm J, Ponsky JL. Laparoscopic management and clinical outcome of emphysematous cholecystitis. Surg Endosc. 2001;15(10):1217–20.