

Emphysematous Cholecystitis: Pitfalls in Its Plain Film Diagnosis

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Abstract. The clinical and radiographic findings of emphysematous cholecystitis are usually characteristic. However, on occasion the radiographic findings may be simulated by other processes. In such circumstances accurate diagnosis can usually be rapidly established by a variety of simple radiographic maneuvers and procedures. Five illustrative cases are presented herein and the pertinent literature is reviewed.

Key words: Cholecystitis, emphysematous – Abdomen, gas pattern.

Since its first radiographic description by Hegner in 1931, emphysematous cholecystitis has become recognized both clinically and roentgenographically as a distinct form of acute cholecystitis [1]. Typically, a characteristic pattern of gas in the lumen and/or the wall of the gallbladder is seen on the plain abdominal film. However, air in the gallbladder may be simulated by gas collections in normal or dilated structures, pathologic processes, or therapeutic devices. Up to one-third of the patients with emphysematous cholecystitis are afebrile and localized tenderness is often not a dominant clinical feature [2]. Therefore the paucity of symptoms is not a differentiating feature. Although ultrasound may at times suggest a diagnosis of emphysematous cholecystitis, the findings are nonspecific [3, 4]. Computed tomography can confirm the diagnosis but is expensive and time-consuming [5, 6]. The use of positional plain film maneuvers and

administration of contrast can usually resolve the diagnosis.

Materials and Methods

Five cases in which plain films of the abdomen suggested the diagnosis of emphysematous cholecystitis were identified. In each case the proper diagnosis was obtained by additional radiographic observations or maneuvers.

Results

Case 1 involved a volvulus of a Meckel's diverticulum that presented as severe upper abdominal pain and a right upper quadrant gas collection (Fig. 1). The clinical history was previously reported elsewhere [7]. Ultrasonography and biliary scintigraphy demonstrated a normal-appearing gallbladder. Laparotomy established the diagnosis. Case 2 represents a gastrostomy tube that had migrated into the duodenum, producing severe right upper quadrant pain due to obstruction (Fig. 2). Contrast administered through the gastrostomy tube confirmed the nature of the lucency on the plain film. The third patient presented with nausea and vomiting. Plain film of the abdomen demonstrated a right upper quadrant gas collection that subsequent oral contrast examination proved to represent a dilate descending duodenum due to obstructing pancreatic carcinoma (Fig. 3). Case 4 is another example of gas in the duodenum in a patient with epigastric distress (Fig. 4). An intravenous cholangiogram and upper gastrointestinal series confirmed the duodenal position of the gas collection. Acute gastritis was identified on the barium study. In the final patient with 2 radiopaque gallbladder calculi and right upper quadrant pain and tenderness, oblique plain films of the abdomen revealed the gas collection overlying the

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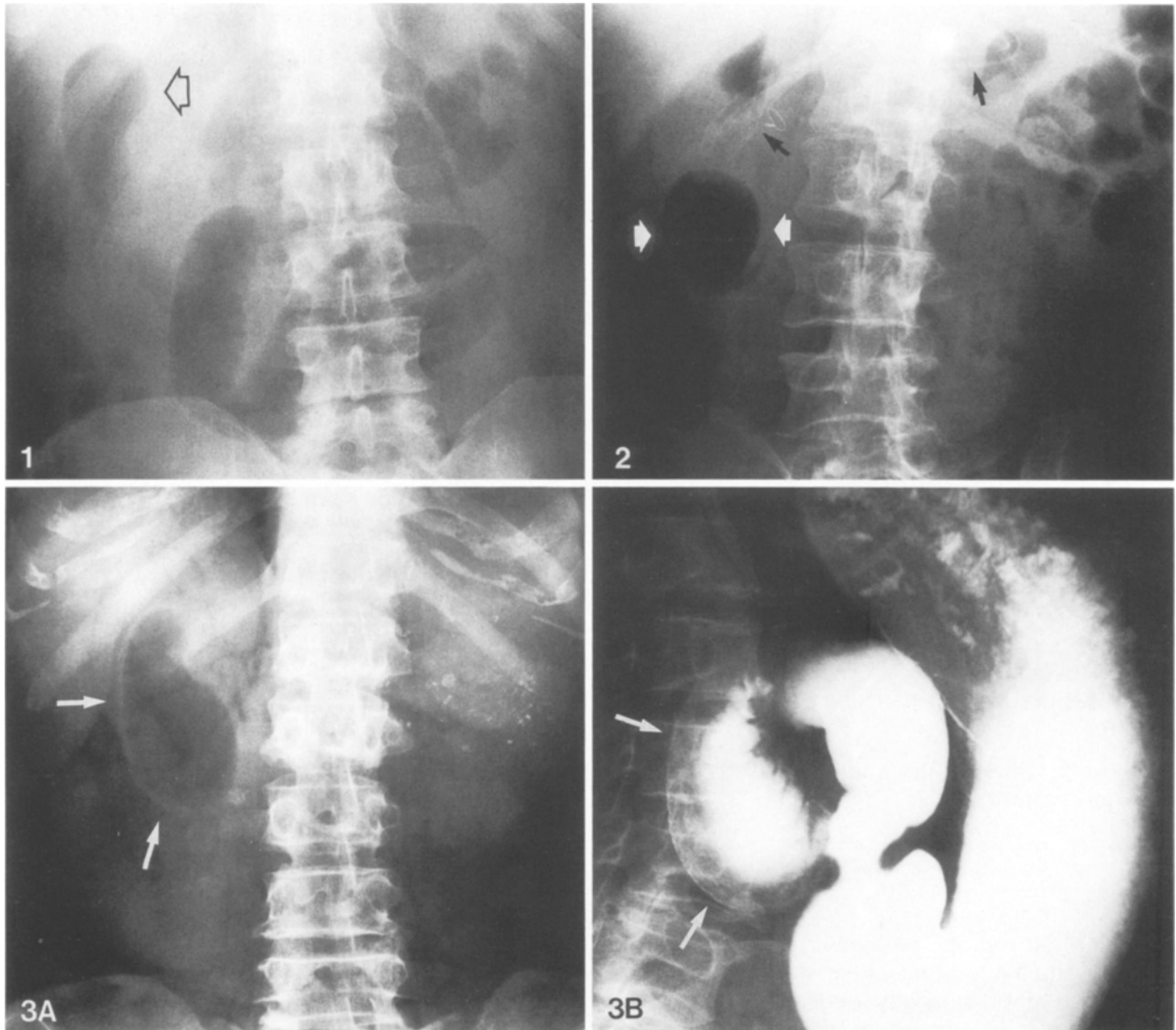


Fig. 1. Ovoid gas-filled Meckel's diverticulum in right upper quadrant simulating emphysematous cholecystitis (*arrow*). Dilated small bowel loops in midabdomen represent ileus due to local inflammation.

Fig. 2. Round gas collection in right upper quadrant (*white arrows*) due to gastrostomy balloon that had migrated into the duodenum producing obstruction. Gastrostomy tube can be identified in the distal stomach (*black arrows*).

Fig. 3. A Ovoid gas collection in right upper quadrant (*arrows*). **B** Upper GI study confirms that the gas collection is a dilated descending duodenum (*arrows*) caused by carcinoma of the pancreas.

calculi to be in the hepatic flexure of the colon (Fig. 5).

Discussion

Emphysematous cholecystitis is an uncommon variant of acute cholecystitis. Approximately one-third of the cases are associated with diabetes. In contrast to the more common form of acute cholecystitis, emphysematous cholecystitis is more com-

mon in male patients, is associated with a lower incidence of gallstones, and the cystic duct is patent in approximately 20% [8, 9]. Patients with emphysematous cholecystitis have a greater morbidity and mortality due to gangrene of the gallbladder leading to perforation and abscess. *Clostridium welchii* is the most frequent organism cultured, but *E. coli*, *Staphylococcus*, and anaerobic *Streptococcus* have also been reported [10]. A characteristic radiographic pattern of gas in the lumen and/or

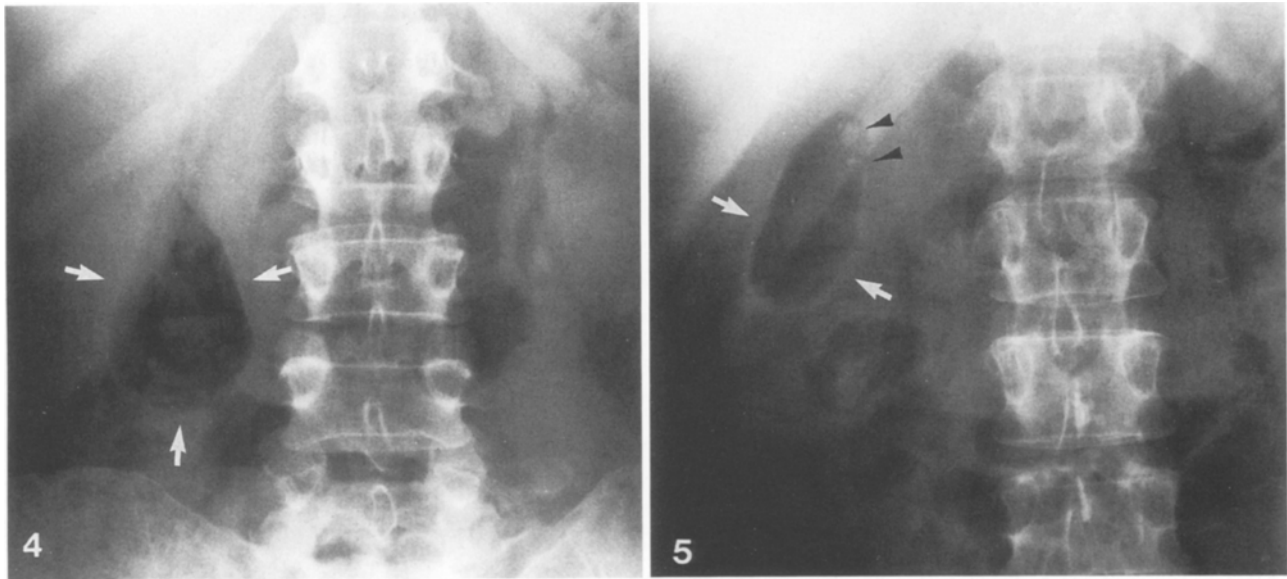


Fig. 4. Ovoid right upper quadrant gas collection (*arrows*) proved to be a dilated duodenal bulb in this patient with endoscopic findings of gastritis and duodenitis.

Fig. 5. Ovoid right upper quadrant gas collection (*white arrows*). Two radiopaque calculi overlies the gas collection (*arrowheads*). Oblique plain films demonstrated the gas to represent the hepatic flexure of the colon. The calculi were unrelated to the gas collection.

the wall of the gallbladder may be seen on the plain abdominal films [10, 11]. This appears as a smooth sharply defined ovoid lucency in the right upper quadrant. A linear lucency partially or completely paralleling a gas collection or bile-filled gallbladder may be identified when air is present within the wall. An air fluid level may be present on erect films. A diagnostic finding, when present, is gas surrounding intraluminal calculi in multiple projections. The gallbladder is usually dilated, unlike the findings with air in the gallbladder from a biliary-enteric anastomosis (normal size) or cholecystoenteric fistula (contracted gallbladder). Air may be identified in the bile ducts when the cystic duct is patent [8]. The radiographic findings have been classed into 3 stages [10]. Stage 1 is gas within the gallbladder lumen and usually is seen 24–48 hours after the acute onset of symptoms. The second stage is intramural gas seen on the plain film as a crescent-shaped lucency in the gallbladder wall or a lucent halo surrounding the lumen, which may or may not be filled with gas. In the third stage perforation and abscess occur in the pericholecystic tissues, producing a mottled gas collection in the right upper quadrant. This appearance is nonspecific and may occur with classic acute cholecystitis as well as any other cause of abscess in the right upper quadrant [12, 13].

Much of the diagnostic difficulty on plain film

arises when other processes simulate the first stage of emphysematous cholecystitis. We have presented several examples, including volvulus of a Meckel's diverticulum, a dilated descending duodenum, a dilate duodenal bulb, gas in the hepatic flexure of the colon, and a gastrostomy balloon. This appearance may also be produced by a large duodenal diverticulum or a right upper quadrant abscess (subhepatic, intrahepatic, perinephric). In most cases, utilization of oblique views of the abdomen, barium examinations, and, if necessary, computed tomography, will clarify the diagnosis.

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