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Typical Presentation With Atypical Pathogen: A Case of Primary Hepatic Abscess Secondary to Klebsiella pneumoniae

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Background
- Hepatic abscesses can form due to different hosts and can be associated with various infections and disorders; however, pyogenic hepatic abscess commonly develop after leakage of bowel contents that spread into the portal system through infection; in the setting of a systemic bacterial infection, it can also manifest as hematogenous seeding.
- Hepatic abscesses are the most common type of intra-abdominal abscesses, accounting for nearly 50% of cases with risk factors such as diabetes, underlying hepatobiliary or gastric disease.
- Most common anatomic site of hepatic abscess is the right lobe given its size and blood supply versus the left. A common associated pathology is pyloric stenosis; also understands as infective suppurative thrombosis of the portal vein, which carries significant morbidity and mortality with the infection.

Case Presentation
- A 66-year-old woman of Taiwanese descent with a history of uncontrolled Type II Diabetes Mellitus presented with 2 days of significant watery diarrhea, lethargy, and weakness. She denied any form of abdominal pain, subjective fevers, chills, night sweats, chest discomfort, or shortness of breath.
- Initial labs were consistent with Diabetic Ketoacidosis (DKA), acute kidney injury, and transaminases in the 100-200 range. She was ateloric and hemodynamically stable. Upon diagnostic management on Day 1, she improved clinically with complete resolution of her DKA with stool studies non-diagnostic for any infection.
- On Day 2, she became acutely dehydrated, hypotensive, and generalized abdominal pain. Blood cultures drawn revealed gram negative rod (GNR) septicaemia with subsequent ultrasound and CT scan of the abdomen demonstrating 7.5 x 6 x 3.3 cm left hepatic abscess.
- Subsequent to IV guided drainage, she rapidly deteriorated and developed altered mental status, distributive shock, and hypoxic respiratory failure requiring ventilator support.
- Her blood cultures returned positive for Klebsiella pneumoniae, and treatment with Ceftazidime and Metronidazole, which initially appeared to control the infection failed to improve her clinical status. Given her persistent signs of septic infection and lack of response to antibiotics along with ascending transaminases and radiographic evidence of acalculous cholecystitis, a percutaneous cholecystostomy was performed.
- Unfortunately, her case became more complicated by this ascending cholecystitis secondary to Enterococcus faecium. The GNR septic shock rapidly overpowered the patient with fulminant hepatitis, acute kidney injury, cardiomyopathy, altered mental status, and respiratory failure within 4 days of presentation despite maximal ventilator and CRRT support.

Discussion
- Invasive liver abscess syndrome is characterized by a virulent strain of Klebsiella that causes bacteremia, hepatic abscesses and metastatic infectious. This virulent strain of K. pneumoniae and hepatic abscesses has been linked in case reports from Asian countries.
- Taiwan has the highest prevalence of this syndrome, with South Korea having the second highest prevalence.
- In 2005 and 2007, the first case reports confirmed the syndrome with the virulent strain, and both patients were Asian and presented in DKA.
- The organism is believed to be a carried in the GI tract of healthy individuals and transmission may be possible secondary to the fecal-oral route and or respiratory exposures.
- Major risk factors for this syndrome include uncontrolled diabetes and patients of Asian origin or descent. Patients have no history of hepatic disease and the abscess is noninfectious. Patient can present with fever, leukocytosis, and elevated liver enzymes in addition to progressing to septic shock.
- K. pneumoniae from Asian patients has a distinct phenotype and genetic features and is much more virulent than strains found outside of Asia. These virulent strains exhibit a hypervirucosity phenotype which causes them to be sticky in nature.
- The serotypes have been labeled as K1 and K2, which have a higher resistance to phagocytes and intracellular killing by neutrophils and bactericidal complement.
- The genes associated with this hypervirucosity phenotype have been identified as mucoviscosity-associated gene (map) and regulator of mucoviscosity (rmpA).
- Almost all strains that cause liver abscess were positive for rmpA gene.
- A positive string sign (>5mm) is seen on agar plates of the invasive strain, which is not associated with the noninvasive strain.
- The infection can become metastatic, with manifestations in the eyes, meninges and brain causing endophthalmitis, meningitis and brain abscesses respectively. Diagnosis is confirmed via percutaneous drainage of the abscess with gram stain and culture and or positive blood cultures in addition to CT scan which show an enhancing abscess.
- Despite good prognosis, those patients with endophthalmitis have significant morbidity with impaired vision for life that is unresponsive to treatment.
- Poor outcomes have been seen in patients with septic pulmonary emboli or empyema.
- Treatment involves drainage in addition to systemic antibiotic therapy, with antibiotic selection dependent on the resistance of the strain. Overall prognosis is good when identified and treated early and if progression to fulminant sepsis and metastases are prevented.
- Cephalosporins are the preferred antibiotic, with combination treatment more frequently used in the US.
- Carbapenems are the drug of choice for ESBL producing Klebsiella pneumoniae, although rare. Most isolates have a community acquired resistance pattern are usually pan-susceptible.
- Treatment for single abscesses is usually 2-4 weeks, and if multiple abscesses are present, then treatment up to 6 weeks is required.
- This case highlights the importance of recognizing this virulent serotype of Klebsiella pneumonia as a potential pathogen in patients with hepatic abscess in East Asian descent. Further, it is important to understand the potential complications, prominently the metastatic component of Klebsiella pneumoniae infection and its timely treatment.
- The reported mortality in hipochiaspid associated with the invasive syndrome is about 9-11% especially in those patients that developed septic shock and metastatic disease.
- The disease is commonly acquired and patients are usually immunocompetent and have no underlying intestinal or hepatobiliary problems.
- Any combination of febrile illness, hepatic fluid collection, possible CNS infection, and Southeast Asian descent should cause concern and raise the suspicion of this primary hepatic abscess syndrome caused by the hyper-virulent Klebsiella pneumoniae strain.

References: