Early *Klebsiella pneumoniae* Liver Abscesses associated **with Pylephlebitis Mimic Hepatocellular Carcinoma**

Chih-Hao Shen, MD[3], Jung-Chung Lin, MD, PhD[2], Hsuan-Hwai Lin, MD[1], You-Chen Chao, MD[1], and Tsai-Yuan Hsieh, MD, PhD[1]

Division of Gastroenterology[1], and Infectious Diseases and Tropical Medicine[2],

Department of Internal Medicine[3], Tri-Service General Hospital,

National Defense Medical Center, Taipei, Taiwan

Corresponding author: Tsai-Yuan Hsieh, MD, Ph.D

Chief, Division of Gastroenterology, Department of Internal Medicine, Tri-Service General Hospital, No. 325, Sec 2, Cheng-Kung Rd., Neihu 114, Taipei, Taiwan

Telephone: +886-287927409

Fax: +886-287927139

E-mail address: tyh1216@ms46.hinet.net

Abstract

We report on a 57-year-old man with chronic hepatitis B and type 2 diabetes mellitus who developed capsular serotype K1 *Klebsiella pneumoniae* liver abscesses, which were accompanied by pylephlebitis and the rapid development of septic pulmonary emboli. Because the early stage liver abscesses with pylephlebitis were radiographically-indistinguishable from hepatocellular carcinoma with portal vein thrombosis, both diagnosis and treatment were delayed. Nonetheless, within three months of appropriate treatment with drainage and broad-spectrum cephalosporin, these lesions disappeared completely.

(Keywords: *Klebsiella pneumoniae*, liver abscess, pylephlebitis, septic emboli)

Introduction

Liver abscesses caused by *Klebsiella pneumoniae* are an emerging phenomenon. The propensity of *K. pneumoniae* liver abscesses to develop extra-hepatic metastases makes them especially noteworthy. Common metastatic complications of the sepsis include pulmonary emboli, pulmonary abscesses, endophthalmitis, cerebral abscesses, prostate abscesses, and psoas muscle abscesses. Underlying type 2 diabetes mellitus is a crucial risk factor for *K. pneumoniae* liver abscess. Fung *et al.* investigated 134 cases of *K. pneumoniae* liver abscess and found that 78% of the patients had underlying type 2 diabetes mellitus. Moreover, among those patients with septic endophthalmitis, 92% were diabetic. In this paper, we report on a diabetic patient of early *K. pneumoniae* liver abscess accompanied by pylephlebitis and pulmonary septic emboli, the clinical and radiographic picture of which closely mimicked hepatocellular carcinoma (HCC).

Case report

A 57-year-old man with chronic hepatitis B and type 2 diabetes mellitus was brought to our emergency department because of general malaise, abdominal fullness, and lower limb swelling that had lasted five days. Physical examination revealed tachycardia, low-grade fever, jaundice, and pitting edema involving both legs. Laboratory studies yielded a white blood cell count of 11.7×10^9 cells/L with 77% neutrophils; hemoglobin was 12.6 g/dL (normal range, 13.5–18 g/dL); platelet count 95×10^9/L (normal range, 150–400 $\times 10^9$/L); prothrombin time 16.7 s (control 11.6 s), with an international normalized ratio of 1.6; aspartate aminotransferase 59 U/L (normal range, 0–37 U/L); alanine aminotransferase 223 U/L (normal range, 0–37 U/L); total bilirubin 1.9 mg/dL (normal range, 0–1.0 mg/dL); albumin 1.9 g/dL (normal range, 4–6 g/dL); blood glucose 288 mg/dL, and C-reactive protein 9.14 mg/dL (normal range < 0.5 mg/dL). Urine and stool tests were normal. Chest radiographs initially disclosed no significant findings. Abdominal ultrasound revealed ill-defined heterogeneous lesions over segment 8 of the liver (Fig. 1B) and an echogenic thrombus within the main trunk of the portal vein (Fig. 1A), with an absence of blood flow by color Doppler imaging. Abdominal computed tomography uncovered multiple, ill-defined lesions over the right lobe of the liver (Fig. 1C); the largest measuring about 5.7 × 2.7 × 3.2 cm and located at the junction of segments 5

and 6. The differential diagnoses at admission included HCC and infection of unknown cause. Intravenous ampicillin 1gm and sulbactam 500mg were administered every 6 hours, pending culture results.

After admission, the patient's low-grade fever persisted. Three days after admission, chest X-rays detected faint, newly-developed opacities in the right middle and left lower lobes of the lungs (Fig. 2A). Chest computed tomography confirmed septic pulmonary emboli (Fig. 2B). His D-dimer level was 4,081 ng/mL (normal range, <500 ng/mL). Antibiotic therapy was altered to intravenous ceftriaxone 2gm daily. Capsular serotype K1 *K. pneumoniae* was isolated from both sets of blood cultures.[1] Ultrasound-guided aspiration and biopsy of a liquefying hepatic lesion were performed. Pathological evaluation of the liver biopsy sample revealed acute necrotizing inflammation with abscess formation. Two weeks after the antibiotics had been changed, the patient's fever and general malaise subsided. Abdominal ultrasound demonstrated shrinking hepatic lesions and no thrombus within the portal vein. Another two-week course of intravenous ceftriaxone, 2gm daily, was administered. By three months follow-up, the lung and liver lesions had disappeared radiographically.

Discussion

Portal vein thrombosis is caused by underlying thrombophilic disorders and precipitated by local factors like inflammation or infection, injury to the portal venous system, or neoplastic disease. In our patient, radiographic images taken during the early formation of pyogenic liver abscesses exhibited a non-liquefying and heterogeneous pattern which mimicked malignancy. Consequently, liver abscesses with pylephlebitis were clinically indistinguishable from HCC with portal vein thrombosis. The presence of pylephlebitis complicated by distant septic metastases to lung resulted in rapid clinical deterioration. The confusion regarding diagnosis resulted in an initial trial of antibiotics, which was not appropriate for the hepatic abcesses that ultimately were identified. Managing hepatic abscesses by both percutaneous transhepatic drainage and broad-spectrum antibiotic coverage (in our case, using a broad-spectrum cephalosporin) is critical to achieving a favorable outcome.

Karen *et al.* have reported on four patients in whom pylephlebitis was misdiagnosed as HCC. In a patient with an acute onset of illness, fever, an elevated WBC, and a normal AFP level, and without any HCC risk factors, the former diagnosis may be more likely. However, diabetes mellitus or other immune-compromised states may mask the inflammatory features normally attributed

to pylephlebitis. Patients who present with heterogenic liver masses and portal vein thrombosis may be erroneously assumed to have HCC, especially in areas wherein chronic hepatitis B or C prevalence is high.

Our review of the scientific literature revealed only two previously-reported patients with pylephlebitis, liver abscesses, and septic pulmonary emboli. Both of them succumbed to their illness. In one patient, who also had type 2 diabetes mellitus, the underlying infectious source was cecal diverticulitis with *K. pneumoniae* bacteremia. The other patient had a perforated diverticulum of the terminal ileum with mixed flora. The delayed diagnoses and inadequate antibiotic coverage were considered the causes of death in both reports. The case we presented was both rare in terms of clinical presentation and significant in that the patient ultimately survived without any sequelae.

Pylephlebitis is a severe complication of intra-abdominal infections, like diverticulitis, appendicitis, inflammatory bowel disease, gastric ulcer, and pancreatitis. In our patient, it is difficult to surmise whether the pylephlebitis was secondary to infection in the region drained by the hepatic portal system or to infection in structures contiguous to the portal vein. Pylephlebitis of liver abscesses that caused by pathogens other than *K. pneumoniae* seldom present extra-hepatic metastases. Both the virulence of *K. pneumoniae*, with capsular serotype K1/K2 particularly virulent,

and the presence of underlying type 2 diabetes mellitus are important, in terms of the likelihood and course of metastatic complications.

In conclusion, liver abscesses with pylephlebitis may mimic HCC with portal vein thrombosis. The presence of septic emboli is important in terms of distinguishing and managing pyogenic liver abscesses early, especially in patients with *K. pneumonia* infection. Prompt and adequate treatment improves both mortality and morbidity.

Figure legends

Figure 1: Abdominal ultrasonography revealed an echogenic thrombus (about 1.2 × 0.7 cm) within the main trunk of the portal vein (A) and ill-defined heterogeneous lesions (the largest about 3.7 cm across) with few central cystic changes over liver segment 8 (B). Abdominal computed tomography also identified ill-defined low density lesions in the right lobe of the liver (C).

Figure 2**:** X-ray showed faint, newly developed opacities in the right middle and left lower lobes of the lungs (A). Computed tomography of the chest revealed multiple pulmonary nodules, about 1–3 cm in diameter, located within the periphery of both lung fields (B). Some lesions were cavitated, strongly suggesting septic pulmonary emboli.

Fig 1.

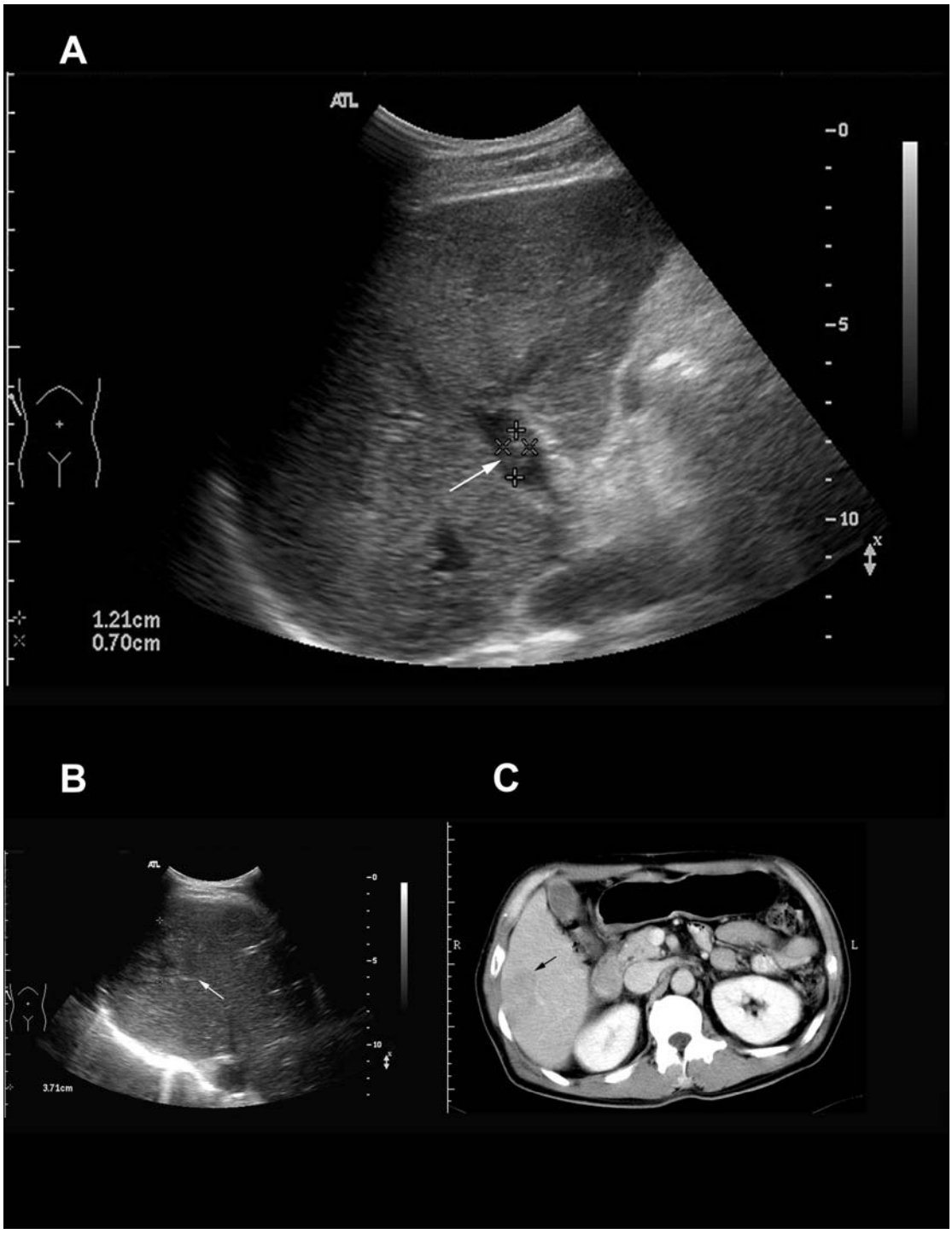

Fig 2.