

“Invasive Klebsiella Pneumoniae Syndrome in Qatar”

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February 22, 2021

Abstract

Klebsiella pneumoniae can cause community-acquired and hospital-acquired infection. It increases morbidity and mortality in high-risk patients. We present a case of invasive Klebsiella pneumoniae in poorly controlled diabetes mellitus, who ended up having a metastatic spread of Klebsiella pneumoniae involving the liver, lungs, kidneys, brain, and muscle.

“Invasive *Klebsiella pneumoniae* Syndrome in Qatar”

Background:

Klebsiella pneumoniae is a Gram-negative, encapsulated bacillus that is widely present in nature. It is a part of the normal flora of human being, present in the oral cavity and intestine [1]. Klebsiella pneumoniae is the most important organism of the Klebsiella species responsible for hospital-acquired infection in compromised hosts with an impaired defense system. Infections caused by Klebsiella pneumoniae can be acquired in long-term care facilities such as nursing homes and, less often, in the community [2]. It can cause various infections, including hospital and community-acquired pneumonia, bloodstream infections, lung abscesses, empyema, bacteremia, catheter-related infections, wound or surgical site infections, upper and lower urinary tract infection, liver abscess, and meningitis. Klebsiella pneumonia infections occur particularly in patients with chronic Alcoholism, Diabetes, chronic kidney disease, and those on long-term steroids. Less common infection includes endophthalmitis, psoas muscle abscess, septic arthritis, pyomyositis, and purulent pericarditis [3]. Multiorgan infections can occur due to the embolic spread as a complication of invasive liver abscess. Embolic Klebsiella infection appears to be a rare complication (2%) [4]. However, it may lead to high morbidity and mortality [5], here we present a case of metastatic klebsiella pneumoniae in poorly controlled diabetic patient.

Case Report:

A 40-year-old Nepalese male who is known to have diabetes (recently diagnosed (HbA1c-13.6) was brought to the emergency department (ED) by emergency medical services (EMS) due to an episode of acute confusion, headache, and dizziness. On examination, the patient was vitally stable; he was aggressive, disoriented to time and place, and had a low level of conscious level, which led to the patient’s intubation in ED; Emergency Computed tomography scan of head was unremarkable. On review of his blood investigations, his PH was 6.9 (normal is PH 7.35- 7.45) with low bicarbonate of 6 mmol/L (normal bicarbonate level 23-29 mmol/L) and serum Beta-hydroxybutyrate levels of 6.6mmol/l (normal levels 0.4-0.5 mmol/L). Based on these reports,

treatment was started for Diabetic ketoacidosis with Intravenous fluids and Intravenous insulin as per local protocol. The patient transferred to the medical intensive care unit (MICU) for further management.

Further investigations showed increase in white blood cell count with value of $15.10^3/\text{uL}$ (normal range is $4-10 \times 10^3/\text{uL}$) and C-reactive protein 320 mg/L ($0-5 \text{ mg/L}$). A chest x-ray showed patchy opacities in both lung fields. After taking samples of blood and urine cultures, empiric antibiotics piperacillin-tazobactam, and clarithromycin started considering the diagnosis of community acquired pneumonia leading to Diabetic ketoacidosis.

On day three of admission blood culture and tracheal aspirate culture grew *Klebsiella pneumoniae*, which was pan-sensitive, so antibiotics de-escalated to amoxicillin-clavulanate.

In the evening patient's condition deteriorated with low blood pressure, and he was started on inotropes as per ICU protocol, his abdomen's ultrasound scan revealed enlarged liver of 17.7 cm and an ill-defined complex lesion of $6.3 \times 6 \times 5.1 \text{ cm}$, likely hepatic abscess. (figure 1A). The patient had a Computed tomography scan of abdomen for better characterization of the abscess, which confirmed an abscess in the liver and showed multiple small abscesses in both the kidneys and numerous air pockets of abscess in the right gluteus (figure 2). During the same day, the patient developed anisocoria. The initial Non-contrast Computed tomography scan head was unremarkable. Magnetic resonance scan of head showed septic embolic meningoencephalitis with widespread microhemorrhages (figure 3A). The patient had ultrasound guided drainage of the liver abscess, drain was removed after 48 hours as there was minimal pus coming out of the drain and drained fluid culture also grew *Klebsiella pneumoniae*. His antibiotics were escalated to meropenem (meningitis dose), vancomycin, and metronidazole by the infectious disease team. Transthoracic echocardiogram and Transesophageal echocardiogram ruled out any heart valve vegetations. All these tests confirmed that the patient had an embolic spread of *Klebsiella* infection.

On day ten, the patient became hemodynamically stable, which led to the tapering of inotropes and sedation, but the patient kept on spiking fever despite multiple antibiotics. A repeat ultrasound scan abdomen after 15 days of ultrasound-guided liver drainage showed interval regression in liver abscess size $4.4 \times 4.8 \times 4 \text{ cm}$, the estimated volume of 54 cc (figure 1B). After receiving two weeks of antibiotics, the patients blood culture came negative. The patient became afebrile and hemodynamically stable, so antibiotics de-escalated to ceftriaxone and metronidazole.

The patient conscious level remained low (Glasgow coma scale remained low), and the follow-up Magnetic resonance scan of head showed the worsening of micro abscesses (figure 3B), for which the patient had a tracheostomy and continued to have tracheostomy ventilation. The patient received an additional six week of ceftriaxone and metronidazole, he remained afebrile during this period, and he was shifted to a long-term facility for continuity of care.

Discussion:

Carl Friedlander discovered *Klebsiella pneumoniae* from a lung autopsy of a patient who died from pneumonia in 1882, initially named Friedlander's bacillus. *Klebsiella pneumoniae* is the most common cause of hospital-acquired pneumonia in the United States, and it also accounts for 3-8% of nosocomial infections (6).

Klebsiella pneumoniae pathogenicity depends not only on host factors like diabetes or chronic alcoholism but also on the bacterial virulence (7). Many virulent factors contribute to the pathogenicity of *Klebsiella pneumoniae*, virulent factors including hypermucoviscosity-specific capsular antigens – i.e., K1, K2, and virulence genes FimH, rmpA, uge, kfu, and alls. K1/K2 Hypermucoviscosity – specific capsular serotypes are associated with invasive infections and usually have a poor prognosis. (7-10).

Metastatic infection can spread to the brain and its meninges resulting in present as focal encephalitis/brain abscess and meningoencephalitis. As in our case patient had multiple micro- abscess in brain secondary *Klebsiella pneumoniae* metastasis.

In our reported case for embolic *klebsiella pneumoniae*, the risk factor is uncontrolled DM, which is well

described in the literature and quite common in the middle east, therefore, the middle east is a particularly high-risk area for *Klebsiella pneumoniae* infection, which needs urgent attention. Unfortunately, we could not check capsular antigens which are the other common risk factors.

The prognosis of *Klebsiella pneumoniae* liver abscess (KLA) is good overall, but the embolic complications can cause significant morbidity (7), as in our case where the patient ended up with severe brain damage. *Klebsiella pneumoniae* liver abscess with the embolic disease is mainly observed in Asia, particularly in Taiwan, but there are case reports from other geographic regions (11). Appropriate antimicrobial treatment combined with percutaneous drainage of liver abscesses increases chances of survival in such patients. However, the availability of a facility for early detection of the virulent strain will help in early diagnosis and treatment, which will reduce the morbidity and will improve the outcome (12).

Conclusion:

Invasive *Klebsiella pneumoniae* infection in poorly controlled diabetes is an emerging disease in Qatar, there are not enough publications on metastatic *Klebsiella pneumoniae* in Qatar in literature. Our case highlights the necessity of early diagnosis and management of *Klebsiella pneumoniae* infections and to control its risk factors.

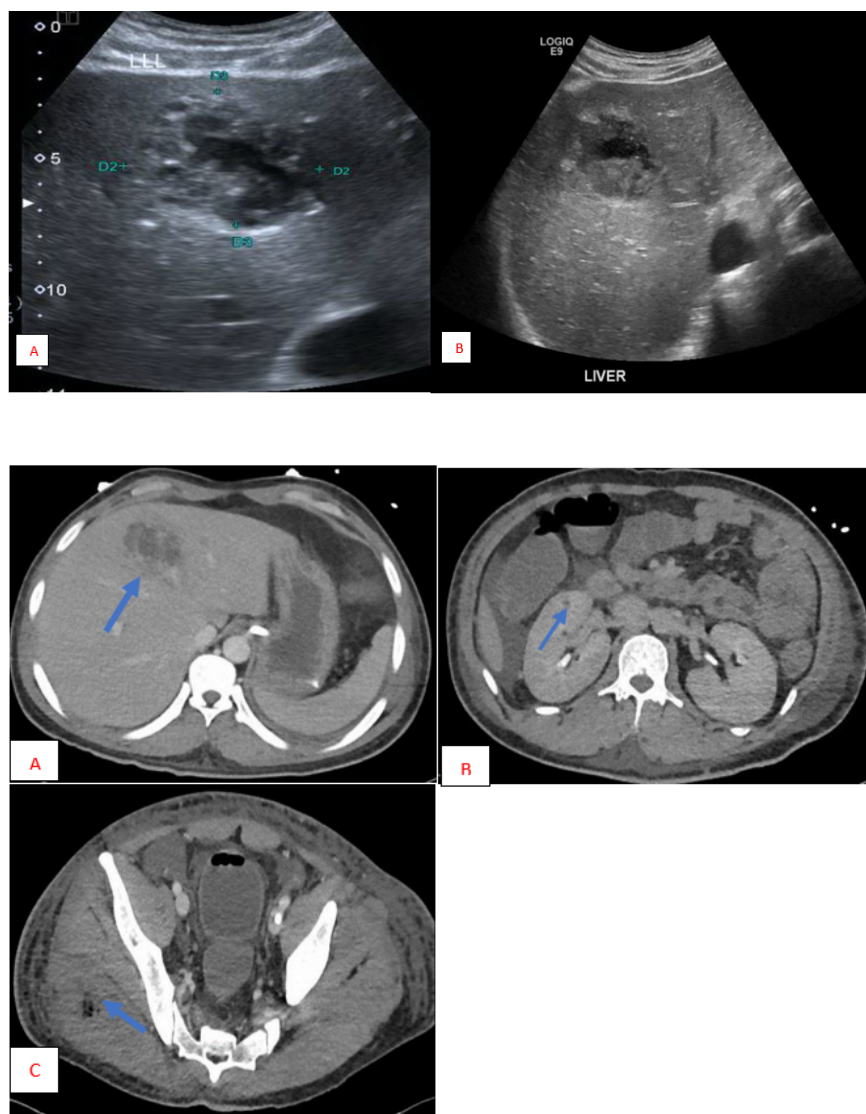
Acknowledgment:

Open Access funding provided by the Qatar National Library

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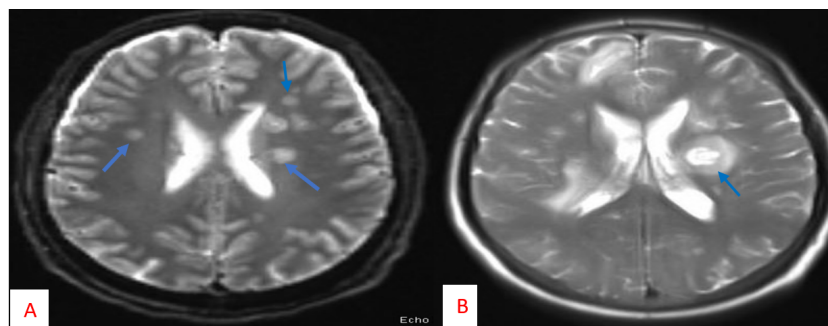


Figure:3 (A)First T1Wi MRI head showing bilateral cerebral abscess(B) Repeat MRI of head T1Wi after 20days of first MRI showing new lesions