CLINICAL VIGNETTE

Cryptogenic Pyogenic Liver Abscess due to Prevotella in an Immunocompetent Male

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Hospital Course

A 43-year-old male with a history of diabetes mellitus presented to the ER with fever, nausea, and vomiting for three days. He denied abdominal pain, jaundice, diarrhea, constipation, and dysuria. He had immigrated from Indonesia two months prior to admission, followed a strictly vegetarian diet, and reported prior negative tests for HIV and tuberculosis. His only chronic medication was metformin 500 mg twice daily.

On presentation, his temperature was 39.2°C and his heart rate 133 bpm. His abdomen was obese, non-tender, and without rebound tenderness or hepatosplenomegaly. Initial labs revealed a hemoglobin of 13.6 g/dL, WBC count of 13,300 cells/µL, glucose of 262 mg/dL, lactate of 32 mg/dL (normal: 5 - 25 mg/dl), AST of 64 U/L, and ALT of 79 U/L. Total bilirubin was 1.9 mg/dL and CK was 4353 U/L. A chest X-ray was normal and urinalysis demonstrated pyuria. In the observation unit, he was given intravenous fluids and ceftriaxone for presumed sepsis from a urinary source. Despite antibiotic treatment, he remained intermittently febrile up to 39.4°C and tachycardic at 130 bpm, and he was transferred to the inpatient medicine service.

CT scan of the abdomen demonstrated a peripherally-enhancing, complex cystic liver mass measuring 4.8 cm by 6.2 cm in the left hepatic lobe with multiple septations concerning for pyogenic liver abscess (Figure 1). Antibiotic coverage was broadened to vancomycin and piperacillin/tazobactam. Percutaneous ultrasound-guided abscess drainage yielded 30 cc of frank pus and a 12-French pigtail drainage catheter was placed. Initial gram stain of the abscess fluid revealed many gram-negative rods and many gram-positive cocci in pairs and chains. Six days later, anaerobic cultures of the abscess fluid grew *Prevotella* species. All blood cultures were negative.

The patient improved markedly following drainage and continued antibiotic therapy. He was discharged on ertapenem to complete a 2-week course of intravenous therapy. Outpatient CT scan confirmed resolution of the abscess and he was given an additional 14-day course of amoxicillin/clavulanate to ensure microbial clearance.

Discussion

Epidemiology and Etiology of Pyogenic Liver Abscess

Pyogenic liver abscess (PLA) is an important disease that requires prompt diagnosis and early treatment. In 1938, Ochsner and Debakey published a seminal review of forty-seven PLA cases, with the majority of cases occurring in young men with appendicitis.[1] Today, biliary tract disease has replaced appendicitis as the most common identifiable cause of PLA.[2] Less commonly described etiologies include portal vein seeding of the liver from intestinal infections, hepatic artery seeding from bacteremia, spread from subphrenic/periphrenic abscesses, and inoculation from penetrating trauma.[3] In a significant portion of cases, no cause is identified.

A recent population-based study in the United States showed that the incidence of PLA is increasing and continues to be associated with significant morbidity and mortality. From 1994 to 2005, the overall incidence of hospitalization for PLA increased from 2.7 to 4.1 per 100,000 population.[3] A number of risk factors predispose to PLA, including male sex, diabetes mellitus, underlying hepatobiliary or pancreatic disease, and liver transplant.[4] Higher than average rates of PLA have been reported in Southeast Asia; this may result from a higher prevalence of upper gastrointestinal cancer and hypermucoviscous *Klebsiella pneumoniae*, which has been associated with metastatic infection.[5]

Diagnosis and Treatment of Pyogenic Liver Abscess

The clinical presentation of PLA is often nonspecific and thus a high index of suspicion is required to make the diagnosis. The classic triad of right upper quadrant pain, fever, and malaise is only present in approximately 30% of patients.[3] As demonstrated by our patient's presentation, the absence of right upper quadrant findings does not exclude a liver abscess. Patients may also present with rigors, nausea/vomiting, anorexia, weight loss, and generalized weakness. Laboratory evaluation commonly reveals leukocytosis, normocytic anemia, hypoalbuminemia and prolonged prothrombin time.[3] CT and ultrasound are the preferred imaging modalities for the diagnosis of PLA, with CT being slightly more sensitive.[6]

While blood cultures are only positive in about 30-60% of cases, abscess cultures have a higher yield, reportedly positive in 70-80% of cases.[3] Many pathogens have been implicated, reflecting the variety of inciting pathologies as well as geographical differences. While abscess material is rarely collected prior to the administration of antibiotics which can confound the microbiological diagnosis, most abscesses are thought to be polymicrobial, with mixed enteric facultative and anaerobic species being the most common pathogens. Our

patient was found to have both gram-positive cocci and gram-negative bacilli, supporting a polymicrobial infection. Given this variability, microbiological diagnosis should always be pursued if possible. Among culture-positive patients, the most common organism isolated is *Escherichia coli*, followed by *Klebsiella pneumonia*e, *Enterococcus*, and *Streptococcus* species.[3] Invasive *Klebsiella pneumoniae* infection occurring with hypermucoviscous strains, initially seen in Taiwan and the Asian Pacific Rim in the 1980-90's, has emerged as a common cause of PLA in the U.S., often associated with a complicated clinical course including bacteremia and metastatic infection.[7]

Treatment of PLA includes systemic antibiotic therapy and drainage. Evidence suggests that antibiotic therapy alone is usually not sufficient to entirely resolve a liver abscess unless it is small (<3 cm).[8] For large lesions, the ideal drainage technique depends on the size and number of abscesses. Continuous percutaneous catheter drainage is recommended for abscesses >5 cm in longest diameter, while in abscesses <5 cm intermittent percutaneous needle aspiration is a valid first-line alternative.[9,10] This approach is supported by the results of a trial of 60 patients with PLA treated with antibiotics and percutaneous drainage via either catheter or needle aspiration. Successful outcomes were observed for all patients with abscess ≤5 cm, regardless of drainage modality. However, among patients with an abscess diameter >5 cm, treatment was successful in 100% of patients treated with catheter drainage compared to 50% of patients treated with needle aspiration.[10]

Prevotella

Prevotella species are gram-negative, obligate anaerobic, pleomorphic rods often grouped with the *Bacteroides* and *Fusobacterium* families. While Prevotella is a normal component of the oral cavity and upper respiratory tract, it can cause subacute or chronic necrotizing infections in the CNS, oral cavity, lungs, abdomen, and female urogenital tract.[11] Case reports have described periodontal disease as a risk factor for *Prevotella* PLA.[12,13] Of note, our patient did not have previous periodontal disease. Culture growth and isolation can only be achieved under stringent anaerobic conditions, and *Prevotella* is rarely the sole microbe isolated. Anaerobic cultures can take several days to be identified as positive due to a slower growth rate than aerobic organisms.

Prevotella species are most commonly susceptible to metronidazole, clindamycin, and amoxicillin/clavulanate. A recent evaluation of antibiotic susceptibility showed all tested *Prevotella* strains to be sensitive to imipenem and amoxicillin/clavulanate, whereas susceptibility to metronidazole and clindamycin were 93% and 88%, respectively.[14] While our patient was initially started on vancomycin and piperacillin/tazobactam, the antibiotics were quickly changed to ertapenem, and he eventually completed his course with 2 weeks of amoxicillin/clavulanate.

Conclusion

This case report represents an unusual case of pyogenic liver abscess with *Prevotella* as the only identified organism by culture in an otherwise immunocompetent male without an identifiable nidus of infection. Pyogenic liver abscess remains a rare but challenging diagnosis given its nonspecific presentation. The classic triad of right upper quadrant pain, fevers/chills, and malaise occurs in only a minority of cases. Therefore, diagnosis requires a high index of suspicion and consideration of risk factors such as male sex, diabetes mellitus, and underlying biliary tract disease. Once a pyogenic liver abscess is suspected, an ultrasound or CT scan should be done to confirm the diagnosis. Drainage of the abscess and appropriate antimicrobial therapy targeting enteric gram-negative and anaerobic organisms are the cornerstones of treatment. Percutaneous drainage serves both diagnostic and therapeutic purposes and should be attempted in the majority of cases. The appropriate drainage technique (needle aspiration, percutaneous drainage, or open surgical drainage) varies based on the size, location, and number of abscesses and should be determined in consultation with interventional specialists.

Figures

Figure 1. Abdominal CT demonstrating a 4.8 x 6.2 cm complex fluid collection in the left hepatic lobe with a locule of gas, concerning for an abscess.

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