

A Case Report on Liver Abscess Caused by *Klebsiella Pneumoniae* in a Patient with Emphysema Thorax

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Abstract: *Liver abscesses are serious infections that can be caused by various pathogens. Klebsiella pneumoniae is a rare but important cause of liver abscesses, particularly in patients with predisposing conditions such as diabetes mellitus or liver cirrhosis. Here, we report a case of a 59 years old patient with liver abscess caused by Klebsiella pneumoniae along with emphysema thorax came with complains of fever and abdominal pain and a history of constipation since few weeks and with a history of newly diagnosed diabetic mellitus, which is an unusual combination of risk factors.*

Keywords: *Klebsiella pneumoniae, Liver Abscess, emphysema thorax*

1. Introduction

Liver abscesses stand out as one of the most prevalent visceral abscesses. Risk factors encompass diabetes, hepato - biliary, and pancreatic diseases. Gram - negative bacilli, notably *Escherichia coli* and *Klebsiella pneumoniae*, emerge as the primary pathogens linked with liver abscesses. 1 Mono - microbial liver abscess caused by *Klebsiella pneumoniae* has indeed been increasingly reported in the Asian population over the last two to three decade. 4 *Klebsiella pneumoniae* (Kp) is indeed a Gram - negative bacillus commonly found in the environment, particularly in soil and water. It is also a member of the normal flora in the human gastrointestinal tract. While it's true that *K. pneumoniae* can cause community - acquired infections. 2

Emphysematous liver abscess, with an incidence ranging from 6% to 24%, can be fatal in up to 25% of cases. This variant of liver abscess is associated with elevated rates of distant complications and a generally unfavorable prognosis. It is frequently attributed to *Klebsiella pneumoniae* infection and is notably prevalent in patients diagnosed with diabetes mellitus. 3

2. Case Report

The 59 - year - old gentleman visited the outpatient department (OPD) with a complaint of high - grade fever persisting for 2 weeks, accompanied by intermittent chills and night sweats occurring around 11 pm. He reported no cough, chest pain, or breathlessness. Additionally, he mentioned a history of constipation, with no bowel movements for approximately 2 days. There were no associated symptoms of vomiting, abdominal pain, diarrhea, gastrointestinal bleeding, jaundice, headache, dysuria, or generalized body ache. The patient has been newly diagnosed with type 2 diabetes mellitus within the last 2 weeks and has commenced medication therapy. Laboratory investigations revealed elevated total leukocyte counts (17700), low hemoglobin

levels (11.7 g/dL), and an elevated erythrocyte sedimentation rate (92 mm/hr). Additionally, the CRP level was elevated (232.2 mg/L), serum sodium was low (127 mmol/L), and HbA1c was 10.6%. LFT showed derangement. The H1N1 test returned negative. The patient was initiated on intravenous antibiotics (Inj MEROPENEM), antipyretics, intravenous fluids, and supportive measures. A subsequent USG abdomen was conducted which revealed a well - defined hetero - echoic area with septations, echogenic particles, and reverberation artifacts in the right lobe of the liver, suggestive of a possible abscess. Grade 1 fatty liver and umbilical hernia were also noted. An HRCT thorax showed minimal fibrotic changes in the right lower lobe and a large hypodense lesion in the right lobe of the liver with air foci, indicative of a liver abscess. Percutaneous drainage of the abscess was advised. Subsequent CECT abdomen revealed a heterogeneously enhancing hypo dense lobulated area with rim enhancement in segment VI of the right lobe of the liver, measuring 9 x 10 cm, with a few air foci within, suggestive of a hepatic abscess. Interventional Radiology consultation was obtained, and USG - guided catheter drainage was performed under strict aseptic precautions to drain the abscess pus, which was sent for culture and sensitivity. Culture and sensitivity of the abscess pus and sputum revealed the presence of *Klebsiella Pneumoniae*. He was shifted to room air. However, the patient experienced breathing difficulty and desaturation, necessitating transfer to the HDU. Nasal prongs were initiated under 4L O₂. Continued improvement was noted, and a repeat Chest X - ray revealed right - sided pleural effusion, prompting USG - guided percutaneous drainage. Pleural fluid analysis showed no growth on culture and sensitivity. CTVS consultation was sought due to persistent right - sided effusion observed on screening CT chest, leading to a decision for a right thoracotomy. The patient was discharged and subsequently readmitted under the care of the CTVS team for the planned surgical procedure for right thoracotomy and decortication. Patient was admitted under the CTVS department for further management. Following initial investigations, the patient underwent a right thoracotomy and

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decortication procedure, which was uneventful without any intraoperative complications. Postoperatively, the patient showed satisfactory lung expansion and respiratory excursions, facilitated by effective physiotherapy. Microbiological culture of tissue samples revealed the presence of pus cells but no bacterial growth after 48 hours of incubation. A screening ultrasound of the liver was performed, showing no significant hepatic collection.

3. Discussion

Community - acquired *Klebsiella pneumoniae* liver abscess has emerged as a significant health concern in several parts of Asia, where it accounts for approximately 80% of all cases of pyogenic liver abscess in countries like Taiwan and Korea. Cases have also been reported sporadically in other regions including Asia, North America, Europe, and Australia 5. In the case of liver abscess caused by *Klebsiella pneumoniae*, the infection typically originates in the gastrointestinal tract and spreads to the liver through the bloodstream. Risk factors for developing this condition include diabetes mellitus, liver cirrhosis, and other conditions that weaken the immune system.

It has been reported that the mortality rate of *K. pneumoniae* meningitis is 53%, and this rate significantly increases when multiple abscesses, such as those in the liver and brain, occur concurrently. Fungal infection also heightens the risk of death. 1

Fever (85.2%) and abdominal pain (39.7%) were the two most common presenting symptoms for liver abscess. Since abdominal ultrasonography is widely used for evaluating patients with fever and acute abdominal pain, diagnosing liver abscess is generally not difficult when assisted by this imaging modality. 7

Pleural empyema secondary to the Trans diaphragmatic extension of a pyogenic liver abscess is a rare but potentially life - threatening complication. Early detection of thoracic empyema is crucial to reduce associated mortality and morbidity rates. Effective treatment requires a multidisciplinary, patient - tailored approach that utilizes combined therapeutic modalities. Importantly, adequate drainage remains the cornerstone of managing any pus collection, regardless of the complexity of the case. 6 The close proximity of hepatic lesions to the diaphragmatic muscle increases the risk of extension of a liver abscess and the subsequent development of pleural empyema.

Gas production in liver abscesses caused by *Klebsiella pneumoniae* is attributed to hyperglycemia, which is prevalent in most cases. It is believed that these facultative anaerobes can thrive in oxygen - deprived environments by metabolizing glucose, particularly under hyperglycemic conditions. This metabolic process leads to the production of carbon dioxide, resulting in the formation of emphysematous liver abscesses. As a result, this condition is commonly observed in patients with poorly controlled diabetes mellitus. 3

Abdominal ultrasound, simple abdominal radiography, and other imaging techniques are useful for diagnosing liver abscesses, but computed tomography (CT) is considered the

best method for sensitive detection of gas within abscesses. In the present case, the X - ray showed air under the right dome of the diaphragm, and as the patient was clinically stable, contrast - enhanced CT (CECT) was performed, confirming the diagnosis.

Diabetes is a risk factor for *Klebsiella pneumoniae* - induced liver abscess, and approximately 80% of patients with diabetes due to an underlying disease present with this type of liver abscess. Patients with uncontrolled blood sugar levels are at higher risk of developing gas - forming liver abscesses and liver abscesses of unknown origin, as well as experiencing metastatic infections, compared to those with controlled blood sugar levels. Liver abscesses of unknown origin and metastatic infections are more prevalent in groups with poor blood sugar control. 6

4. Conclusion

The occurrence of emphysema and liver abscess is uncommon, they can be potential complications that require early detection and treatment to reduce mortality and morbidity. Patients with emphysema thorax should be monitored closely for the development of liver abscess, especially those with underlying risk factors such as diabetes mellitus. This case highlights the importance of considering *Klebsiella pneumoniae* as a possible pathogen in liver abscess, particularly in patients with predisposing conditions. Early recognition and appropriate management, including antibiotic therapy and drainage if necessary, are crucial in improving outcomes in such cases.

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Conflict of Interest

The authors declared that there is no conflict of interest.

Abbreviations

CRP: C - Reactive Protein
CECT: Contrast - Enhanced Computed Tomography
USG: UltraSonography
HRCT: High - Resolution Computed Tomography
LFT: Liver Function Test
HBA1C: Glycated Hemoglobin
CTVS: Cardiothoracic and Vascular Surgery

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