Case Report

The imaging findings of Peliosis hepatis on gadoxetic acid enhanced MRI

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A B S T R A C T

Peliosis hepatis involves multiple blood-filled cystic spaces in the hepatic parenchyma. Using conventional imaging, distinguishing PH from other malignancies can be difficult. The findings of Peliosis hepatis on gadoxetic acid (Gd-EOB) enhanced magnetic resonance imaging are not well reported. Therefore, we report the imaging features of pathologically proven PH. On the hepatobiliary phase of Gd-EOB magnetic resonance imaging, most lesions showed unenhanced areas, but some lesions showed central enhancement "halo sign."

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Introduction

Peliosis hepatis (PH) is an uncommon liver disease characterized by tumor-like lesions comprising multiple blood-filled cysts [1]. Although the pathogenesis of PH is not well known, it is frequently observed in association with tuberculosis, malignancy (eg, hepatocellular carcinoma), acquired immunodeficiency syndrome (AIDS), and drug usage (including steroids and oral contraceptives) [2]. PH is benign in nature and often asymptomatic [3]. However, hepatomegaly, ascites, portal hypertension, cholestasis, and hepatic failure may result from

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PH [4]. PH rupture and intraperitoneal hemorrhage have also been reported [5]. Therefore, conducting early imaging to diagnose PH is desirable.

Because of the development and wide availability of imaging modalities in the recent decades, the detection of PH lesions has become feasible, yet variable imaging findings can result, and occasionally, PH mimics malignant liver diseases such as liver metastasis and hepatocellular carcinoma [6]. The imaging findings of PH on computed tomography (CT), ultrasonography (US), magnetic resonance imaging (MRI), and 18F-fluorodeoxyglucose (18F-FDG) positron-emission tomography (PET)/CT have been reported previously. However, gadoxetic acid (Gd-EOB) MRI findings are not well known [3,6,7]. Therefore, we report on the Gd-EOB MRI features of one patient with pathologically proven PH lesions initially suggested to be liver malignancies.

Case report

A 72-year-old male with left lower-abdominal pain presented to our hospital. Blood tests and blood biochemistry; liver and kidney function tests; and alpha fetal protein, cancer embryo antigen, and carbohydrate antigen 19-9 concentrations were all within normal ranges. He was negative for hepatitis B surface antibody and hepatitis C antibody.

B-mode US revealed multiple, homogeneous low-echogenicity nodules throughout the whole liver, with irregular lesion boundaries. Moreover, Doppler US showed no blood flow signals in these lesions. On the noncontrast-enhanced CT image, it was difficult to detect multiple lesions that were successfully detected by US. The patient had multiple enhanced lesions (Figs. 1 and 2). During a previous CT 4 years ago, an enhanced lesion (17 mm in diameter) was observed in segment 6 (S6) of the liver and was initially thought to be consistent with hemangioma. During the present CT, the S6 lesion was revealed to have progressively grown (26 mm in diameter) with the subsequent appearance of multiple liver lesions. These lesions showed a pattern of gradual enhancement on dynamic contrast-enhanced CT (Fig. 3); further, dynamic enhanced MRI using Gd-EOB displayed a similar pattern. Using hepatobiliary phase MRI, the multiple lesions presented a low signal intensity (Fig. 4). Of these, several lesions showed central enhancement (i.e., a “halo-like” appearance) of a similar intensity as that of normal liver parenchyma (Fig. 4). At this point, 18F-FDG-PET was performed. The liver lesions had no abnormal uptake and there were also no abnormal uptake findings elsewhere in the whole body. The uptake of 18F-FDG in the S6 lesion was the same as that noted with normal liver parenchyma (Fig. 5). Esophagogastroduodenoscopy and colonoscopy were performed to exclude malignancy of the primary lesion, and no abnormal results were obtained. However, considering that liver lesions demonstrated an increase in number and size, it was difficult to deny the possibility of multiple liver metastases of an unknown malignancy or of a malignant liver tumor and metastases. Therefore, we next conducted US-guided percutaneous needle biopsy using a 16-gauge needle. After biopsy, no complications were noted. The histopathology of the lesion ultimately demonstrated PH (Fig. 6).

Discussion

Imaging characteristics of PH as revealed by US, contrast-enhanced CT, and MRI have been reported previously, but the diagnosis of PH remains difficult because of the various manifestations of PH that may arise during imaging. We herein report CT and MRI imaging features of PH. To our knowledge, Gd-EOB enhanced MRI findings of PH have not been previously reported in the literature. The distribution of PH can be focal,
segmental, or diffusely disseminated in hepatic sinusoids, and the imaging features of PH are nonspecific; on US, PH appears as hypoechoic or hyperechoic nodules or a diffuse heterogeneous hepatic echotexture, whereas on contrast-enhanced CT and MRI, PH presents various patterns of enhancement [6,8]. Therefore, it has been reported that it is difficult to distinguish PH from other liver malignancies using US, contrast-enhanced CT, and conventional MRI [2,5]. On the other hand, Gd-EOB, which is the “liver-specific” contrast material of MRI, has a unique drug-deposition trait as compared with the conventional Gd-based contrast material used during MRI. Gd-EOB is taken up by hepatocytes through the organic anion transporting polypeptide and eliminated through the MRP into the biliary tract [9–11]. Therefore, during the hepatobiliary phase, the enhanced area of the liver reflects the normal hepatocyte area. In this case, some lesions had central enhancement (Fig. 4). PH is characterized by cystic blood-filled cavities distributed randomly throughout the liver parenchyma and typically involves the entire normal liver. Considering the behavior of Gd-EOB, the central enhancement seen in some PH lesions might be normal hepatocyte area. The imaging findings of $^{18}$F-FDG PET/CT in this study were similar to those of a previous study [7]. PH showed an isometabolic area with the adjacent hepatic parenchyma because PH lesion did not show increased metabolic activity that caused inflammatory focus or malignant transformation [7]. Moreover, in the histopathological findings, normal hepatocytes were seen in the PH. We believe that areas of central enhancement in the PH lesions on Gd-EOB MRI should be considered as the spared normal hepatocyte area. According to the developmental morphology of most malignancies, central enhancement in the center of the lesion is not usually seen on Gd-EOB MRI. Therefore, although further studies were needed, we believe that the finding of a “halo-like” appearance on Gd-EOB MRI may be helpful in distinguishing PH lesions from malignant ones.

In addition, the differential diagnosis of PH from other benign lesion was important because occasionally progressive and life-threatening complications occur from PH [6]. Focal nodular hyperplasia (FNH) and dysplastic nodules could take up the hepatobiliary agent [12]. FNH usually showed hyperintensity on the hepatobiliary phase. Dysplastic nodules showed hyper-, iso-, or hypointensity on the hepatobiliary phase according to the grade of malignancy and organic anion transporting polypeptide expression during multistep hepatocar-
cinogenesis. On the other hand, on the hepatobiliary phase, PH showed hypointensity and several lesions showed central enhancement. Therefore, although further studies are needed, we deemed that the differences in imaging findings during the hepatobiliary phase might help to distinguish between PH and FNH or dysplastic nodules.

The cause of PH in our patient was unclear. The patient’s medications did not contain any drug known to be associated with PH [2] and he had no known predisposing factor such as a chronic debilitating disease (eg, tuberculosis, hematologic malignancy, or AIDS) [2]. However, previous reports have suggested that no associated condition is identifiable in 20%–50% patients with PH [8].

Histopathology constitutes the gold standard for the diagnosis of PH. The histopathologic results of liver biopsy or hepatolobectomy revealed dilated sinusoidal spaces with congest-
tion in the liver parenchyma. Although liver biopsy remains the most reliable method in the diagnosis of PH, it is still an invasive procedure, bringing with it the risk of bleeding [13]. Based on the imaging findings collected from our patient, we believe that the possibility of PH should be considered if a hepatic lesion shows central enhancement in the hepatobiliary phase on Gd-EOB MRI. If this finding is confirmed to be relevant in this context in future studies, the observation of central enhancement on the hepatobiliary phase of Gd-EOB MRI might help to suspect PH and be useful for considering the clinical strategy.

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