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When liver meets lung: A rare hepaticobronchial fistula with endobronchial spread

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Abstract
Hepatic abscesses are uncommon but potentially life-threatening conditions. Rarely, they may extend across the diaphragm to form hepatobronchial fistulae with associated pulmonary complications. We report a case of a 34-year-old male with a gas-forming hepatic abscess complicated by a hepatobronchial fistula and endobronchial seeding. Multimodality imaging including ultrasound and CT demonstrated the hepatic abscess, transdiaphragmatic communication, and tree-in-bud nodules in the lung. The patient underwent percutaneous drainage with pigtail catheter placement, and pus culture grew Escherichia coli. He improved clinically with antibiotics and drainage. This case underscores the importance of recognizing rare hepatic abscess complications with imaging to guide prompt management.

Keywords: Hepatic abscess, hepatobronchial fistula, endobronchial seeding, tree-in-bud, ultrasound, CT

Introduction
Pyogenic liver abscesses are clinically significant infections that can lead to serious complications if not promptly treated. Common complications include rupture into the peritoneal cavity, pleural empyema, and pericardial involvement [1]. However, direct extension into the thoracic cavity with formation of a hepatobronchial fistula is extremely rare, with very few cases reported worldwide [2, 3].
Such cases pose diagnostic challenges because initial clinical and radiographic findings may mimic other conditions, such as hydatid disease, subphrenic abscess, or even Chilaiditi sign [4]. Early recognition of this rare complication is crucial because prompt drainage and targeted antibiotic therapy can improve outcomes.
Herein, we describe a case of gas-forming hepatic abscess with hepatobronchial fistula and endobronchial seeding. The imaging findings and clinical management are discussed in detail, with emphasis on the role of multimodality imaging in diagnosis.

Case Report
A 34-year-old male presented with high-grade fever, cough with purulent expectoration, and right upper abdominal pain for one week. He denied jaundice, prior surgery, or history of tuberculosis. On examination, he was febrile, with tenderness in the right hypochondrium and crepitations in the right lower lung field. Laboratory evaluation revealed leukocytosis (15,200/µL) and mildly deranged liver enzymes.
Ultrasound of the abdomen revealed a large liquefied lesion in the right hepatic lobe with internal echoes and a peripheral rim of air, suggestive of a pyogenic abscess.

Fig 1: Ultrasound abdomen showing a large liquefied hepatic abscess with internal echoes and peripheral rim of air.

Chest radiograph showed a right lower zone opacity with subdiaphragmatic air-fluid level, initially mistaken for Chilaiditi sign.

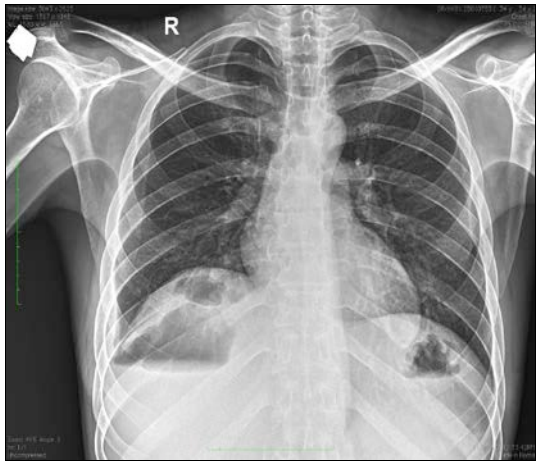

Fig 2: Chest X-ray showing subdiaphragmatic air-fluid level mimicking Chilaiditi sign.

Contrast-enhanced CT of the abdomen revealed a gas-forming hepatic abscess in segment VII/VIII, with direct extension through the diaphragm into the right lower lobe.

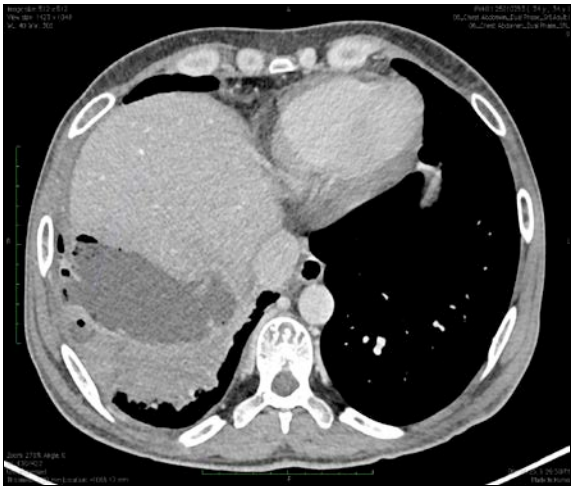

Fig 3: Axial contrast-enhanced CT showing hepatic abscess extending through the diaphragm.

Fig 4: Coronal CT demonstrating the hepatobronchial fistula tract crossing the diaphragm.

Lung window CT showed multiple tree-in-bud nodules in the right lower lobe, consistent with endobronchial spread of infection.

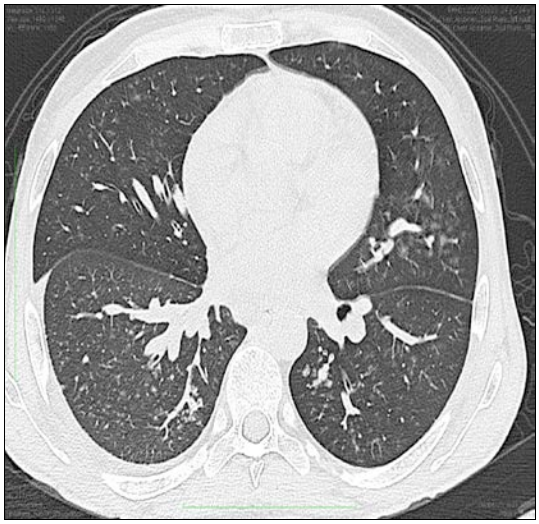

Fig 5: Axial CT lung window showing tree-in-bud opacities suggestive of endobronchial seeding.

Ultrasound-guided percutaneous drainage was performed with placement of a pigtail catheter. Thick pus was aspirated, and culture confirmed growth of Escherichia coli. The patient improved with drainage and intravenous antibiotics. Follow-up ultrasound demonstrated catheter in situ with reduction in abscess cavity size.

Fig 6: Ultrasound post-drainage showing pigtail catheter in situ within the hepatic abscess cavity.

Discussion

Pyogenic liver abscesses most commonly occur due to biliary tract disease or portal spread of infection. Gram-negative organisms, particularly Escherichia coli and Klebsiella pneumoniae, are frequently isolated [5]. Gas-forming organisms may predispose to rapid tissue destruction and higher rates of complications [6].

Direct transdiaphragmatic extension with hepatobronchial fistula formation is rare, with only a few cases documented in the literature [2, 7]. The mechanism involves erosion of the abscess cavity through the diaphragm, producing communication with the bronchial tree [8]. Clinically, such patients may present with both abdominal and pulmonary features, including productive cough, hemoptysis, and right upper quadrant pain.

Imaging plays a central role in diagnosis. Ultrasound is widely available and demonstrates the abscess cavity and gas-related echogenicity. CT remains the gold standard for confirming diaphragmatic breach, identifying fistulous tracts, and evaluating pulmonary sequelae such as endobronchial spread. Tree-in-bud opacities on lung windows are particularly helpful in establishing endobronchial dissemination [9, 10].

Differential diagnoses include ruptured hydatid cyst,

bronchobiliary fistula secondary to obstructive biliary pathology, and subphrenic collections [11]. Careful correlation of imaging with clinical and microbiological findings is essential.

Management strategies focus on percutaneous or surgical drainage combined with culture-directed antibiotics. In most cases, image-guided catheter drainage suffices, with surgery reserved for refractory or complex cases [12, 13]. Our patient responded well to percutaneous drainage and antibiotics, consistent with outcomes reported in literature.

This case highlights the need for radiologists and clinicians to recognize the rare complication of hepatobronchial fistula in patients with hepatic abscesses, especially when pulmonary symptoms are present.

Conclusion

Hepatobronchial fistula is an uncommon but important complication of hepatic abscess. Multimodality imaging, especially contrast-enhanced CT with lung windows, is essential for accurate diagnosis and differentiation from mimics. Prompt drainage and antibiotic therapy can result in favorable outcomes, preventing the need for surgical intervention.

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None.

Author's Contribution

All authors contributed equally in diagnosis, management, manuscript preparation, and review.

Conflict of Interest

None declared.

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Patient Consent

Patient consent was obtained for publication of this case report and accompanying images.

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