

CASE REPORT

PERIOPERATIVE MEDICINE

Liver abscess caused by *Klebsiella pneumoniae* associated with endophthalmitis

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Abstract

Klebsiella pneumoniae is a gram-negative pathogen that can cause severe infections including pyogenic liver abscess which has other metastatic septic complications. One of them is Endogenous Endophthalmitis (EE), particularly caused by *Klebsiella pneumoniae* is associated with serious sequelae and morbidity. We report the case of a middle-aged male with *Klebsiella pneumoniae* EE in whom a later liver abscess was found on ultrasound. Even though early suspicion was raised and both intravitreal and systemic antibiotics were given even before liver abscess was found as the source of EE, unfortunately, the patient later developed right eye perforation and evisceration was performed. A high index of suspicion for liver abscess should be entertained in patients presented with ocular symptoms along with fever and high CRP to establish an early diagnosis to prevent its dire consequences.

Key words: Pyogenic liver abscess. Endogenous endophthalmitis. *Klebsiella pneumoniae*

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1. Introduction

Klebsiella pneumoniae (*K. pneumoniae*) is a gram-negative bacterium that is a common cause of severe infections, including pneumonia, urinary tract infections, liver abscess, endophthalmitis and meningitis. A pyogenic liver abscess (PLA) caused by virulent *K. pneumoniae* is an emerging infectious disease worldwide and particularly in Southeast Asia; its incidence has increased during the recent past.¹ The increased incidence of PLA caused by a highly virulent strain of *K. pneumoniae*, serotype K1, that can infect immunocompetent adults with no known medical conditions, is quite a worrying phenomenon. This high virulence of the mentioned strain can be explained by the mechanism in which excessive viscosity results from the production of a mucoviscous exopolysaccharide web, which in turn leads to higher resistance to complement deposition and phagocytosis.² Other identified risk factors for developing PLA include age > 65 y and underlying diabetes mellitus.³

Throughout the years, the prognosis of PLA has improved with increased use of diagnostic imaging such as ultrasound and computed tomography (CT) scanning along with potent antibiotics. Endogenous endophthalmitis (EE) is an infection inside the eyeball involving the vitreous and/or aqueous humour, and is associated with poor visual outcomes, especially if it resulted as a septic complication of PLA caused by *K. pneumoniae*.

We herein report a case of EE associated with PLA in which the visual outcome did not improve even after treatment. We emphasize on prompt diagnosis and aggressive treatment of PLA to prevent its serious complications. We discuss the clinical characteristics in our patient and compare with the past reports.

2. Case Report

A 49 y old male, known to have diabetes mellitus, presented with fever, chills, productive cough, and shortness of breath for 5 days. He also experienced right



Figure 1: Heterogeneous opacities of both lungs with elevated right hemidiaphragm, and obscured both right and left hemidiaphragm and cardiac borders

eye pain with purulent discharge and blurring of vision. On examination, there was purulent discharge from the right eye, injected conjunctiva, hypopyon (more in the right eye), and a dense fibrous membrane covering the whole right pupil. Pulmonary examination revealed a respiratory rate of 26/min and coarse crepitations from the lower to mid-zone in both lung fields. The liver was just palpable and there was tenderness on palpation at the right hypochondrium.

Blood investigations indicated leukocytosis, with white blood cell (WBC) count at $26.3 \times 10^9/L$, raised aspartate aminotransferase (AST)-80 U/L, alanine transaminase (ALT)-117 U/L, alkaline phosphatase (ALP)-271 U/L and high C-reactive protein > 200 mg/dL. Chest X-ray (Figure 1) revealed heterogeneous opacities in both lung fields, whereas abdominal ultrasound and CT scan of the liver (Figure 2) showed an ill-defined heterogeneous hypoechoic and hypodense lesion measuring 5.9 x 7.9 cm at the segment V/VIII of the liver. Right eye vitreous and sputum culture results were positive for *K. pneumoniae* and the patient was diagnosed with disseminated *Klebsiella* infection consisting of community-acquired pneumonia, bilateral endophthalmitis, and liver abscess. He was admitted to the intensive care unit (ICU) on day 12 of admission due to worsening sepsis.

Initially, after the suspicion of EE, ceftazidime 2 G IV, metronidazole 500 mg IV were given 8 hourly, plus intravitreal ceftazidime and vancomycin injections. Later, the ultrasound revealed a liver abscess, but early drainage could not be performed as it was not liquefied. The liver abscess, however, was ruptured with the intra-abdominal collection and percutaneous drainage of the liver abscess was performed on day 14 of hospital admission. Unfortunately, the patient's right eye then developed right eye perforation, and right eye evisceration was performed and the patient was informed

of the grim diagnosis. Post-operatively, the patient's clinical condition was stable, and he was discharged to the ward from the intensive care unit (ICU). He was left with one eye, with eyesight limited to hand motions at the time of hospital discharge.

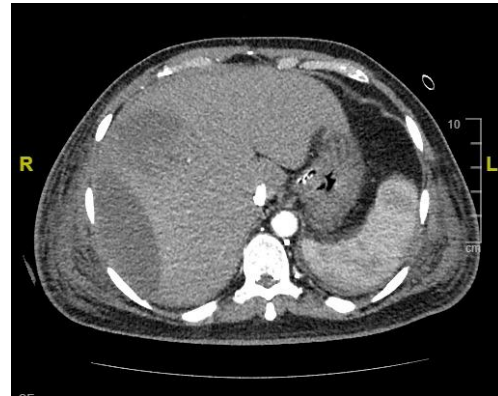


Figure 2: Hypodense collection noted on segment V/VIII measuring approximately 5.4 cm x 5.8 cm x 5.8 cm

3. Discussion

K. pneumoniae is usually found among the intestinal flora of healthy and immunocompetent individuals. However, it tends to carry a serious prognosis if it causes pyogenic liver abscess and is also the commonest bacterial isolate to cause metastatic infections. Metastatic infections such as endophthalmitis, meningitis, and cerebral abscess are present in approximately 13% of patients with a primary hepatic abscess.⁴ Liver abscess, produced by *K. pneumoniae* typically presents with fever, nausea, vomiting, diarrhea, right upper quadrant tenderness, elevated white cell counts, as well as raised transaminase enzymes and bilirubin. According to Park et al. important risk factors for developing EE in a PLA patient, include *K. pneumoniae* infection, presence of another systemic coinfection, right superior segment liver abscess, and underlying diabetic mellitus.⁵ Lee et al. reported that initial manifestations of a PLA patient occasionally are extrahepatic and it is essential for the clinicians to have a high degree of suspicion to avoid delays in the diagnosis.⁶

In our case, extrahepatic symptoms motivated the patient's visit as he had a fever, chills, right eye pain, discharge, and blurring of vision before presentation. It was only on examination that it revealed that the patient had a palpable liver and right hypochondriac tenderness; laboratory results also showed leukocytosis and raised hepatic transaminases. Abdominal ultrasound revealed a hypoechoic lesion at the liver on Day 6 of admission and the patient was subsequently diagnosed with disseminated *Klebsiella* infection, leading to liver

abscess and bilateral endophthalmitis. Besides having *K. pneumoniae* infection, our patient also had underlying type 2 diabetes mellitus, which is also a significant risk factor for EE in patients with PLA. Hyper-mucoviscous organism growth in a culture containing *K. pneumoniae* isolate suggests an invasive *K. pneumoniae* strain and attending clinicians should be alerted as soon as possible to avoid metastatic complications including EE.⁷

Endophthalmitis infection caused by *K. pneumoniae* typically presents as eye redness, swelling, blurring of vision, and pupillary hypopyon and the diagnosis can be confirmed with the positive result of blood or swab cultures. Lee et al. had stated in 2012 that the degree of vision at diagnosis directly correlates to the visual outcome after treatment in EE patients.⁷ Almost 45% of the patients with *K. pneumoniae* PLA have ocular symptoms as the initial manifestations and this may lead to delayed diagnosis or initially missed diagnosis in cases of EE. According to Yang et al. the severe visual outcome can result in just more than 2 days of delayed treatment among EE patients.⁸

Our patient was diagnosed with *K. pneumoniae* EE when *K. pneumoniae* was isolated from the pus swab culture from the patient on Day 4 of admission. The intravitreal treatments were given even before the results of the swab culture. However, the treatment was already late by more than 2 days since the symptoms in the patient were present on Day 6 of illness when he was admitted into the hospital. Visual acuity of the patient was poor at diagnosis as the right eye could only perceive light and the vision in the left eye was limited only to hand motion.

As soon as bilateral EE was suspected, the patient was started on intravenous ceftazidime and metronidazole along with intravitreal injections of ceftazidime and vancomycin. This was in line with the treatment suggested in the literature; according to Wong et al. in 2002, cephalosporins antibiotics have good penetration into aqueous humour of the eyes. Our patient was also given early intravitreal antibiotics in hope of a better visual prognosis. Unfortunately, the patient later developed right eye perforation and evisceration had to be performed.

As for the liver abscess, early percutaneous drainage is warranted but, in our case, it could not be performed as it was not liquefied then. Our case demonstrated that even though there was early suspicion of EE and treatment was administered to a patient, the patient's vision still could not be salvaged. It necessitates early suspicion and prompt intervention by the clinicians to save the vision.

4. Conclusion

In patients presenting with ocular symptoms along with fever and high CRP, a high suspicion for liver abscess

should be raised to prevent serious consequences of delayed or misdiagnosis. This can be seen in patients as found in literature elsewhere that if correct diagnosis and adequate treatments were not given early enough, disastrous sequelae will ensue, including to loss of eyesight in patients with metastatic septic complications.

5. Conflict of interest

The authors declare no conflicts of interest. No external or industry funding was involved.

6. Authors' contribution

LJW: Conduct of the study work

MZM: Concept, manuscript editing

7. References

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