

## Emphysematous Hepatitis: A Rare Cause of Septic Shock

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### Abstract

### Case Report

Emphysematous hepatitis is a rare fatal, rapidly progressive infection of the liver that typically occurs in individuals with diabetes. It is characterized by the accumulation of gas in the hepatic parenchyma replacing the healthy tissue and leading to acute liver failure. In this study, we present a case of emphysematous hepatitis affecting a 54-year-old diabetic man with extensive segmental replacement of liver parenchyma by gas. Although the patient received early broad-spectrum antimicrobial therapy and supportive care, the condition progressed to a fatal outcome, which is consistent with other case reports. It is crucial for radiologists and clinicians to be aware of this condition and its potential fatality, allowing for early diagnosis and aggressive management to improve patient outcomes.

**Keywords:** Emphysematous hepatitis, hepatic failure, diabetic complication, Imaging.

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## INTRODUCTION

Emphysematous hepatitis is a rare life-threatening condition caused by necrotizing gas-forming infection of the liver parenchyma. Although the exact cause is not well understood, some studies have suggested a link between emphysematous hepatitis and diabetes mellitus, as most reported cases involved patients with this condition [1-6].

Diagnosis of emphysematous hepatitis is typically made using radiological imaging, specifically computed tomography, which reveals the presence of gas within the liver tissue. Given the severity of this condition, early recognition and prompt treatment are critical in reducing mortality rates.

This presentation describes a case of emphysematous hepatitis in a patient with diabetes whose course was unfavorable despite management.

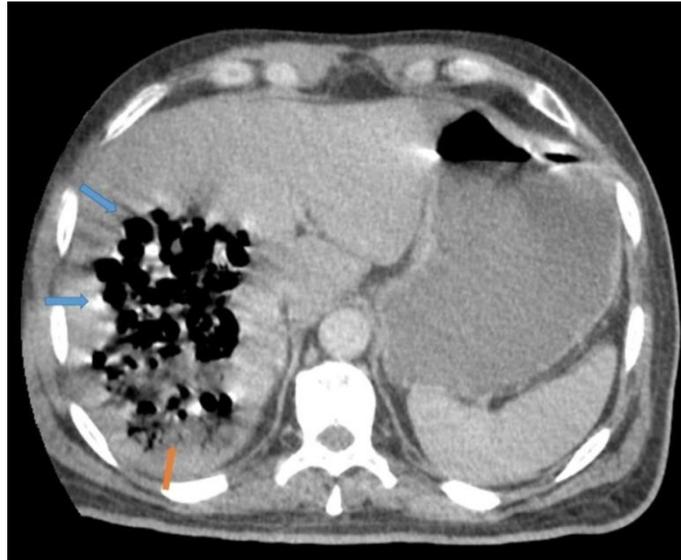
## OBSERVATION

A 54-year-old man followed for diabetes for 10 years, who presented to the emergency room with

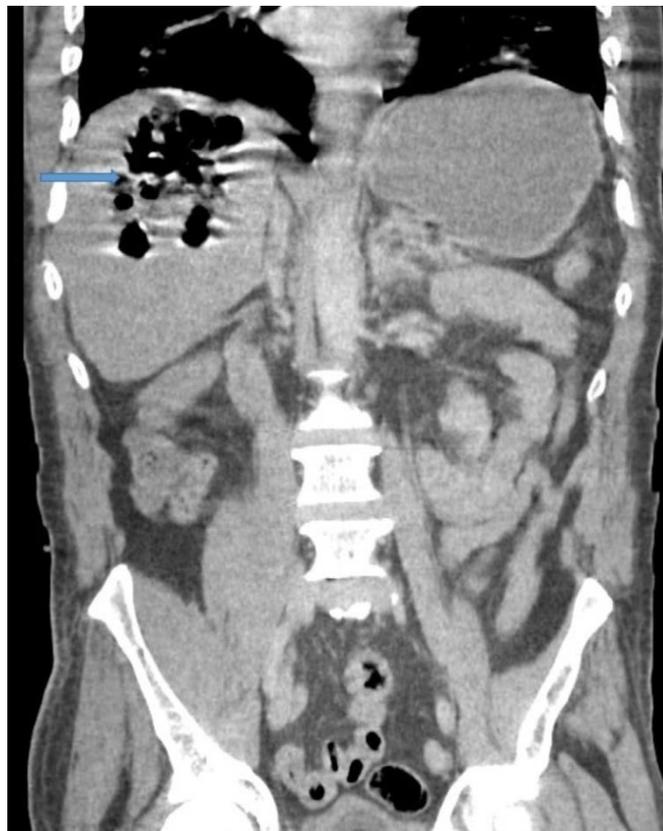
severe right upper abdominal quadrant pain associated with fever and no history of trauma or surgery, particularly liver surgery.

Clinically, he had a heart rate of 154 beats per minute, and the blood pressure was 90/50 mm Hg. On physical examination, he was disoriented, and the right upper quadrant of the abdomen was tender to palpation.

Laboratory examination revealed leucocytosis of 36,000 cells/mm<sup>3</sup> with 90% neutrophils, and elevated lactates. An emergent CT of the abdomen was performed before and after the administration of contrast agent in the arterial and portal venous phase. The imaging revealed the replacement of liver parenchyma with gas involving segments V, VII and VIII, with no fluid collection, evidence of abscess formation, or communication with the gallbladder. The main portal vein and hepatic artery was well enhanced (fig 1, 2). The patient was diagnosed with emphysematous hepatitis primarily based on CT findings. Aggressive antibiotic therapy was started immediately. Despite treatment, the patient died after 12 hours of admission.



**Figure 1: Portal abdominal CT scan (axial section): Lesional area involving the right liver made of multiple contiguous aerial images (blue arrow) and area of fluid density posteriorly (orange arrow)**



**Figure 2: Portal abdominal CT scan (coronal section): Lesional area involving the right liver made of multiple contiguous aerial images (blue arrow) with persistence of a parenchymal tongue at the level of the hepatic dome**

## DISCUSSION

Emphysematous infections affecting the abdomen and pelvis are serious conditions that can be life-threatening and require urgent medical and surgical intervention. Examples of such infections include emphysematous cholecystitis, gastritis, pancreatitis, pyelonephritis, and emphysematous cystitis [1].

Emphysematous hepatitis, on the other hand, is a rare infection that affects the liver parenchyma, with only a few isolated case reports. The term was first described by Blachar *et al.*, in 2001[2]. It's a rare disorder marked by the replacement of hepatic parenchyma with gas, which is often followed by an acute and fulminant inflammation of the liver, leading to acute liver failure and septic shock [1, 2].

Gas within the liver may result from a range of causes, including liver abscesses, iatrogenic factors, and infrequently, infection by gas-forming bacteria. The latter occurs due to mixed acid fermentation of glucose, leading to the production of gases such as nitrogen and hydrogen. *Escherichia coli*, *Klebsiella*, *Clostridium*, and *Staphylococcus aureus* are among the common organisms associated with EP [3].

Emphysematous hepatitis typically presents with abdominal pain and fever. CT is the preferred imaging technique for its diagnosis as it allows for early detection, assessment of the extent, location of liver involvement, and exclusion of other potential causes of septic shock and acute abdominal pain [4]. The diagnosis of this condition is confirmed by observing the replacement of the liver parenchyma with gas, with no evidence of fluid collections, abscess formation or mass effect [3]. The imaging findings resemble those of emphysematous pyelonephritis, particularly type I, which refers to parenchymal destruction with mottled or streaky gas but with no associated fluid collection present [5]. The primary differential diagnosis includes pyogenic abscess and gas formation within infarcted liver parenchyma. CT appearance of abscess is characteristic and consists of a clustered or multiseptated, round or oval hypodense collection of pus, which may be encapsulated, with rim enhancement, mass effect and air-fluid level [2]. None of these characteristics were observed in our patient. The occurrence of liver infarction is exceedingly rare, primarily due to the liver's dual blood supply from the hepatic artery and portal vein, as well as the extensive network of collaterals present within the organ. Both systems must be compromised, most often from embolus or thrombus, for an infarct to result. Gas formation has been described in sterile and infected infarcted tissue in the form of gas bubbles, but extensive parenchymal necrosis with gas replacing solid parenchyma is not usually seen [3]. It is also essential to differentiate parenchymal gas in the liver from air observed in other liver structures, such as bile ducts following endoscopic sphincterotomy and portal veins due to bowel infarction.

Management of this condition usually involves parenteral broad-spectrum antibiotics and drainage of the gas on the concern of an underlying collection but usually, no fluid/pus is obtained [6]. We did not attempt drainage in our patient due to its perceived futility, and

the rapid deterioration of the patient's condition made it unsafe to perform the procedure.

## CONCLUSION

Emphysematous hepatitis is a rare fulminant liver infection in diabetic patients. Computed tomography is an important tool in the positive diagnosis, showing the replacement of the liver parenchyma by gas. The outcome is often fatal as in our observation, which justifies the sensitization of clinicians and radiologists on this entity for an early diagnosis and an aggressive management in order to reduce the mortality it causes.

**Conflict of Interest:** The authors report no conflicts.

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