Case Report

Pyogenic Liver Abscesses with an Elevated Carcinoembryonic Antigen Level



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Abstract

Serological tumor markers are useful for the detection of malignancies and evaluation of disease progression. These markers are not checked as part of a routine examination for patients with benign diseases and without any clinical suspicion of malignancy. However, some markers appear to be elevated in patients with benign diseases and without malignancies. We present a case of pyogenic liver abscesses with an elevated serum carcinoembryonic antigen (CEA) level associated with neither evidence of malignancy nor elevation of other tumor markers such as carbohydrate antigen (CA 19-9) and alpha-fetoprotein (AFP) levels. The serological level of CEA decreased and subsequently became within normal limits with treatment. This case also demonstrates that diabetic patients with a liver abscess may present with no infectious symptoms and that fine-needle aspiration is as effective as catheter drainage in the treatment of pyogenic liver abscess.

Keywords: Carcinoembryonic antigen, pyogenic liver abscesses, tumor markers

INTRODUCTION

Many types of serological tumor markers have been used for the detection of malignancies and evaluation of disease progression. Tumor markers such as carcinoembryonic antigen (CEA) are specifically elevated in patients with malignancies.^[1] However, it is well known that CEA levels are affected by a multitude of conditions including benign ones. Malignant conditions associated with an elevated CEA include primary carcinomas of gallbladder, bile ducts, and the pancreas, as well as secondary metastatic carcinoma to the liver. Benign conditions associated with an elevated CEA include benign hepatobiliary diseases, such as alcoholic liver disease, hepatoma, severe alcoholic cirrhosis, viral hepatitis, primary biliary cirrhosis, active chronic hepatitis, cholecystitis, cholelithiasis, as well as pancreatitis.^[2] Furthermore, CEA levels can be elevated in peptic ulcer disease, inflammatory bowel disease, diverticulitis, and cigarette smoking.^[3] As there are many conditions that are related to an elevated CEA, the detection of a high serum tumor marker level may sometimes produce a false impression for malignancy.

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We recently encountered a case of pyogenic liver abscesses presented with an elevated serum CEA level but without malignancy.

CASE REPORT

A 30-year-old nonsmoking and nondrinking man presented to a clinic for polyphagia, polydipsia, polyuria, rectal bleeding, and body weight loss of 20 kg in a year. Initial blood tests showed high blood sugar and CEA levels. The patient came to our center due to abnormal laboratory results. He was given investigations for further evaluation. Repeated blood tests also showed an elevated CEA level (10.56 ng/mL; normal < 5.0 ng/ mL) on June 15, 2020. In view of the elevated tumor marker and persistent rectal bleeding, both colonoscopy and abdominal ultrasound were performed on June 23. While colonoscopy showed mild mixed hemorrhoids, abdominal sonography revealed moderate fatty liver with focal fatty sparing and

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a large lobulated hypoechoic hepatic tumor with septation measuring $10.0 \text{ cm} \times 8.2 \text{ cm}$ in the right lobe, favoring a hepatic abscess but pending exclusion of a malignant tumor [Figure 1]. Interestingly, the patient did not complain of a fever and right upper quadrant pain which are symptoms typical of liver abscess. The patient was subsequently transferred to our emergency department on June 29. At the emergency room, the patient denied any fever, chills and rigors, nausea, vomiting, abdominal pain, and diarrhea. Upon physical examination, the patient's temperature was 38.7°C, and abdomen was soft with the absence of right upper quadrant tenderness. Laboratory investigations showed leukocytosis (white blood cell count, 11.98×109 L; normal range, $4.0-10.8 \times 109$ L), elevated serum C-reactive protein (CRP) level (8.2 mg/dl; normal < 0.5 mg/ dl), and hyperglycemia (165 mg/dl; normal range, 60-108 mg/ dl) but liver function was normal (GPT: 36 IU/L; normal range, 4-44 IU/L; total bilirubin: 0.8 mg/dl; normal range, 0.2-1.2 mg/dl). Serum alkaline phosphatase was not checked due to normal transaminase and bilirubin levels. Abdominal computed tomography revealed a large liver tumor suggesting liver abscess and multiple small hepatic lesions suggesting a suspected metastatic liver disease. Malignant neoplasm with central necrosis had to be excluded [Figure 2a-d]. Under the provisional diagnosis of liver abscess, suspected malignant hepatic neoplasm and metastatic liver disease, and newly diagnosed type II diabetes mellitus with poor control, the patient was admitted to general medical ward for inpatient management.

During hospitalization, blood tests showed normal serum AFP and CA 19-9 levels, negative results for amebic antibody, hepatitis B surface antigen, and anti-HCV antibody. A course of empirical antibiotics consisted of IV ceftriaxone 1 g q12 h and IV metronidazole 500 mg q6 h was given. On July 1, a large bore needle 18 G was inserted into the largest and most liquefied dependent part of the abscess under ultrasound guidance. Yellowish green pus 35 ml was aspirated and sent for pus culture examination. On July 4, serum CEA level (2.68 ng/mL) was normalized. The culture



Figure 1: A large lobulated hypoechoic hepatic tumor with septation in the right lobe of liver measuring about 10.0 cm \times 82 cm

yielded *Klebsiella pneumoniae* on July 7. Metronidazole was subsequently discontinued. Serum CRP level (0.3 mg/dl) and white cell count were normalized shortly afterward on July 11 with clinical condition much improved. The patient was discharged home on the same day with levofloxacin (500 mg) once daily prescribed based on the susceptibility test results.

After discharge from our center, a follow-up abdominal ultrasound performed on July 28 showed a regressive change of the abscess presented with a hypoechoic honeycomb-like mass measuring 6.3 cm \times 4.4 cm. There was no clinical presentation of inadequate infection control, and therefore, we continued the same choice of antibiotics until the end date of the treatment regimen on August 4 (total duration of antibiotic treatment was 37 days).

DISCUSSION

A study reported that patients with obstructive jaundice associated with elevated CEA levels do not necessarily have cancer. Benign extrahepatic biliary tract obstruction and biliary tract inflammation can cause elevated CEA levels that tend to return to normal once these pathological processes are resolved. In the same paper, 2 in 29 jaundiced patients had liver abscesses.^[2]

Elevated serum CEA level is associated with several factors. In cancer, CEA has been demonstrated on the glycocalyx of the tumor cell surface. Cellular regeneration in the liver could increase the production of CEA. Inflammation in the liver could give rise to glycoproteins with CEA-like activity. Impaired liver function could result in a failure to excrete small amounts of CEA which may be produced under normal conditions.^[4] In addition, elevated serum CEA level is associated with hepatobiliary diseases through the following



Figure 2: (a) Nonenhanced liver computed tomography scan showed a hypodense mass in the right lober of liver. (b) Enhanced liver computed tomography scan showed a hypodense mass with central fluid accumulation in the right lobe of liver. (c) Enhanced liver computed tomography scan showed a tiny hypodense lesion in the left lobe of liver. (d) Enhanced liver computed tomography scan showed a tiny hypodense lesion in the right lobe of liver

mechanisms; (1) Biliary obstruction may interfere with hepatic CEA excretion. (2) Hepatocellular damage may impair removal of CEA from blood and reduce degradation of CEA. (3) Inflammation within the biliary tract of liver may increase circulating CEA levels. Elevated CEA levels found in benign diseases are usually associated with inflammatory processes.^[2]

In our patient, his transaminase and bilirubin levels were within normal limits without any evidence of hepatitis, biliary tract obstruction, or biliary tract inflammation. His CEA level followed the course of disease of pyogenic liver abscesses which implies that CEA level was not acting as a tumor marker but an inflammatory index. This case suggests that patients with liver diseases and elevated CEA levels do not necessarily have cancer, making the diagnostic value of CEA for cancer rather limited. It is important to consider benign as well as malignant etiologies when interpreting mildly elevated circulating CEA levels in patients with hepatobiliary disease. For patients with elevated CEA level presenting with atypical clinical pictures and imaging studies suggesting liver abscess, it is important to provide an appropriate interpretation of the data, a thorough explanation to the patient, and a close follow-up.

We also found that a large pyogenic liver abscess in a diabetic patient can present without symptoms of infection as experienced by our patient.

Last but not least, we found that fine-needle aspiration is as effective as catheter drainage in pyogenic liver abscess. It is widely accepted that percutaneous drainage should be performed for unilocular abscesses larger than 5 cm. There is a preference for drainage with the placement of a catheter over needle aspiration; catheter drainage for larger abscesses is supported by results from a meta-analysis of five randomized trials comparing catheter drainage to needle aspiration in over 300 patients with pyogenic liver abscesses, most of which were larger than 5 cm.^[5] In our patient, a pyogenic liver abscess as large as 10 cm was successfully treated with fine-needle aspiration alone without percutaneous catheter drainage or even surgical treatment (more invasive procedures). This was only made possible under careful clinical observation, comprehensive laboratory monitoring, close abdominal ultrasound follow-up, and adequate duration of appropriate antibiotic coverage. Fine-needle aspiration is beneficial as it is a less invasive procedure that leads to much less patient discomfort and complications. It is also beneficial as it can be repeated several times whenever infection control is inadequate. For these reasons, fine needle aspiration can be an appropriate option for percutaneous drainage of large pyogenic liver abscess in selected cases.

Persistent visible pyogenic liver abscess after fine-needle aspiration and adequate antibiotic treatment revealed by a short-term abdominal ultrasound follow-up (in our case, 27 days after fine-needle aspiration) does not indicate inadequate treatment. Our results suggested that a close observation of clinical response and an adequate laboratory test follow-up is an appropriate strategy to evaluate the adequacy of treatment. In fact, sonographic abnormalities resolve much more slowly than clinical and biochemical markers. In a study conducted in Nepal, most of the subjects without abscess drainage had a mean time of 16 weeks to ultrasonographic resolution of abscesses <10 cm and a mean time of 22 weeks to resolution of abscesses >10 cm.^[6] In our case, the time of abscess being undetectable sonographically was 14 weeks.

Declaration of patient consent

The authors certify that they have obtained appropriate patient consent form. In the form, the patient has given his consent for the images and other clinical information to be reported in the journal. The patient understands that his name and initial will not be published and due efforts will be made to conceal the identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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