CLINICAL VIGNETTE

Evaluation of a Hepatic Lesion in a Previously Healthy Adult Male

Clement Lee, MS, and Antonio M. Pessegueiro, M.D.

Case Presentation

A 33-year-old Hispanic-American male with a remote medical history of hepatitis A infection and chronic mild transaminitis attributed to hepatosteatosis presented with several days of myalgias, fevers, headaches, and abdominal pain associated with nausea, vomiting, and non-bloody diarrhea. He also reported an intermittent non-productive cough. The patient reported military travel to Japan, Guam, and Hawaii five months prior to admission, travel to Mexico four years ago, and animal contact only with his parrot and two dogs at home. He denied sick contacts, ingestion of raw meats, use of illicit drugs, and insect bites. He drank alcohol occasionally on the weekends. He and his wife were monogamous and had no prior history of sexually transmitted infections, including HIV. He had received the influenza vaccination earlier that year.

On presentation, the patient was febrile to 104°F and tachycardic to 103 bpm. Other pertinent positives on physical examination included right upper quadrant tenderness and an equivocal Murphy's sign. There were no splinter hemorrhages or periorbital edema. Kernig's and Brudzinski's signs were not present, and the patient did not display photophobia, nuchal rigidity, or any new rashes. Heart and lung sounds were normal. There was no rebound tenderness or organomegaly on abdominal examination. Back exam was normal without focal tenderness, and his mental status was normal.

An abdominal ultrasound revealed a normal gallbladder, borderline splenomegaly with normal splenic morphology, and a liver mass. Abdominal MRI revealed a 6 cm complex cystic lesion in the left lobe of the liver (Figure 1). Radiology favored a bacterial over an amebic abscess. Additional testing included a complete blood count, basic metabolic panel, hepatic panel, serum lipase, chest X-ray, hepatitis serologies, HIV 1 and 2 antibody screen, bacterial blood cultures, stool ova and parasites smear, *Entamoeba histolytica* EIA, *Clostridium difficile* PCR, and antibodies against *Trichinella*, *Echinococcus,* and *Taenia solium*. Early results showed an elevated alanine transaminase (78 U/L; Ref: 8-64 U/L), alkaline phosphatase (134 U/L; Ref: 37-113 U/L), total bilirubin (2.3 mg/dL; Ref: 0.1-1.2 mg/dL), and white blood cell count (14.6 x 10E3/uL; Ref: 4.2–10 x 10E3/uL). Infectious serologies would not result for several days.

The patient was started on intravenous fluids, ondansetron, and empiric ciprofloxacin and metronidazole. The infectious disease service was consulted and affirmed the radiologist's interpretation of a likely bacterial abscess. Interventional radiologists proceeded with ultrasound-guided percutaneous aspiration of the hepatic lesion with drain placement. Post-operatively, the patient's fever resolved, but the leukocytosis continued to trend upward (peaking at 23.6 x 10Ex3/uL), and he developed new mild right lower quadrant abdominal pain and worsening cough. Bacterial cultures of the blood and bacterial, fungal, and acid-fast cultures of the liver aspirate remained negative; ciprofloxacin and metronidazole were discontinued and ertapenem started for empiric coverage. Five days after ultrasound-guided aspiration of the hepatic lesion, the *Echinococcus* IgG returned positive. All other studies resulted negative.

Now working under the presumption of an echinococcal infection that may have been spread during aspiration, a confirmatory *Echinoccocus* Western blot was sent and the patient underwent CT scans of his chest, abdomen, and pelvis, as well as MRI of the brain. Scans showed a new 6 x 1.3 cm subcapsular abscess, a new 1-2 cm periappendiceal abscess, and a new small left pleural effusion. Brain MRI showed no abnormalities. Albendazole and praziquantel were added and ertapenem was continued to cover possible bacterial superinfection. The patient's abdominal pain and cough improved and leukocytosis resolved. The hepatic drain was then removed; and a PICC line was placed in anticipation for outpatient antibiotic therapy.

On the day of discharge, the *Echinococcus* Western blot returned negative. Antihelminthic therapy was discontinued, and the patient was discharged home on intravenous ertapenem alone. When the patient returned two weeks later, the original liver lesion had decreased in size to 2.1 cm, and all of the additional fluid collections had resolved. Ultimately, the patient's presentation was attributed to a pyogenic liver abscess (PLA) caused by an unidentified bacterial organism, with the picture complicated by a positive *Echinococcus* test as well as seeding of the abscess in the course of percutaneous aspiration.

Discussion

As demonstrated by this case presentation, proper evaluation and treatment of a liver abscess may be challenging. This is especially true when abdominal imaging does not show classic features of a specific disease process. In addition, the differential often includes diagnoses that are not treated similarly. In this case, the two most likely diagnoses, PLA and echinococcosis, warrant different treatment strategies, with the former amenable to simple aspiration and the latter

requiring special drainage techniques to avoid rupture of cyst contents.[1]

In the United States, the incidence of PLA is 8-15/10,000, comprising >80% of all liver abscesses.[2] While most PLA is secondary to an abdominal infection, a primary infection is not discovered in as many as 53% of patients, especially in patients with single liver lesions such as our patient.[1,3] PLA classically presents as abdominal pain, fever, and vomiting in a 55- to 60-year-old male with known biliary disease or diabetes mellitus.[1,2,4] Although our patient had a strong family history of diabetes mellitus type 2, his hemoglobin A1C was normal.

Our patient demonstrated some common laboratory findings seen in PLA, including leukocytosis, elevated alanine transaminase, elevated alkaline phosphatase, and hyperbilirubinemia.[2] Other PLA findings that were not seen include hypoalbuminemia and anemia of chronic disease.[1] Imaging in PLA usually reveals lesions in the right lobe of the liver that have a rim of enhancement on CT with contrast.[2,5] A right pleural effusion can also be seen.[1,2] Special imaging signs that may help diagnose PLA include the "double target" (hypodense center, isodense abscess wall, and hypodense outer edema) and "cluster of grapes" (multiple abscesses coalescing together) signs.[5] In our patient, an abdominal CT was not initially obtained, so none of these signs were available for aiding in diagnosis.

In the last three decades, the most common pathogen isolated from PLA has shifted from *Escherichia coli* to *Klebsiella pneumoniae*.[2,4] About a third of PLA isolates may show polymicrobial infection, while another third may not grow any organisms at all, as with this patient.[4] The recent fall in PLA mortality is mainly ascribed to improved imaging and diagnosis, as well as the usage of percutaneous drainage, which is indicated for all abscesses >6 cm in size and even for some smaller lesions.[1,2,4] Additional treatment for PLA includes empiric antibiotic therapy covering anaerobic and enteric gram-negative organisms with the length of treatment tailored to the number of abscesses and clinical response.[1,2] Our patient did not fit the usual PLA demographic, making definite diagnosis more difficult. This was further complicated by his positive *Echinococcus* IgG titer.

Echinococcal disease is seen more globally than in the United States.[1] It may also present as right upper quadrant abdominal pain in a middle-aged patient, not unlike PLA.[5] Distinguishing features include eosinophilia (seen in 40% of patients), positive serologies, and history of travel to an endemic sheep-raising region such as Africa, Australia, South America, or Eurasia.[1,5,6] The WHO has defined five different types of *E. granulosus* cysts that may be seen on ultrasonography with daughter hydatids or their parts resembling "snowflakes," "honeycomb," "water lilies," "balls of wool," or "cone-shaped shadows."[6] However, early in the development of daughter cysts, none of these pathognomonic signs may be present, and it may be challenging to differentiate echinococcal disease from PLA without positive serologies or other clinical data.[5,6]

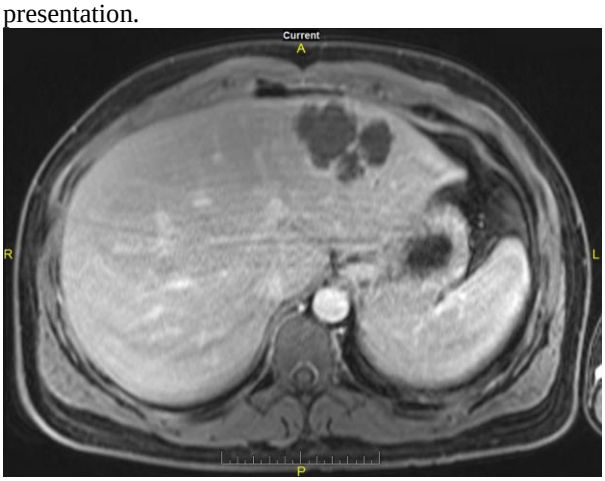
The false-positive rate of the *E. granulosus* IgG test is low with the test's specificity quoted at 99%.[7] It is the most sensitive and specific test for diagnosis of echinococcosis.[7] With such high specificity, positive titers strongly suggest either past or present infection. Our patient had a follow-up Western blot that was negative, indicating the absence of reactive *Echinococcus* protein antigens in his blood.[8] Taking into consideration both the negative confirmatory test and the history of military travel around the world, the patient presumably became infected subclinically at some point in the past and developed circulating IgG antibodies against the parasite.

One major factor that clouded the diagnostic picture was the appearance of multiple new lesions after aspiration of the patient's primary liver abscess. PLA can be associated with metastatic lesions, especially if the PLA is caused by *K. pneumoniae*.[2] The most common sites of bacterial spread are the eyes, meninges, other sites of the central nervous system, and lungs.[2] Compared to surgical drainage of PLA, percutaneous drainage is associated with fewer complications, including a lower rate of seeding into other organs during the procedure.[9] However although it is rare, such seeding has been reported.[9] Much more commonly discussed is the accidental puncture of an echinococcal cyst leading to adverse events, including fatal anaphylactic shock. This appears to be an exaggerated concern with lethal anaphylaxis only occurring in 0.04% of treated cysts.[10] The assumed association of adverse outcomes with echinococcal cyst rupture, in combination with the patient's positive *Echinococcus* IgG, influenced the treatment team to prioritize echinococcal treatment.

This case emphasizes the complexity of diagnosing liver abscesses, especially when a patient does not fit the classic demographic for a disease process and laboratory findings confound the evaluation. It is important to consider that common diseases may have unconventional presentations (e.g., PLA in a young healthy male), and that events believed to be common, on the contrary, may be exceedingly rare (e.g., anaphylaxis following percutaneous drainage of an echinococcal cyst). Finally, this case reminds us that in order to make accurate diagnoses a clinician must be familiar with the current medical literature, become comfortable with recognizing all possible scenarios of a given disease trajectory, and use new incoming clinical data to refine and even amend old diagnoses and treatment plans.

Figures

Figure 1. T1-weighted axial MRI of the abdomen on presentation.



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Submitted January 4, 2016