

WITHDRAWN: Invasive liver abscess caused by hypervirulent Klebsiella pneumoniae: case report and literature review

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Case Report

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EDITORIAL NOTE:

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Abstract

Background: Klebsiella pneumoniae is a common pathogenic bacteria that cause infectious diseases, Klebsiella pneumoniae invasive liver abscess syndrome is a rare disease, which often caused by hypervirulent Klebsiella pneumoniae(hvKP), the hvKP patients with sepsis may have life-threatening multiple organ dysfunction and visual sequelae.

Case presentation: We report a case of Klebsiella pneumoniae invasive liver abscess syndrome caused by hvKP, the patient was treated with long-term antibiotic treatment, along with controlling blood sugar with Insulin, and the patient was eventually discharged from the hospital. Case analysis and literature review were performed to improve the understanding of invasive liver abscess caused by hvKP.

Conclusions Patients with hvKP invasive liver abscess are in relatively severe conditions and often have poor visual prognosis. Appropriate antimicrobial drugs should be administered to prevent complications and improve prognosis.

Background

Klebsiella pneumoniae is a well-known Gram-negative pathogen that causing various clinical infection patterns, such as pneumonia, bacteremia, urinary tract infection, endophthalmitis, as well as liver abscess and meningitis. Klebsiella pneumoniae has emerged as the predominant cause of pyogenic liver abscess in Asia, and also as a primary pathogen of pyogenic liver abscess in China^[1]. Klebsiella pneumoniae is divided into classic Klebsiella pneumoniae and hypervirulent Klebsiella pneumoniae (hvKP) according to the differences of characteristics in virulence.

The Hypervirulen phenotype of Klebsiella pneumoniae is associated with the development of a distinctive invasive syndrome^[2], Hypervirulen strains of Klebsiella pneumoniae often show hypermucoviscosity, are determined as hvKP, hvKP is the main pathogen of liver abscess^[3]. Multiple abscesses caused by hvKP bacteremia is also called Klebsiella pneumoniae invasive liver abscess syndrome, it is a rare clinical condition characterized by primary liver abscess associated with other organ abscesses, including eyes, lungs and central nervous system^[4], and it is more frequently in patients with hypertension and diabetes mellitus^[5]. The syndrome has been mentioned in many publications for many years^[6, 7], it occurs worldwide, and poor prognosis is common.

We herein report a case of Klebsiella pneumoniae invasive liver abscess syndrome caused by hvKP. We discuss clinical characteristics and made literature review.

Case Presentation

A 78-year-old woman presented to the intensive care unit(ICU) with a 6-day history of fever and a 1-day history of unconsciousness. His medical history included type 2 diabetes mellitus and hypertension. On physical examination, the patient was somnolence, and her right eye was swollen with purulent

secretions (Fig. 1a). Laboratory studies revealed a white blood cell count of 25,110 per cubic millimetre (reference range 4,000 to 10,000). Findings on computed tomography of eye, abdomen, and lung included the presence of uneven vitreous density of the right eye and exudation around the right eyeball (Fig. 1b), low-density areas in the right lobe of the liver, maximal diameter of 4.65 cm (Fig. 2a,2b), a small cavity and ground-glass opacities in the lung upper right lobe, and solitary nodule shadow in the lung lower right lobe close to the pleura (Fig. 3 [arrow]). Contrast-enhanced magnetic resonance imaging of the brain revealed ring-enhancing lesion (0.5 cm in diameter) located in the left forehead (Fig. 4 [arrow]). Based on the clinical data, we diagnosed her with invasive liver abscess syndrome accompanied by pneumoniae, endogenous endophthalmitis and brain abscess. Empiric treatment with intravenous Meropenem was started in the ICU. We chose not to perform percutaneous or surgical drainage of the liver abscess, as the abscess was not liquefied and systemic response to antibiotic therapy was favourable.

Blood culture grew Klebsiella pneumoniae, and the string test was performed, the test was positive, and a diagnosis of hvKP bloodstream infection was made, and Klebsiella pneumoniae invasive liver abscess syndrome was also diagnosed, examination showed that the hvKP sensitive to most antibiotics, including Meropenem, the patient was continually treated with Meropenem, along with controlling blood sugar with Insulin. Besides the right eyeball, abnormal images disappeared after the patient was treated with a 30-day course of antibiotic. The patient survived but had right eye visual sequelae. At three months follow-up after discharge from the hospital, the patient was doing well except for the loss of vision in the right eye.

Discussion

Klebsiella pneumoniae is one of the common pathogens in nosocomial and community-acquired infections, and it is the primary pathogen of liver abscess. Klebsiella pneumoniae invasive liver abscess syndrome caused by hvKP is a devastating infection that is uncommon in western countries, while increasingly prevalent in Asian countries^[8, 9]. The most striking aspect of hvKP strains is the ability to cause severe infections in otherwise healthy patients^[10], hvKP typically presents as a community-acquired infection causing a liver abscess. Strains of hvKP often associated with rmpA and magA genes and confer a mucoid phenotype. The string test is commonly used to determine the hypermucoviscous phenotype, and we will define the string test positive when a bacteriologic inoculation loop can generate a viscous string > 5 mm in length by stretching bacterial colonies on an agar plate^[11].

The distinctive feature of community-acquired hvKP is good susceptibility to most available antibiotics, but some studies reported that healthcare-associated hvKP showed different results of antimicrobial susceptibility^[11, 12]. The emergence of hypervirulent strains resistant to antimicrobial drugs will bring more challenges in clinical diagnosis and treatment. A rapid microbiological test to confirm the pathogen as early as possible is crucial for treatment. The case we reported was characterized by community-acquired hvKP infection, and the hvKP was sensitive to most antibiotics, the infection was quickly controlled after using Meropenem. However, some patients require a prolonged course of antimicrobial

treatment which has evolved over the months from inpatient treatment to outpatient parenteral antibiotic therapy.

Klebsiella pneumoniae invasive liver abscess syndrome affects multiple organs, in addition to liver abscesses, hvKP metastasize to distant sites, including lungs, brain, eyes, kidneys, spleen, bone marrow^[13, 14]. The symptoms of Klebsiella pneumoniae invasive liver abscess syndrome are nonspecific and can include fever, chill, abdominal pain, nausea, vomiting, dizziness and vision loss, but may also be driven by the location of the metastatic infection. Of these, sight-threatening endophthalmitis has been commonly reported, and Klebsiella pneumoniae endogenous endophthalmitis typically has poor visual prognosis, it may cause irreversible visual loss if not treated properly and on time^[15, 16, 17]. Early diagnosis and prompt treatment may salvage useful vision in some eyes.

The patients of Klebsiella pneumoniae invasive liver abscess syndrome need to be admitted to the ICU for monitoring and treatment, septic shock and multiple organ failure were risk factors for mortality^[18]. Therefore, high awareness, early and aggressive treatment of patients diagnosed with Klebsiella pneumoniae invasive liver abscess syndrome is critical in saving the lives of patients. It is also essential to guide clinical management from laboratory testing to optimize patient outcomes.

Abbreviations

hvKP : hypervirulent Klebsiella pneumoniae; ICU : intensive care unit

Declarations

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Ethical approval and Consent to participate

Not applicable.

Consent for the publication

Informed consent for the publication of all images was obtained from the patient.

Availability of supporting data

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

XGX and ZHM contributed equally to this work and should be considered co-first authors. XGX, QDL and YLZ participated in the writing of the article, and YLZ edited the final draft. ZHM provided the clinical data and participated in the writing of the article. All authors had read and approved the final manuscript.

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Figures

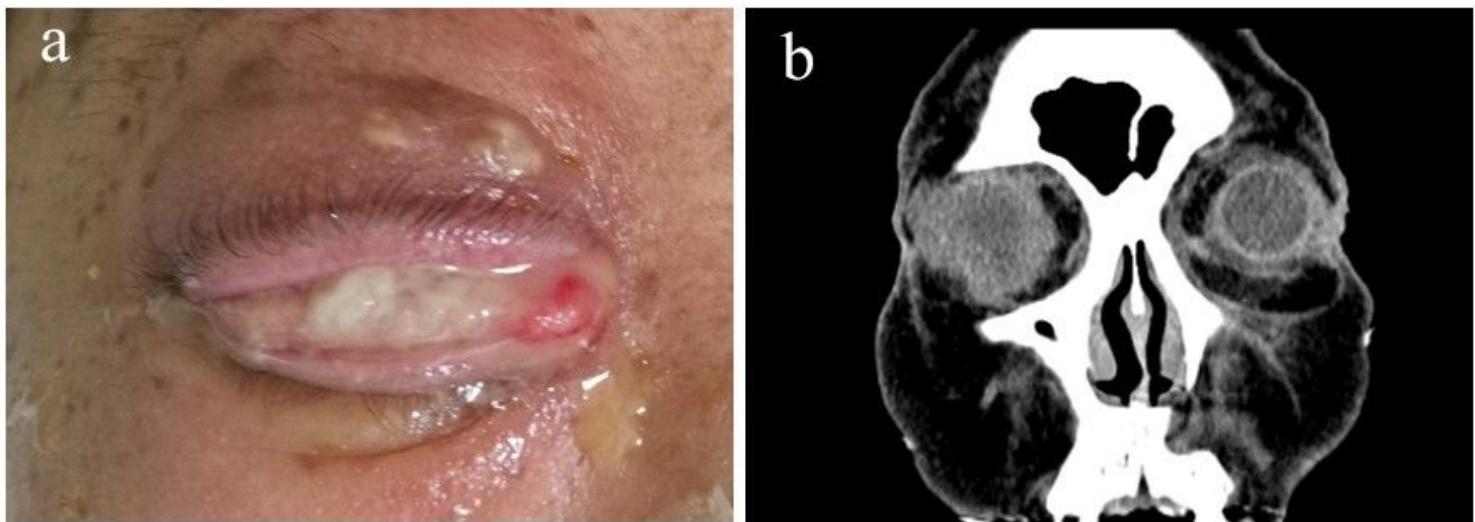


Figure 1

The appearance and CT of the right eye. a. The patient right eye was swollen with purulent secretions; b. The vitreous density of the right eye was uneven and exudation around the right eyeball.

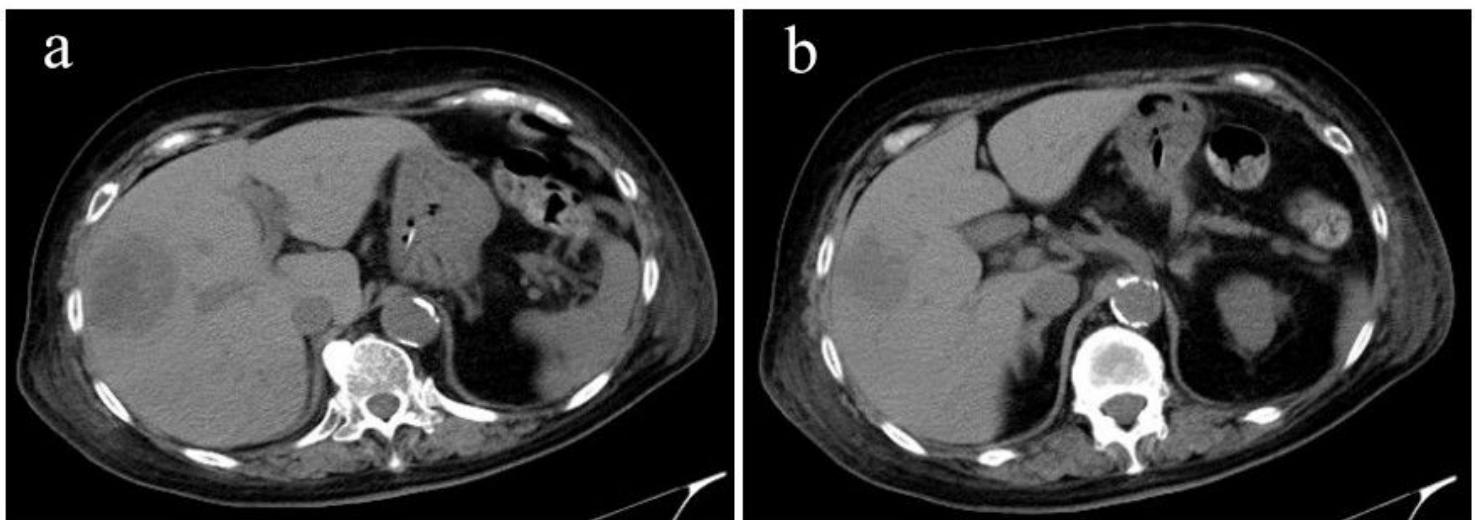


Figure 2

Low-density areas in the right lobe of the liver. a. The maximal diameter of Low-density areas was 4.65cm; b. The flake low-density shadow in the right lobe of the liver.

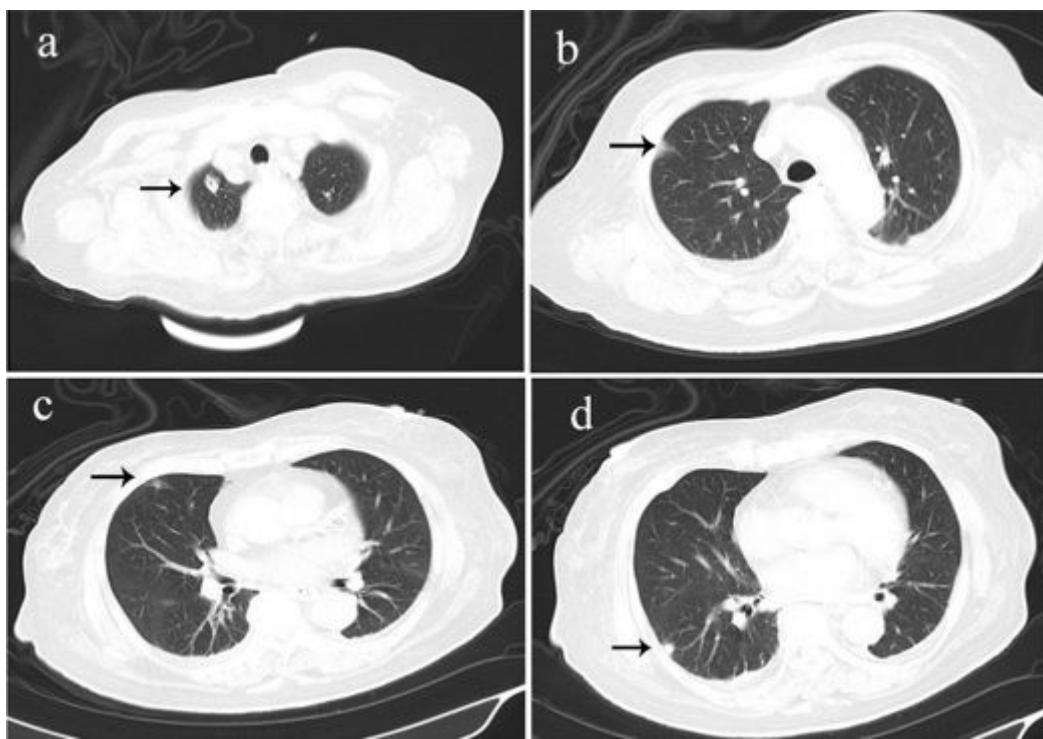


Figure 3

The patient's CT image in the lungs. a. A small cavity in the lung upper right lobe; b and c. Ground-glass opacities in the lung upper right lobe; d. Solitary nodule shadow in the lung lower right lobe close to the pleura.

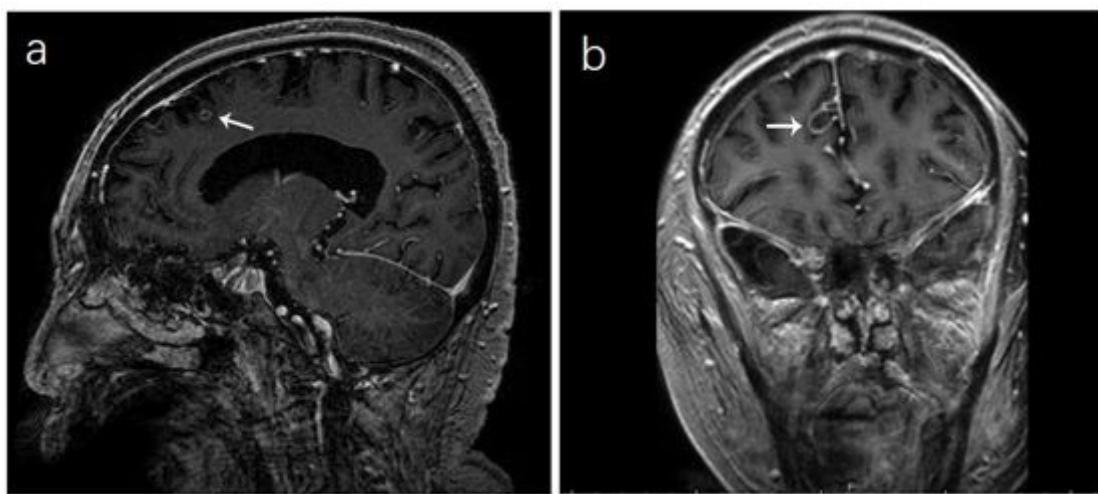


Figure 4

Contrast-enhanced magnetic resonance imaging of the brain revealed ring-enhancing lesion (0.5cm in diameter) located in the left forehead. a. The image on the sagittal plane. b. The image on the coronal plane.