Case Report
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대한영상의학회지

A Case Report of Localized Hepatic Sinusoidal Dilatation: The Diagnostic Usefulness of the Hepatobiliary Phase of Gd-EOB-DTPA-Enhanced Magnetic Resonance Imaging
간의 국소적 동모양 혈관 확장증의 증례보고: Gd-EOB-DTPA 조영증강 MRI의 간담도 시기의 진단적 유용성

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Hepatic sinusoidal dilatation (HSD) is a rare vascular disorder characterized by focal dilatation of the sinusoidal spaces in the liver. In most cases, it may be associated with venous outflow impairment. In addition, this histological change could occur in a number of systemic and hepatic conditions in the absence of hepatic venous obstruction. However, the pathogenesis has not yet been elucidated. To the best of our knowledge, imaging findings in a case of localized HSD without any additional medical disorder or oral contraceptive therapy have not been described previously in the literature written in English. Here, we describe imaging findings in a case of localized HSD mimicking a hepatic tumor, focusing on the useful findings on the gadolinium ethoxybenzyl diethylenetriamine pentaacetic acid-enhanced hepatobiliary phase MR image.

Index terms
Hepatic Sinusoidal Dilatation
Gadolinium Ethoxybenzyl Diethylenetriamine Pentaacetic Acid
MRI
Hepatobiliary Phase

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INTRODUCTION

Hepatic sinusoidal dilatation (HSD) may be associated with venous outflow impairment such as hepatic sinusoidal obstruction syndrome, Budd-Chiari syndrome, or cardiac disease. In the absence of hepatic venous obstruction, HSD may be related to several other diseases, such as certain systemic inflammatory disorders, granulomatous and neoplastic diseases, and hematological malignancies (1, 2). It may also be related to systemic chemotherapy for malignancy such as colorectal cancer, pregnancy, and oral contraceptive use (3-5).

Here, we describe ultrasonography (US), computed tomography (CT), and magnetic resonance imaging (MRI) findings of the HSD in our case. We report the useful MRI finding of HSD that it has connection to the hepatic or portal vein, reliably identified on the hepatobiliary phase (HBP).

CASE REPORT

A 37-year-old woman was referred to our institution from a local medical clinic due to an incidentally-detected large hepatic mass on US. The patient had no complaints of symptoms or past medical history. A physical examination and laboratory findings showed no abnormality.

On transabdominal US examination in our hospital, a 3-cm sized, non-specific hypoechoic mass in hepatic segment VI rela-

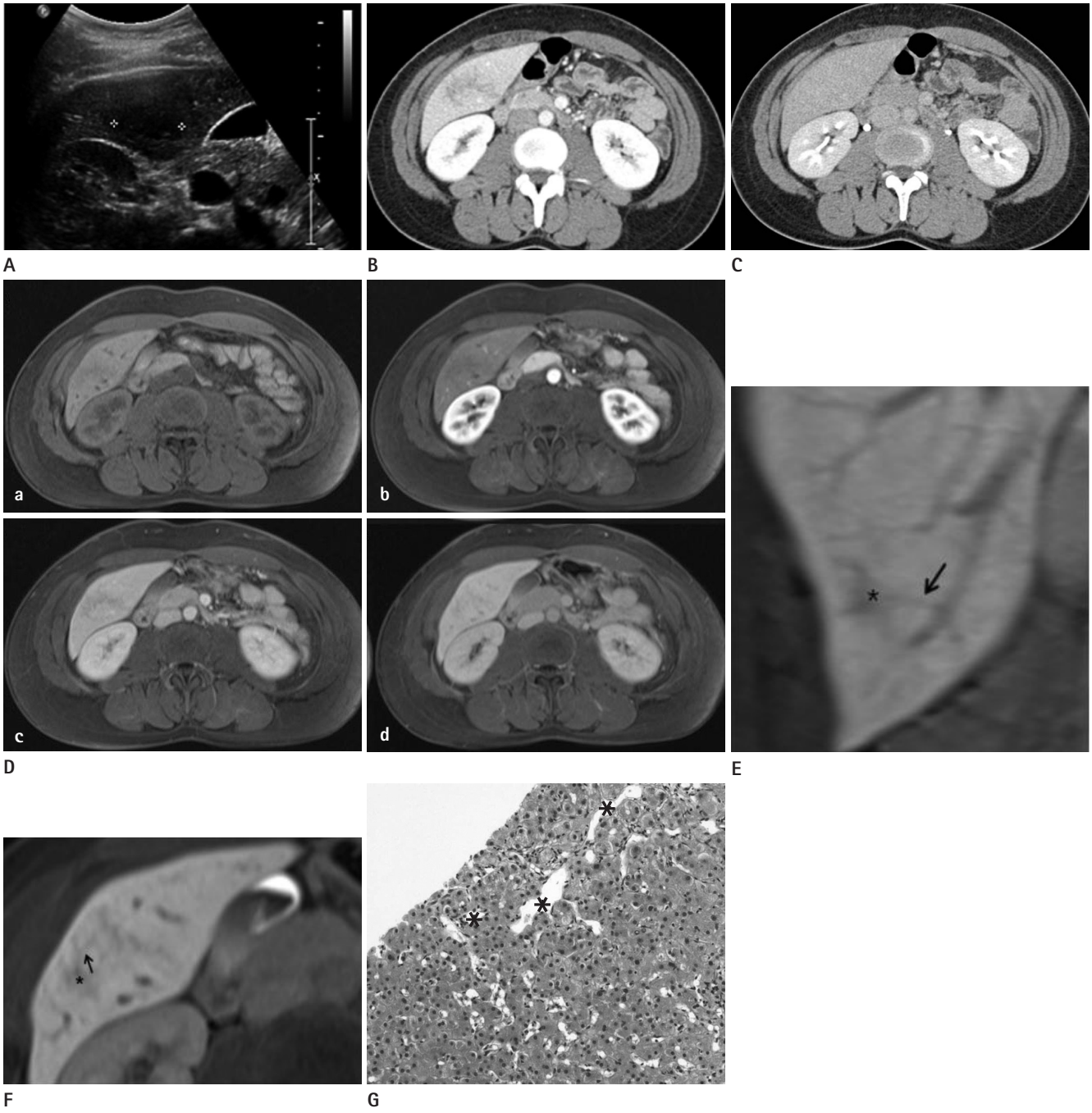

Fig. 1. A 37-year-old woman with localized hepatic sinusoidal dilatation (HSD).
A. Transabdominal ultrasonography showing an ill-defined and hypoechoic lesion (approximately 3 cm) in hepatic segment VI.
B. The axial enhanced CT image during the portal venous phase (PVP) (60 sec) showing an ill-defined and hypodense structure with an almost isodense portion in hepatic segment VI.
C. The axial enhanced CT image during the equilibrium phase (3 min) showing the lesion as isodense compared with adjacent liver parenchyma.
D. Contrast-enhanced dynamic MR HSD images during arterial, portal venous, and transitional phases, including an unenhanced T1-weighted image. **a.** On the unenhanced T1-weighted image, a focal, ill-defined, slightly hypointense hepatic lesion is noted. **b.** In the arterial phase, the lesion is indistinct. **c.** In the PVP, an ill-defined and hypointense structure with an almost isointense area, as compared with adjacent liver parenchyma, is observed. **d.** In the transitional phase, the lesion becomes less prominent than in the PVP.
E, F. On the axial **(E)** and reformatted coronal **(F)** MR images of the delayed hepatobiliary phase, the ill-defined, vessel-like hypointense structure (asterisk) is connected to the peripheral branch of the right portal vein and the middle hepatic vein, respectively (black arrow).
G. Photomicrograph showing the only sinusoidal dilatation (asterisk) without peliosis in the liver tissue obtained by needle biopsy (hematoxylin and eosin, × 200).

tive to the surrounding liver was detected (Fig. 1A). The focal hepatic lesion was not defined on the non-enhanced CT images. On the contrast enhanced dynamic CT scan of the liver, this focal hepatic lesion showed delayed enhancement (Fig. 1B, C).

Liver MRI was then performed with dynamic imaging, including imaging in the arterial phase (30 sec), portal venous phase (60 sec), and transitional phase (3 min), as well as the HBP (10 min), after administration of 0.1 mmol/kg Gd-EOB-DTPA (Primovist; Bayer Healthcare, Berlin, Germany). On T1-weighted images, the focal hepatic lesion was slightly hypointense (Fig. 1D). On T2-weighted half-Fourier acquisition turbo spin echo (HASTE) images, it was isointense to the adjacent liver parenchyma. In comparison with the CT scans, a similar enhancement pattern was observed on the enhanced dynamic MR images (Fig. 1D). An ill-defined, vessel-like hypointense structure was best depicted, especially on the HBP than on any other phase. In addition, connection with the peripheral branches of both the right portal vein and middle hepatic vein was shown on the HBP (Fig. 1E, F). In the diffusion-weighted image and apparent diffusion coefficient map, no definite diffusion restriction was seen.

A sonographic-guided needle biopsy was performed, and a microscopic examination showed only HSD without other histological abnormalities (Fig. 1G).

DISCUSSION

HSD can occur in various conditions. If HSD is the only abnormal finding in the liver, other systemic diseases may coexist. Therefore, further medical investigation for neoplastic or granulomatous disease elsewhere in the body is needed (5).

To our knowledge, imaging findings of localized HSD in a patient without any other medical disorders or oral contraceptive therapy have not been described in the literature.

Weinberger et al. (6), described sonographic findings of a hyperechoic hepatic mass. In comparison, in our case, HSD was shown as a hypoechoic mass in the liver on US, equivalent to the other previous case (7).

Yang et al. (7), described the crossing vascular structures within the slightly hyperintense lesion on T2-weighted HASTE images as an interesting MRI finding. However, in our case, since the lesion was not shown on T2-weighted HASTE images, it was not possible to evaluate the presence of the crossing vascular structures. On the HBP images, we found that HSD had a connection to both the middle hepatic vein and the right portal vein. This useful imaging finding is highly suggestive of vascular lesions, because the hepatic sinusoidal space is anatomically connected to the hepatic vessels. In addition, the reticular vessel-like lesion was shown with no mass effect or occlusion. This helps to distinguish HSD from hepatic neoplasms, because the extension of normal hepatic vessels to large hepatic neoplasms is extremely rare, with the exception of a few malignancies in the liver (8). Shin et al. (9), reported that reticular hypointensity on Gd-EOB-DTPA MR HBP images is highly specific for the diagnosis of sinusoidal obstruction syndrome in patients with treated colorectal hepatic metastases. Comparing their study with our case, there are some differences; the connection of HSD with hepatic vessels was not identified, and chemotherapy for colorectal hepatic metastases induced HSD.

Histologically, focal HSD is associated with hepatocyte atrophy and necrosis.

Therefore, we believe that reticular hypointensity on MR HBP images is attributed to the absence or insufficiency of functional hepatocytes within the lesion, which is needed for contrast uptake. Undamaged normal hepatic tissues in the center and periphery of HSD may also contribute to the reticular shape and poorly defined margin of these lesions.

Peliosis hepatis should be included in the differential diagnosis. It is defined as cystic dilatation of the hepatic sinusoidal space filled with red blood cells on microscopic examination. To distinguish peliosis hepatis from sinusoidal dilatation, hepatic lesions should have evidence of disruption of reticulin fibers supporting the hepatocytes and sinusoids. In peliosis hepatis, the radiological findings are variable depending on the size and stage of the hemorrhage. Small (< 2 cm) peliosis hepatis may be undetectable on imaging studies, however, large peliosis hepatis typically show a sign of progressive centrifugal enhancement on the portal and equilibrium phases without mass effect on adjacent hepatic vessels (10).

In conclusion, detecting a connection between the focal hepatic lesion and portal or hepatic veins on the delayed HBP MR images could be one of the diagnostic imaging clues for HSD. However, a potential limitation for the present study is that the connection of HSD with hepatic vessels was not pathologically confirmed due to an insufficient specimen.

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간의 국소적 동모양 혈관 확장증의 증례보고: Gd-EOB-DTPA 조영증강 MRI의 간담도 시기의 진단적 유용성

박경민 · 김성훈*

간의 동모양 혈관 확장증은 드문 혈관성 질환으로서 간의 국소적인 동모양 공간의 확장을 말한다. 많은 경우에 간정맥 혈류의 장애로 인해 발생된다. 그러한 혈류장애 없이 다양한 전신성 질환이나 간 침윤성 질환들과 관련될 수 있지만 정확한 병리기전은 아직 명확히 밝혀지지 않았다. 다른 질환이나 경구 피임약 복용 없이, 다른 조직학적 변화는 보이지 않고 국소적 동모양 혈관 확장증만을 보이는 증례의 영상학적 소견에 대한 논문은 지금까지 없었다. 본 증례보고에서는 국소적 동모양 혈관 확장증의 영상소견을 기술하고, 특히 진단에 도움이 될 수 있는 Gd-EOB-DTPA를 사용한 조영증강 MRI의 간담도 시기에서의 유용한 영상소견에 초점을 맞추고자 한다.

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