

CLINICAL VIGNETTE

An Unusual Presentation of a Liver Abscess: Klebsiella Liver Abscess Syndrome Disproportionately in East Asian Patients

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Introduction

Klebsiella Liver Abscess Syndrome (KLAS) is a monomicrobial infection that disproportionately affects patients of East Asian ethnicity. Many studies have demonstrated its epidemiologic predilection and suggested potential mechanisms for its pathogenic niche and clinical manifestations. We report an otherwise healthy 29-year-old Chinese male who presented with sepsis, headache, and myalgias for three days prior to admission. Although an unlikely diagnosis for a young, otherwise healthy patient with no major risk factors, the diagnosis should be considered given its epidemiologic tendencies and its metastatic potential.

Case Presentation

A 29-year-old male with history of gallbladder polyps and Gilbert Syndrome presented with headaches, myalgias and fevers for three days. One day prior, he was evaluated at his ambulatory office and found to have elevated liver tests and leukocytosis. His symptoms worsened and he was admitted through the emergency department. On admission, he reported persistent headaches, myalgias, tea-colored urine, and dull RUQ and epigastric abdominal pain. He denied any recent travel history or sick contacts. Vital signs were notable for temperature of 104F, heart rate of 115 bpm, with other vital signs within normal limits. Pertinent exam findings included scleral icterus, jaundice of upper extremities, mild epigastric tenderness on palpation with no rebound or guarding, no neck rigidity, and unremarkable neurologic exam. Laboratory results on admission showed elevated liver function tests, leukocytosis, and hyperglycemia despite no history of diabetes. Further evaluation included HgbA1c of 5.5% and negative hepatitis viral serologies. Other extensive infectious work-up was also unremarkable. The patient was empirically started on ceftriaxone and metronidazole. CT scan showed a multiloculated 48x42 mm hepatic abscess in the right hepatic lobe (Figure 1). Shortly thereafter, Interventional Radiology performed a CT-guided placement of a drain into the abscess. During the hospitalization, blood cultures from his outpatient clinic and aspirate culture from the drain were positive for speciated mucoid *Klebsiella pneumoniae*. The patient improved and was transitioned to oral ciprofloxacin 500 mg twice daily based on microbial sensitivities. Repeat CT scan eight days later showed a decrease in size of the abscess to 15x27 mm. The drain was subsequently removed. The patient remained afebrile for several days before discharge. He was followed closely by

Infectious Disease as outpatient and continued to show improvement clinically and objectively via interval CT imaging showing resolving abscess.

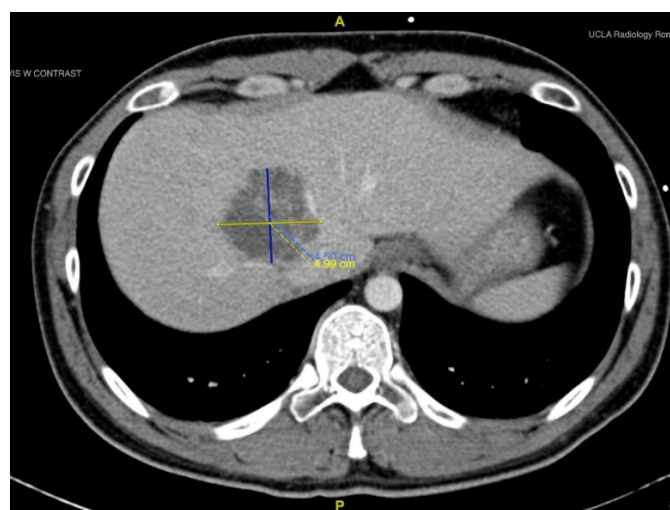


Figure 1.

Discussion

Liver abscesses are rare and commonly are polymicrobial. However, numerous cases of monomicrobial *Klebsiella pneumoniae* abscesses have been reported worldwide and show a predisposition for patients of East Asian ethnicity.¹⁻⁸ Our patient, who is a young and otherwise healthy Chinese male, shares many similarities with the presentations and demographics of these cases. Prior research studies report potential mechanisms of KLAS and potential explanations for increased risk in East Asians. Some showed close association of KLAS specifically with the hyper-mucoviscous phenotype of K1 and K2 *Klebsiella pneumoniae* species.⁹⁻¹² Of note, the *magA* gene and *rmpA* genes have been isolated from serotypes K1 and K2 strains and specifically code for the hyper-mucoviscous phenotype. This particular phenotype has been shown in studies from Yu et al. to have a specific affinity for purulent tissue infections, particularly in liver, lung, psoas muscle, and other focal abscesses.^{10,12}

An epidemiologic study reported patients of Chinese ethnicity specifically have K1 and K2 *Klebsiella pneumoniae* naturally

colonized in their intestinal flora.¹³ Lin et al. suggested that Chinese ethnicity itself may be partially linked to the increased prevalence of KLAS in Asian countries.¹³ One of the strongest risk factors in studies of KLAS is hyperglycemia.^{8,14} Although there are many etiologies for hyperglycemia, our otherwise healthy patient had persistently elevated blood sugars during the admission despite no history of diabetes and a normal HgbA1c. The mechanism can be multifactorial but KLAS may play a role and may contribute to the patient's overall clinical picture.

Our patient's clinical presentation is similar to many reported cases worldwide. These symptoms include fever, abdominal pain, and leukocytosis.^{2,7} Some have also shown a male predominance and a higher incidence of a focal lesion within the right hepatic lobe, as with our patient.^{2,15} In addition, multiple worldwide cases of metastatic KLAS complications have been reported, which include meningitis and endophthalmitis.^{8,16,17} Although our patient did not develop these complications, we monitored closely for metastatic signs both during hospitalization and subsequent outpatient follow-up. Additionally, our use of both CT-guided drain placement and antibiotics was supported as the best option when compared with monotherapy.¹⁵ Recognition of this syndrome was critical to the treatment and subsequent monitoring, and provided insight on the etiology of a disease that occurred in an otherwise young, healthy individual.

REFERENCES

1. **Braiteh F, Golden MP.** Cryptogenic invasive Klebsiella pneumoniae liver abscess syndrome. *Int J Infect Dis.* 2007 Jan;11(1):16-22. Epub 2006 Feb 10. PubMed PMID: 16473034.
2. **Chan KS, Yu WL, Tsai CL, Cheng KC, Hou CC, Lee MC, Tan CK.** Pyogenic liver abscess caused by Klebsiella pneumoniae: analysis of the clinical characteristics and outcomes of 84 patients. *Chin Med J (Engl).* 2007 Jan 20;120(2):136-9. PubMed PMID: 17335656.
3. **Chung DR, Lee SS, Lee HR, Kim HB, Choi HJ, Eom JS, Kim JS, Choi YH, Lee JS, Chung MH, Kim YS, Lee H, Lee MS, Park CK; Korean Study Group for Liver Abscess.** Emerging invasive liver abscess caused by K1 serotype Klebsiella pneumoniae in Korea. *J Infect.* 2007 Jun;54(6):578-83. Epub 2006 Dec 18. PubMed PMID: 17175028.
4. **Ko WC, Paterson DL, Sagnimeni AJ, Hansen DS, Von Gottberg A, Mohapatra S, Casellas JM, Goossens H, Mulazimoglu L, Trenholme G, Klugman KP, McCormack JG, Yu VL.** Community-acquired Klebsiella pneumoniae bacteremia: global differences in clinical patterns. *Emerg Infect Dis.* 2002 Feb;8(2):160-6. PubMed PMID: 11897067; PubMed Central PMCID: PMC2732457.
5. **Lederman ER, Crum NF.** Pyogenic liver abscess with a focus on Klebsiella pneumoniae as a primary pathogen: an emerging disease with unique clinical characteristics. *Am J Gastroenterol.* 2005 Feb;100(2):322-31. Review. PubMed PMID: 15667489.
6. **Lee KH, Hui KP, Tan WC, Lim TK.** Klebsiella bacteraemia: a report of 101 cases from National University Hospital, Singapore. *J Hosp Infect.* 1994 Aug;27(4):299-305. PubMed PMID: 7963472.
7. **Rahimian J, Wilson T, Oram V, Holzman RS.** Pyogenic liver abscess: recent trends in etiology and mortality. *Clin Infect Dis.* 2004 Dec 1;39(11):1654-9. Epub 2004 Nov 9. PubMed PMID: 15578367.
8. **Wang JH, Liu YC, Lee SS, Yen MY, Chen YS, Wang JH, Wann SR, Lin HH.** Primary liver abscess due to Klebsiella pneumoniae in Taiwan. *Clin Infect Dis.* 1998 Jun;26(6):1434-8. PubMed PMID: 9636876.
9. **Lee HC, Chuang YC, Yu WL, Lee NY, Chang CM, Ko NY, Wang LR, Ko WC.** Clinical implications of hypermucoviscosity phenotype in Klebsiella pneumoniae isolates: association with invasive syndrome in patients with community-acquired bacteraemia. *J Intern Med.* 2006 Jun;259(6):606-14. PubMed PMID: 16704562.
10. **Nadasy KA, Domiati-Saad R, Tribble MA.** Invasive Klebsiella pneumonia syndrome in North America. *Clin Infect Dis.* 2007 Aug 1;45(3):e25-8. Epub 2007 Jun 18. PubMed PMID: 17599300.
11. **Yeh KM, Kurup A, Siu LK, Koh YL, Fung CP, Lin JC, Chen TL, Chang FY, Koh TH.** Capsular serotype K1 or K2, rather than magA and rmpA, is a major virulence determinant for Klebsiella pneumoniae liver abscess in Singapore and Taiwan. *J Clin Microbiol.* 2007 Feb;45(2):466-71. Epub 2006 Dec 6. PubMed PMID: 17151209; PubMed Central PMCID: PMC1829066.
12. **Yu WL, Ko WC, Cheng KC, Lee HC, Ke DS, Lee CC, Fung CP, Chuang YC.** Association between rmpA and magA genes and clinical syndromes caused by Klebsiella pneumoniae in Taiwan. *Clin Infect Dis.* 2006 May 15;42(10):1351-8. Epub 2006 Apr 11. PubMed PMID: 16619144.
13. **Lin YT, Siu LK, Lin JC, Chen TL, Tseng CP, Yeh KM, Chang FY, Fung CP.** Seroepidemiology of Klebsiella pneumoniae colonizing the intestinal tract of healthy Chinese and overseas Chinese adults in Asian countries. *BMC Microbiol.* 2012 Jan 19;12:13. doi: 10.1186/1471-2180-12-13. PubMed PMID: 22260182; PubMed Central PMCID: PMC3273430.
14. **Wang HH, Tsai SH, Yu CY, Hsu HH, Liu CH, Lin JC, Huang GS, Cheng WT, Tung HJ, Chen CY, Chang WC.** The association of haemoglobin A1C levels with the clinical and CT characteristics of Klebsiella pneumoniae liver abscesses in patients with diabetes mellitus. *Eur Radiol.* 2014 May;24(5):980-9. doi: 10.1007/s00330-014-3113-1. Epub 2014 Feb 22. PubMed PMID: 24563159.
15. **Li J, Fu Y, Wang JY, Tu CT, Shen XZ, Li L, Jiang W.** Early diagnosis and therapeutic choice of Klebsiella pneumoniae liver abscess. *Front Med China.* 2010 Sep;4(3):308-16. doi: 10.1007/s11684-010-0103-9. Epub 2010 Aug 17. PubMed PMID: 21191837.
16. **Cheng DL, Liu YC, Yen MY, Liu CY, Wang RS.** Septic metastatic lesions of pyogenic liver abscess. Their

association with *Klebsiella pneumoniae* bacteremia in diabetic patients. *Arch Intern Med*. 1991 Aug;151(8):1557-9. PubMed PMID: 1872659.

17. **Fang CT, Lai SY, Yi WC, Hsueh PR, Liu KL, Chang SC.** *Klebsiella pneumoniae* genotype K1: an emerging pathogen that causes septic ocular or central nervous system complications from pyogenic liver abscess. *Clin Infect Dis*. 2007 Aug 1;45(3):284-93. Epub 2007 Jun 19. Review. PubMed PMID: 17599305.