Radiology Case Reports 15 (2020) 1261–1265

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/radcr

Case Report

The imaging findings of Peliosis hepatis on gadoxetic acid enhanced MRI ☆

Morikatsu Yoshida, MD[a,], Daisuke Utsunomiya, MD[b], Sentaro Takada, MD[c], Yoshihiro Komohara, MD[d], Tomohiro Mizoshiri, MD[a], Seitaro Oda, MD[e], Kazunori Harada, MD[f], Osamu Ikeda, MD[e]*

[a] *Department of Radiology, Amakusa Medical Center, 854-1 Jikiba, Kameba, Amakusa City, Kumamoto 863-0046, Japan*
[b] *Department of Radiology, Yokohama City University School of Medicine*
[c] *Department of Radiology, Japanese Red Cross Kumamoto Hospital*
[d] *Department of Cell Pathology Graduate of School of Medicine, Kumamoto University*
[e] *Department of Diagnostic Radiology, Faculty of Life Sciences, Kumamoto University*
[f] *Department of Surgery, Amakusa Medical Center*

ARTICLE INFO

Article history:
Received 13 February 2020
Revised 25 April 2020
Accepted 26 April 2020

Keyword:
Peliosis hepatis
Hepatobiliary phase
Gadoxetic acid enhanced magnetic resonance imaging

ABSTRACT

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."

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

☆ **Competing interest:** The authors declare that they have no conflicts of interest.

* Corresponding author.
E-mail address: y_morikatsu@hotmail.com (M. Yoshida).

https://doi.org/10.1016/j.radcr.2020.04.059

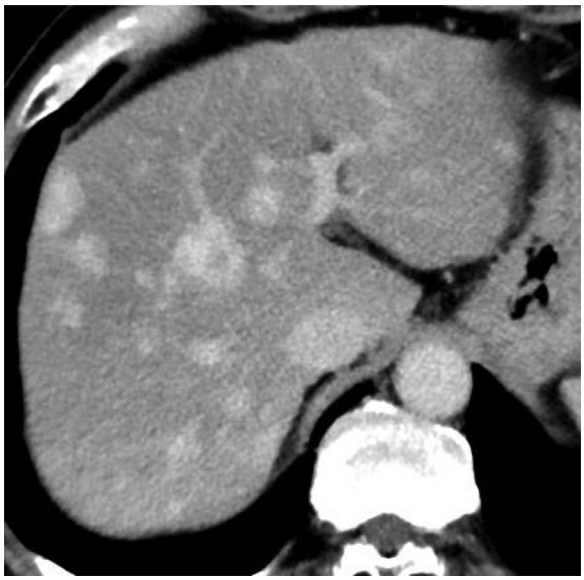

Fig. 1 – Contrast-enhanced CT image showing multiple hypervascular mass lesions in the liver.

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 ^{18}F-fluorodeoxyglucose (^{18}F-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)

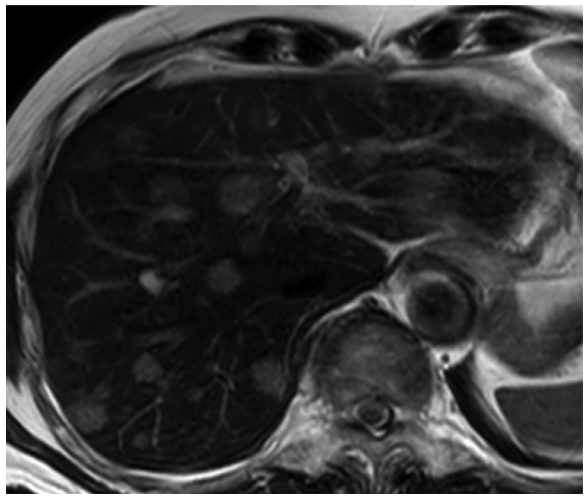

Fig. 2 – T2-weighted MRI scan displaying multiple mass lesions with mild hyperintensity.

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 (ie, a "halo-like" appearance) of a similar intensity as that of normal liver parenchyma (Fig. 4). At this point, ^{18}F-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 ^{18}F-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,

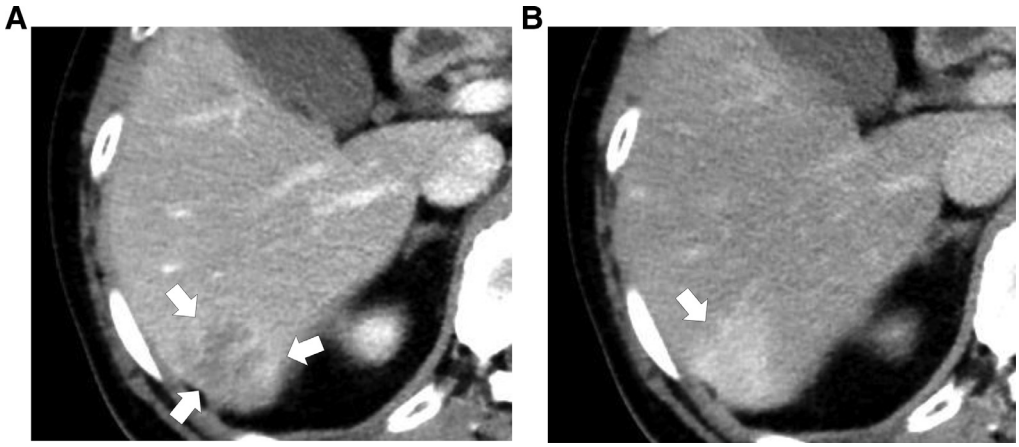

Fig. 3 – Dynamic contrast-enhanced CT findings. (A) In the arterial phase, the mass lesion in the liver (S6) presents irregular and ring-like enhancement (arrows). (B) In the venous phase, the liver lesion is more strongly enhanced than the normal liver parenchyma.

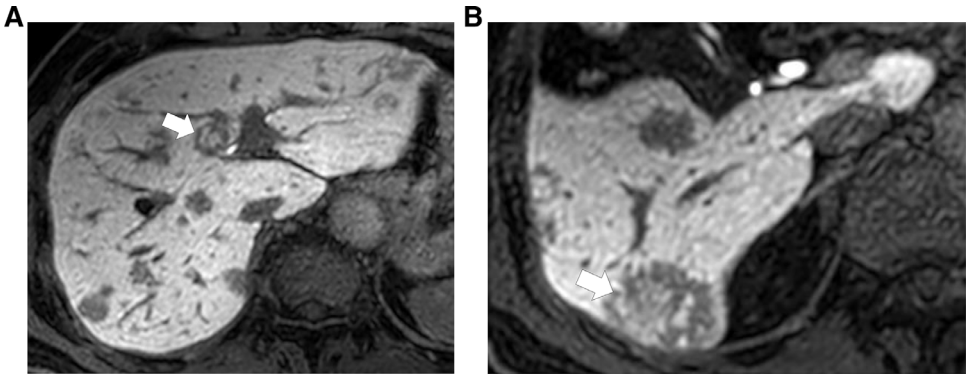

Fig. 4 – Gd-EOB MRI findings. (A, B) On hepatobiliary-phase images, there are multiple low-intensity lesions in the liver. Some lesions have central enhancement, which is suggestive of spared normal hepatocyte area (arrow).

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-

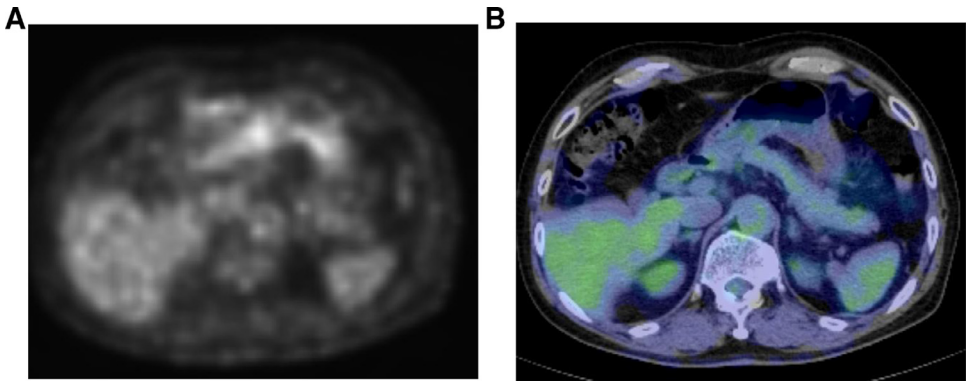

Fig. 5 – The 18F-FDG PET image (A, B). The multiple liver lesions showed isometabolic with their adjacent hepatic parenchyma.

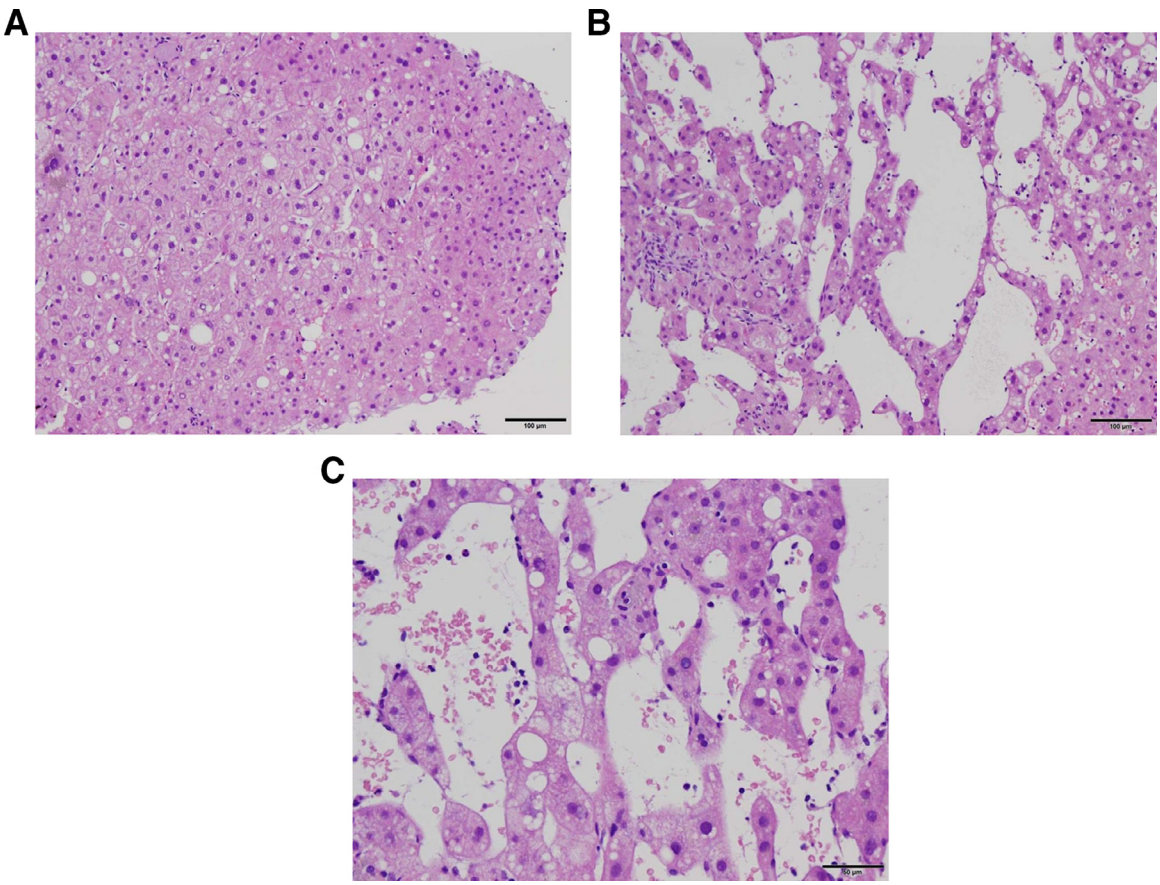

Fig. 6 – Histology of liver biopsy sample (A, B, C). (A) Hematoxylin and eosin staining of normal liver area (B) Hematoxylin and eosin staining of pelisosis area of a magnification of 100 (B) and 200 (C). In the lesion sinusoidal dilation containing red blood cells and normal hepatocyte were observed.

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 conges-

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.

REFERENCES

[1] Zak FG. Peliosis hepatis. Am J Pathol 1950;26(1):1–15 incl 2 pl.
[2] Dai YN, Ren ZZ, Song WY, Huang HJ, Yang DH, Wang MS, et al. Peliosis hepatis: 2 case reports of a rare liver disorder and its differential diagnosis. Medicine (Baltimore) 2017;96(13):e6471.
[3] Gouya H, Vignaux O, Legmann P, de Pigneux G, Bonnin A. Peliosis hepatis: triphasic helical CT and dynamic MRI findings. Abdominal Imaging 2001;26(5):507–9.
[4] Charatcharoenwitthaya P, Tanwandee T. Education and Imaging: hepatobiliary and pancreatic: spontaneous intrahepatic hemorrhage from peliosis hepatis-an uncommon complication of a rare liver disorder. J Gastroenterol Hepatol 2014;29(10):1754.
[5] Kim EA, Yoon KH, Jeon SJ, Cai QY, Lee YW, Yoon SE, et al. Peliosis hepatis with hemorrhagic necrosis and rupture: a case report with emphasis on the multi-detector CT findings. Korean J Radiol 2007;8(1):64–9.
[6] Iannaccone R, Federle MP, Brancatelli G, Matsui O, Fishman EK, Narra VR, et al. Peliosis hepatis: spectrum of imaging findings. AJR Am J Roentgenol 2006;187(1):W43–52.
[7] Seo M, Lee SH, Han S, Sung C, Son DH, Lee JJ. Peliosis hepatis shows isometabolism on (18)F-FDG PET/CT: two case reports. Nucl Med Mol Imaging 2014;48(4):309–12.
[8] Vignaux O, Legmann P, de Pinieux G, Chaussade S, Spaulding C, Couturier D, et al. Hemorrhagic necrosis due to peliosis hepatis: imaging findings and pathological correlation. Eur Radiol 1999;9(3):454–6.
[9] Sourbron S, Sommer WH, Reiser MF, Zech CJ. Combined quantification of liver perfusion and function with dynamic gadoxetic acid-enhanced MR imaging. Radiology 2012;263(3):874–83.
[10] Huppertz A, Balzer T, Blakeborough A, Breuer J, Giovagnoni A, Heinz-Peer G, et al. Improved detection of focal liver lesions at MR imaging: multicenter comparison of gadoxetic acid-enhanced MR images with intraoperative findings. Radiology 2004;230(1):266–75.
[11] Ahn SS, Kim MJ, Lim JS, Hong HS, Chung YE, Choi JY. Added value of gadoxetic acid-enhanced hepatobiliary phase MR imaging in the diagnosis of hepatocellular carcinoma. Radiology 2010;255(2):459–66.
[12] Yoneda N, Matsui O, Kitao A, Kozaka K, Kobayashi S, Sasaki M, et al. Benign hepatocellular nodules: hepatobiliary phase of gadoxetic acid-enhanced MR imaging based on molecular background. Radiographics 2016;36(7):2010–27.
[13] Gronlykke L, Tarp B, Dutoit SH, Wilkens R. Peliosis hepatis: a complicating finding in a case of biliary colic. BMJ Case Rep 2013;2013.