Tuberculosis is one of the well-described infectious diseases, which has a worldwide occurrence and is associated with various clinical manifestations (1). Hepatic tuberculosis is one of the uncommon forms of extrapulmonary tuberculosis (1-4). In tuberculosis, involvement of liver is usually seen in association with pulmonary or miliary tuberculosis (1, 2, 5). Occurrence of isolated hepatic tuberculosis without extrahepatic manifestations is very rare (1-5). In both, isolated hepatic and systemic tuberculosis, hepatic involvement tends to be multiple micro- or macronodular, whereas the single nodule or mass form is rare (1-3, 6). Hence, hepatic tuberculosis can mimic primary or metastatic liver malignancies (1). In the present study, we have reported some unusual findings on isolated hepatic tuberculosis, which was revealed to be infiltrative type of hepatic tuberculosis from CT scans and ultrasonograms.

**Hepatic Tuberculosis: Unusual CT and Sonographic Findings**

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A case of infiltrative type of hepatic tuberculosis is presented. Ultrasonography revealed a very ill-margined, heterogenously low echoic lesion in the right hepatic lobe. CT scans demonstrated a very ill-defined, geographic, hypodense lesion with minimal contrast enhancement mimicking cholangiohepatitis or infiltrative tumor in the right hepatic lobe.

**Index words:** Tuberculosis
Liver
Computed tomography (CT)
Ultrasound (US)

A 49-year-old female patient was admitted to our hospital with abdominal pain and fever from past 20 days. During the past four years, the patient had undergone repeated intrahepatic biliary stone removals by choledochoscopy. Physical examination revealed neither hepatomegaly nor splenomegaly. Laboratory tests showed an elevated level of C-reactive protein (CRP), however her other tests were normal, including alkaline phosphatase, erythrocyte sedimentation rate (ESR), a-fetoprotein, and CA 19-9. Plain chest radiography was unremarkable. Abdominal CT revealed a very hypoattenuating lesion in the right lobe of the liver (Fig. 1A). There was less enhancement of lesion when compared with rest of the liver parenchyma. There was neither lymphadenopathy nor calcification in the abdomen. Abdominal ultrasonography revealed a very ill-defined, heterogeneous, subtle low echogenicity in the right lobe of the liver. CT and ultrasonographic findings revealed the presence of cholangiohepatitis associated with intrahepatic biliary stones. The patient's symptoms were relieved after administration of antibiotics, and after discharging she had no specific symptoms. Two months
later, follow-up CT revealed the expansion of a very ill-defined, geographic, hypodense lesion with subtle contrast enhancement in the right lobe of the liver and a new, ill-defined, low-attenuating lesion in the left lobe of the liver (Figs. 1B and C). There was neither lymphadenopathy nor calcification and no abnormal findings were observed on the CT scans. The patient was readmitted and underwent sonographically guided percutaneous liver biopsy of a very ill-margined, heterogeneously low echoic lesion in the right lobe of the liver (Fig. 1D). Histologic examination showed chronic granulomatous inflammation with caseous necrosis, which was consistent with tuberculosis (Fig. 1E). Ziehl-Neelsen stain of the specimen for Mycobacterium tuberculosis was negative. Culture for Mycobacterium tuberculosis by employing the specimen was not performed. Anti-tuberculous treatment with isoniazid, rifampin, ethambutol, and pyrazinamide was started, and the patient was

Fig. 1. A 49-year-old woman with hepatic tuberculosis.
A. Enhanced CT scan shows a very ill-defined, hypodense lesion (arrows) in the right lobe of the liver. There is pneumobilia in the left intrahepatic bile duct of the liver due to previous removal of biliary stone by cholecdochoscopy.
B, C. Follow-up enhanced CT scans obtained two months after the initial CT, reveal the expansion of a very ill-defined, geographic, hypodense lesion (arrows) with minimal contrast enhancement in the right lobe of the liver and a new ill-defined, low-attenuating lesion (arrows) in the left lobe of the liver.
D. Ultrasonogram shows a very ill-margined, heterogeneously low echoic lesion (arrows) in the right lobe of the liver.
E. Photomicrograph of the lesion shows chronic granulomatous inflammation (arrows) with caseous necrosis (*). [H & E stain, × 100]
F. Thirteen weeks after initiation of anti-tuberculous treatment, a follow-up enhanced CT scan shows reduction of hypoattenuating lesion (arrows) in the right lobe of the liver.
discharged from the hospital six days after initiation of the anti-tuberculous medication. Thirteen weeks after initiation of the anti-tuberculous treatment, follow-up abdominal CT revealed reduction of the hypoattenuating lesions in both the lobes of liver (Fig. 1F). We thought that the hypoattenuating lesion in the left lobe of the liver was also hepatic tuberculosis.

Discussion

Tuberculosis can affect virtually any organ system in the body and can be devastating if left untreated. In recent years, the prevalence of tuberculosis in both immunocompetent and immunocompromised individuals has increased, and this disease has become a subject of universal concern. Isolated hepatic tuberculosis without extrahepatic involvement and the macronodular or pseudotumor forms are rare (1-3). Kok and Yapp (1) reported that only 5 (0.3%) of 1678 new cases of tuberculosis represented isolated hepatic tuberculosis without extrahepatic involvement of tuberculosis. Hepatic tuberculosis can be classified as follows [3]: a) primary acute pulmonary tuberculosis with liver involvement; b) miliary tuberculosis; c) primary tuberculosis; d) tuberculoma (abscess); e) chronic pulmonary tuberculosis with liver involvement; and f) tuberculous cholangitis.

Hepatic tuberculosis can be diagnosed on CT scans as micronodular (miliary) or macronodular (7). The micronodular type manifests on CT scans as multiple, tiny, low-attenuation foci, each a few millimeters in diameter and it spreads throughout the liver. The macronodular type is rare and manifests as diffuse liver enlargement with multiple, hypodense lesions measuring from 1- to 3-cm in diameter or as a single tumor-like mass (1, 3, 6, 7). Contrast enhancement occurs in peripheral granulomatous tissue, and the central low density of caseation necrosis shows less enhancement or homogenous minimal enhancement (5). As the time progresses, calcification of the lesion occurs and occasionally may become extensive [1]. The ultrasonograms reveals the presence of the miliary form is that of a homogenous enlarged liver or a bright echo pattern, which is indistinguishable from that observed in liver cirrhosis or other cases of increased hepatic echogenicity [1, 8]. The macronodular form is seen as multiple round hypoechoic nodules [1, 8].

In our case, CT revealed a very ill-defined, geographic, low-attenuation lesion with minimal contrast enhancement. There were some penetrating vessels through the hypoattenuating lesion. These CT findings were neither micronodular nor macronodular. Ultrasonography also revealed a very heterogeneously hypoechoic lesion with ill margin. The cause of cholangitis was unclear because either tuberculosis or biliary stone could be the cause of cholangitis.

When hepatic tuberculosis is present in the macronodular form, it is often confused with metastasis, lymphoma, sarcoidosis, and liver abscess (1, 2, 6, 8). In our case, because of the patient’s underlying biliary stone disease, her hepatic lesion was initially mistaken for nonspecific cholangiohepatitis associated with biliary stones. It could also have been considered to be another infiltrative disease such as lymphoma, amyloidosis or fatty deposition.

Because the radiologic and clinical findings of hepatic tuberculosis have a low specificity, microbiological or histopathologic examination of such specimens is needed in order to make a diagnosis. Histologically, a tuberculous lesion is composed of central caseating necrosis with surrounding epitheloid and giant cells and bordering lymphohistiocytic cells [3, 8]. The more unequivocal confirmation is the discovery of tuberculous bacilli after the use of special stains and/or on subsequent cultures. Because the frequency of positive acid-fast smears is low, ranging from 0 to 45%, the caseating necrosis can be considered to be very suggestive and sufficient for the diagnosis [8]. The proper clinical setting and follow-up of liver recovery, under specific anti-tuberculosis medication, leads to final diagnosis [8].

This rare case shows the infiltrative type of hepatic tuberculosis without extrahepatic involvement of tuberculosis. In patients who are presented with protracted illness and have an unusual lesion in the liver on cross-sectional images, biopsy must be performed for correct diagnosis and suitable treatment must be given.

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References