

# Hepatocellular Carcinoma Mimicking Liver Abscesses in a Cirrhotic Patient with Severe Septic Shock as a Result of Salmonella O9 HG Infection

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## Key Words

Salmonella · Sepsis · Hepatocellular carcinoma

## Abstract

We describe a case of severe Salmonella O9 HG sepsis with a mass in the liver, which was diagnosed as hepatocellular carcinoma (HCC) by autopsy of the liver. The patient was a 67-year-old man with chronic high blood pressure. In addition, he was an alcoholic and had been drinking every day for many years. He had had a dinner of 'sukiyaki' with a raw egg two days before admission. The next morning, he had developed vomiting, diarrhea, and abdominal pain. Salmonella O9 HG was found in the blood and stool cultures. In the computed tomography (CT) finding of the liver, there was a 2 cm early-enhanced mass with a multilocular structure, with ringed enhancement and daughter nodes. Since we thought that the mass was a liver abscess, we performed needle aspiration from the liver mass and were able to withdraw blood. Despite adequate antibiotic treatment, the patient died as a result of complications on the 55th day after admission. After the patient's death, we conducted an autopsy. There were two HCC masses, a moderately-differentiated and a well-differentiated mass, as a result of alcoholic cirrhosis of the liver. As the HCC had multilocular cyst-like structures, which were fiber- and necrosis-rich, CT images of the liver masses resembled abscesses.

## Introduction

Hepatocellular carcinoma (HCC) is a relatively common disease. In normal conditions, if there are space-occupying lesions (SOL) in the liver, HCC is one of the most important diseases in differential diagnosis. However, in patients with systemic inflammatory response syndrome (SIRS) or bacteremia, it can be very difficult to diagnose HCC, in cases with uncommon HCC-related computed tomography (CT) findings. We report a case of severe Salmonella O9 HG sepsis with SOL in the liver, which was subsequently diagnosed as HCC by autopsy of the liver tissue.

## Case Report

Our patient was a 67-year-old man with chronic high blood pressure, and hypotensive medicine had been prescribed for several years by his clinician at the Circulatory Organ Internal Medicine Department of our hospital. In addition, he was an alcoholic and had been drinking every day for many years. The patient had had a dinner of 'sukiyaki' with a raw egg two days before admission. The next morning, he developed vomiting, diarrhea, and abdominal pain. On the second morning after the meal (the day of admission), his condition worsened, so he came to our hospital via ambulance.

On arrival, physical examination revealed that his body temperature was 36.8°C, blood pressure was 68/35 mm Hg, and his heart rate was irregular, ranging from 30 to 70 beats per minute. The patient's consciousness was rated at E4V5M6 on the Glasgow Coma Scale. There were no ascites. Blood test results showed that the white blood cell count was 10,200/mm<sup>3</sup>, platelet count 12,200/mm<sup>3</sup>, red blood cell count 3.96 × 10<sup>6</sup>/mm<sup>3</sup>, prothrombin time international ratio 1.53, total bilirubin 1.9 mg/dl (normal 0.2–1.1 mg/dl), alanine aminotransferase 265 IU/ml (normal 8–42 IU/ml), aspartate aminotransferase 744 IU/ml (normal 13–33 IU/ml), creatine phosphokinase 986 IU/ml (normal 62–287 IU/ml), blood urea nitrogen 43 mg/dl (normal 8–20 mg/dl), creatinine 5.9 mg/dl (normal 0.8–1.3 mg/dl), and C-reactive protein 18.8 mg/dl (normal 0–0.5 mg/dl). He was seronegative for hepatitis B and C virus. His liver function was Child A on admission.

Although we commenced infusion of saline solution, we were unable to prevent shock. Therefore, we administered noradrenaline and antidiuretic hormone. Blood and stool cultures were taken as a precaution. Since blood pressure and heart rate were unstable, the patient was hospitalized in the intensive care unit. At this point, we thought that his clinical state was caused by a toxic effect of the hypotensive medicine, and that dehydration from vomiting and diarrhea was further exacerbating his condition. Therefore, we decided to perform conservative medical treatment in the intensive care unit in an attempt to improve his condition.

In the evening, body temperature increased to 40.5°C. A blood test at this time showed that the white blood cell count was 3,100/mm<sup>3</sup>, platelet count 9,600/mm<sup>3</sup>, red blood cell count 3.57 × 10<sup>6</sup>/mm<sup>3</sup>, and endotoxin 99.3 pg/ml (normal <5.0 mg/dl). Noradrenaline was needed to maintain blood pressure. The patient's condition developed into SIRS, warm shock, so we diagnosed it as sepsis [1] as a result of gastroenteritis and/or food poisoning. Therefore, we started treatment with ciprofloxacin and metronidazole. To determine whether other causes of infection were present, we performed CT scan at the same time. In the liver CT, there was a 2 cm early-enhanced SOL with a multilocular structure, with ringed enhancement and daughter nodes (fig. 1). Therefore, we diagnosed alcoholic liver cirrhosis with liver abscess.

Three days later, Gram-negative bacilli were found in the blood cultures and alpha-fetoprotein (AFP) was 355.4 mg/ml (normal 0.0–10.0 mg/ml). As the patient's body temperature had not decreased, we changed the antimicrobials to meropenem hydrate until drug sensitivity was not evident. We also performed echo-guided needle aspiration from the liver SOL and were able to withdraw blood. The aspirated blood culture and cytodiagnosis were negative. We thought that the elevation of AFP was caused by liver inflammation. On the 4th day, after it had become clear that the bacilli of blood and stool were Salmonella O9 HG positive, we changed the antimicrobial to ceftriaxone and waited for sensitivity results. On the 5th day, the sensitivity results of ceftriaxone, ciprofloxacin, and meropenem hydrate for Salmonella O9 HG showed that they were all effective, so we continued ceftriaxone treatment. By blood culture after the 5th day we were unable to prove the presence of bacteria. Therefore, we took dynamic CT of the liver, and the radiologist diagnosed liver abscess.

As the patient was in a condition of renal failure, respiratory failure, severe liver dysfunction, and disseminated intravascular coagulation, we transferred him to intensive care and performed blood transfusion, respiratory management, hemodialysis, and plasma exchange. However, we could not control the progression of multiple organ failure, particularly severe liver dysfunction (Child C). Afterwards, the patient exhibited ventilatory associated pneumonia and finally died as a result of these complications on the 55th day after admission.

After the patient's death, we conducted an autopsy. There were two HCC masses (fig. 2) including a moderately-differentiated and a well-differentiated type, as a result of alcoholic cirrhosis of the liver. The HCC was characterized by multilocular cyst-like structures, which were fiber- and necrosis-rich, so the CT images of the liver masses resembled abscesses. In addition, as the patient's general condition was in SIRS, diagnosis of HCC prior to death was difficult. The autopsy diagnosis included pneumatosis cystoides intestinalis, thrombotic microangiopathy of the kidney, and penetrating gastric ulcer.

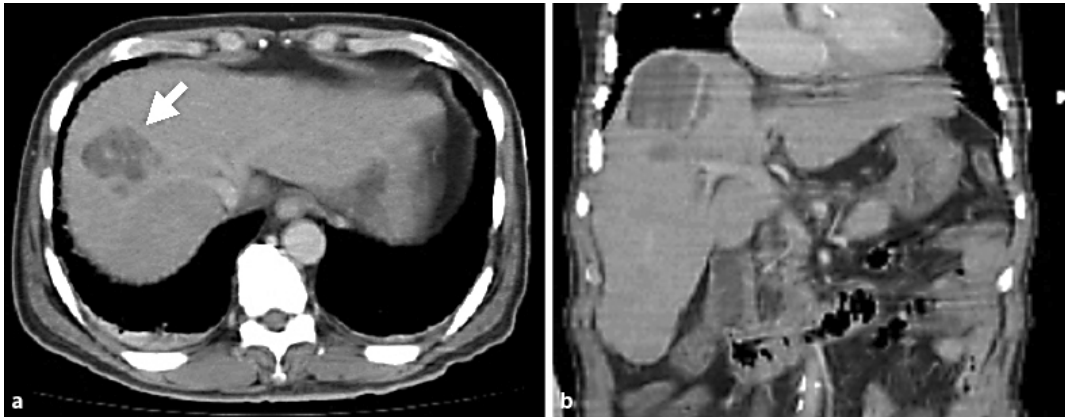
## Discussion

Salmonella sepsis occurs with severe complications of Salmonella gastroenteritis. Of patients with nontyphoidal Salmonella gastroenteritis, only 5% have positive blood cultures, and 5–10% of people with bacteremia may develop localized infections [2]. Therefore, liver abscesses secondary to Salmonella bacteremia occur in as few as 0.5% of patients with nontyphoidal Salmonella gastroenteritis. Intra-abdominal infections such as hepatic or splenic abscess cholecystitis are quite rare.

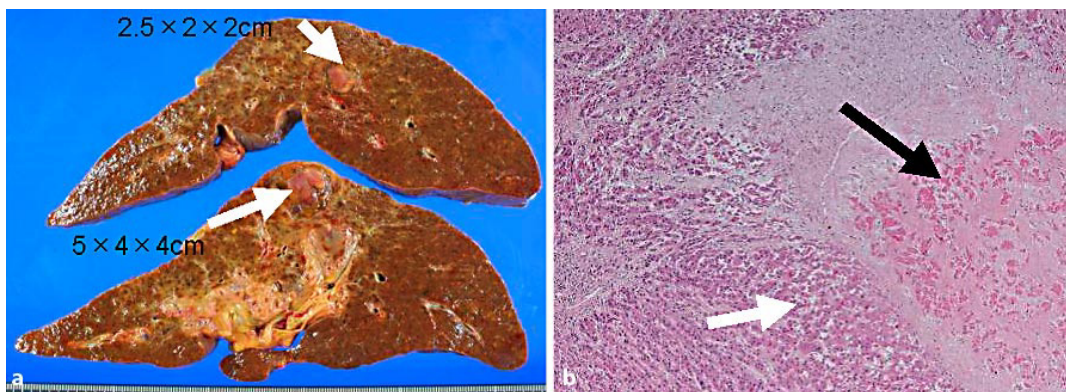
Liver abscesses are extremely rare in cirrhotic patients, their incidence being only 0.09% [3]. Therefore, salmonellosis with liver abscesses in cirrhotic patients is extremely rare; to our knowledge there are only two other reports of this condition [4, 5]. According to Chou et al. [4], there were no reports in the English language literature of salmonellosis with liver abscess in cirrhotic patients prior to their report. Nevertheless, we thought that the liver SOL was an abscess that had developed during the patient's lifetime. The reasons why we could not get an accurate diagnosis were: (1) our patient's condition developed into severe sepsis within a few hours; (2) we took blood from aspiration of liver masses, and the cytodiagnosis was negative; (3) in the CT, there were multilocular structures in the liver that were indicative of abscesses. Since the patient's Salmonella sepsis was severe, we had to choose appropriate drugs and, believing that the liver masses were abscesses, we performed needle aspiration and took blood. We thought that there was a vessel at the tip of the needle, or that the SOL became blood-rich owing to the antibiotics, and that his condition (shock, low platelets, and liver dysfunction) was too poor for measures such as another biopsy trial. Although magnetic resonance imaging has been shown to be a valuable tool for the diagnosis of this disease, as reported by Brown et al. [6], we believed that the patient would have been unable to endure magnetic resonance imaging. Thus, we halted further attempts of different diagnoses.

The most important clinical features that help to differentiate abscess from HCC are the relatively acute onset of illness, the presence of fever, and elevated white blood cell levels. The absence of risk factors for development of HCC, including seronegativity for hepatitis B and C, having no imaging findings consistent with cirrhosis, and having a normal serum AFP, also argue against a diagnosis of HCC [6]. We should have taken into account the serum AFP, but the factors described by Brown alone are insufficient to diagnose SOL of the liver in a septic patient. To rescue such patients, the important treatments are antibiotics and drainage of the SOL. A biopsy must be done in the absence of drainage of pus.

**Fig. 1.** CT scans of the liver on day 1 of admission. **a** The arrow indicates the enhanced liver mass with daughter nodes. This mass has a multilocular structure. **b** Coronal section image recomposition of CT scans of the liver.



**Fig. 2.** HCC with liver cirrhosis. **a** Liver weight was 1,600 g. There were two masses in the liver, sized  $5 \times 4 \times 4$  cm and  $2.5 \times 2 \times 2$  cm. **b** Pathological image of the larger carcinoma (HE stain,  $\times 100$ ). The black arrow indicates necrotic tissue and the white one carcinoma cells. Fibrous structure was very abundant.



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