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Emphysematous Cholecystitis in a Patient with Type 2 Diabetes Mellitus: A Case Report

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Abstract | **Case Report**

Acute emphysematous cholecystitis is a rare and severe form of acute cholecystitis, representing approximately 1% of cases. This condition is characterized by a necrotizing infection, with the hallmark feature being the presence of gas within the gallbladder. Here we present a case of a diabetic patient who suffered from EC with normal liver function tests. 69-year-old woman with a 10-year history of type 2 diabetes mellitus treated with oral antidiabetics, who was admitted to the emergency department with right upper quadrant abdominal pain, fever, and general malaise. Clinical examination revealed stable vital signs and localized tenderness in the right hypochondrium. Laboratory investigations showed leukocytosis, normal liver enzymes and bilirubinemia, increased inflammatory markers. Abdominal ultrasound revealed an alithiasic thickened gallbladder wall with intramural gas and pericholecystic fluid, suggestive of emphysematous cholecystitis. This diagnosis was confirmed by computed tomography, which also showed a gas dissecting along the entirety of the gallbladder wall and small fluid effusion in the douglas pouch. The patient underwent urgent open cholecystectomy, during which a necrotic gallbladder was removed. EC is a severe variant of acute cholecystitis with a poor prognosis if not promptly and accurately diagnosed. Computed tomography (CT) remains the most specific imaging tool for diagnosis. The cornerstone of treatment is timely cholecystectomy, which is essential to reduce both morbidity and mortality.

Keywords: Emphysematous cholecystitis, Diabetes mellitus, Gallbladder gas, Computed tomography (CT), Cholecystectomy.

INTRODUCTION

Emphysematous cholecystitis (EC) is a rare but potentially life-threatening form of acute cholecystitis caused by gas-producing organisms in the gallbladder. The incidence of EC less than 1% of all acute cholecystitis cases, and it is more commonly observed in men than in women and is highly associated with type 2 diabetes mellitus [1]. Here, we describe a rare case of a patient with diabetic who developed EC without specific abdominal symptoms, while exhibiting normal liver function test results.

CASE PRESENTATION

A 69-year-old women with a 10-year history of type 2 diabetes mellitus treated with two oral antidiabetic therapies, was admitted in to the emergency department for an abdominal pain in the right upper quadrant with a high fever and general malaise. On admission, the patient had blood pressure of 120/ 80 mmHg, a pulse rate of 86 b.p.m. and a body temperature of 38.1°C. No cardiac murmur was detected, his lung sounded clear, the right hypochondrium tenderness without defence or contracture non-tender. The laboratory test results showed: elevated leucocyte count (WBC) of 20.93 10^3/µL, hemoglobin at 10,5 g/dL, aspartate aminotransferase (AST) of 62 IU/L, alanine amino transferase (ALT) of 71 IU/L, alkaline phosphatase (ALP) of 144 IU/L, total bilirubin of 10,31mg/dL, c-guanosine triphos phate (c-GTP) of 46 IU/L, Urea 1,09 g/l ,serum creatinine of 43 mg/l and C-reactive protein of 243 mg/l. Ultrasound of the abdomen was ordered, and it reveals alithiasic gallbladder thickening of the gallbladder wall containing ‘small gas bubbles’ and with liquid around, an appearance consistent with emphysematous cholecystitis (Fig. 1). The study was completed with abdominal comput erized tomography scan (CT) (Fig. 2) that reported acute emphysematous cholecystitis associated with a small fluid effusion from the douglas cul-de-sac (Fig.2). The patient underwent an emergency open cholecystectomy. The gallbladder was

found to be necrotic. The culture of the bile collected during the operation did not show any pathogens.

Fig. 1: Ultrasound of the abdomen showing stratified thickening of the gallbladder wall with small gas bubbles and liquid around it

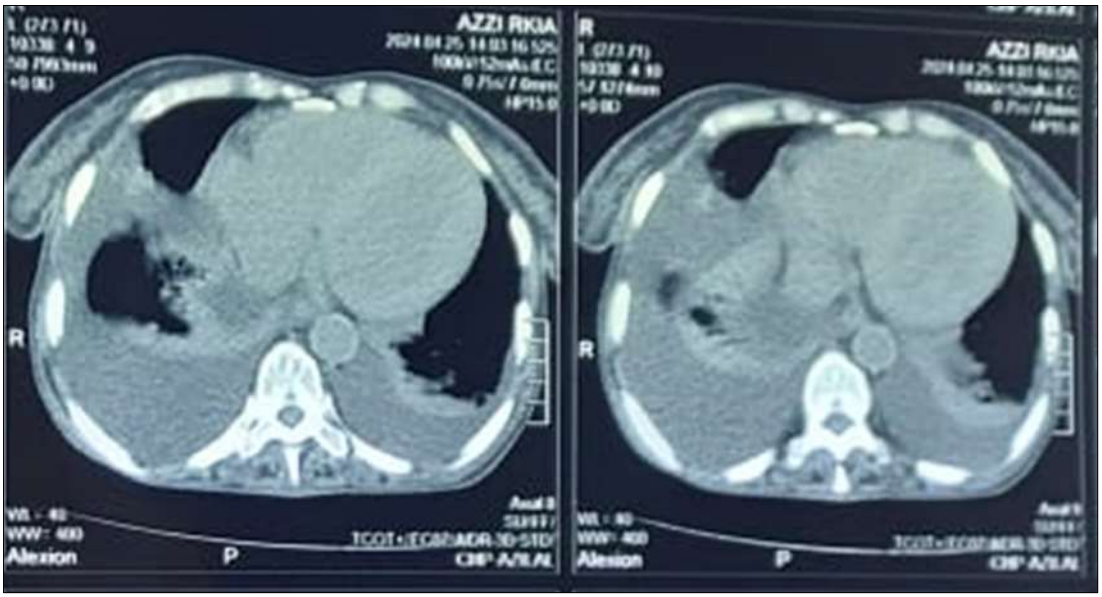

Fig. 2: Abdominal computed tomography showe gas dissecting along the entirety of the gallbladder wall

DISCUSSION

Emphysematous cholecystitis (EC) is a severe and potentially fatal form of acute cholecystitis, characterized by high mortality rates. It is more commonly seen in patients with diabetes, renal failure, peripheral vascular disease, immunosuppression, or those undergoing chronic dialysis. This rare condition accounts for approximately 1% of all acute cholecystitis cases [2]. Unlike cholelithiasis and acute cholecystitis, which are more prevalent in women, emphysematous cholecystitis (EC) is twice as common in elderly men, typically between the fifth and seventh decades of life [3]. Additionally, approximately 50% of EC cases occur in patients with a history of diabetes mellitus [4]. The presence of air in emphysematous cholecystitis is attributed to bile infection caused by gas-producing bacteria, including *Clostridium* species, *Fusobacterium nucleatum*, *Escherichia coli*, *Klebsiella* species, and anaerobic streptococci in the setting of gallbladder ischemia, typically caused by occlusion of the cystic artery [5, 6].

The clinical presentation of EC closely similar to that of acute cholecystitis, including right upper quadrant pain radiating to the shoulder, tenderness with a positive Murphy's sign, nausea, vomiting, and fever. However, in EC, the severity of these signs and symptoms can be significantly more pronounced [7]. In

patients with diabetes, these individuals often exhibit reduced pain sensitivity due to peripheral neuropathy which can result in subtler clinical symptoms. The clinical manifestation of EC is typically insidious and may progress rapidly, often afebrile, and the tenderness and "Murphy's sign" is typically absent. The EC can quickly progress to sepsis and gallbladder perforation if not promptly managed [8-10].

The diagnosis of emphysematous cholecystitis is based on clinical features, laboratory tests, and imaging modalities. Abdominal radiography may reveal the presence of gas within the gallbladder fossa; however, it cannot reliably distinguish emphysematous cholecystitis (EC) from other potential causes of gas in this region, such as a gas-containing liver abscess, biliary-enteric fistula, gallstone ileus, sphincter of Oddi dysfunction, or overlapping retroperitoneal air [10]. The radiography demonstrates accuracy in about 50% of all cases of EC [11].

Ultrasonography (US) is the first method of choice used to evaluate gallbladder (GB) pathology, with a reported diagnostic accuracy of EC approximately 77% [11, 7]. The sonographic findings depend on the amount of gas present within the GB. On ultrasound, air in the gallbladder lumen appears highly echogenic, accompanied by low-level posterior shadowing and reverberation artifacts, due to the gas present within the gallbladder (Fig .1). A rarer finding involves tiny hyperechoic foci within the lumen, released by gas-producing bacteria. These hyperechoic foci are reminiscent of champagne bubbles rising inside a champagne flute, the "champagne sign" or "effervescent gallbladder" [12]. Sonographically, it may be challenging to differentiate emphysematous cholecystitis (EC) from the wall echo shadow complex seen in cholelithiasis in a contracted GB, or from calcification in a porcelain GB [10-12].

Computed tomography (CT) is widely recognized as the diagnostic modality of choice for emphysematous cholecystitis (EC), owing to its high sensitivity in detecting gas within the gallbladder wall or lumen (Fig. 1). Beyond confirming the presence of gas, CT imaging enables a comprehensive assessment of gallbladder inflammation, facilitates the exclusion of other differential diagnoses, and assists in identifying potential complications such as abscesses or gallbladder perforation [12, 9]. Hepatobiliary nuclear scanning may demonstrate non-visualization of the gallbladder, along with a region of increased hepatic activity adjacent to the gallbladder fossa. This feature is sometimes termed the rim sign which is specific for advanced or complicated cholecystitis, such as such as perforated and EC [13].

In the management of emphysematous cholecystitis (EC), prompt surgical intervention via early cholecystectomy is essential due to the disease's rapid progression. Empirical broad-spectrum antibiotic therapy should be initiated immediately, with coverage targeting anaerobic bacteria, enteric Gram-negative bacilli, and Gram-positive organisms [14]. In the present case, the patient was promptly treated with antibiotics followed by an emergency open cholecystectomy, resulting in a favorable outcome.

Emphysematous cholecystitis (EC) carries a poor prognosis, with a high mortality rate of up to 15% [15]. Compared to uncomplicated acute cholecystitis, EC presents a fivefold increased risk of gallbladder perforation, making emergent cholecystectomy necessary for affected patients. However, for critically ill patients who are not candidates for surgery, a temporary approach such as percutaneous cholecystostomy can be beneficial.

In conclusion, emphysematous cholecystitis is a severe variant of acute cholecystitis with a poor prognosis if not promptly and accurately diagnosed. Its subtle and non specific clinical presentation poses a diagnostic challenge for clinicians, specially in patients with with diabetes mellitus and preripheral neuropathy. Therefore, radiologists play a crucial role in recognizing its characteristic features across various imaging modalities, ultrasonography typically the first-line imaging modality plays a pivotal role in detecting gallbladder pathologies in such patients, as clinical signs may be less pronounced.

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