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Indium chloride bone marrow scintigraphy for hepatic myelolipoma: A case report and literature review

Bone marrow scintigraphy for hepatic myelolipoma

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Abstract

BACKGROUND

As hepatic myelolipoma is rarely encountered, its radiological diagnosis using ultrasonography (US), computed tomography (CT), and magnetic resonance imaging (MRI) is challenging. Hepatic myelolipoma is similar to fat-contained hepatic lesions seen in hepatocellular carcinoma and angiomyolipoma. Therefore, further development of techniques to diagnose hepatic myelolipoma is warranted.

CASE SUMMARY

A 44-year-old obese man was found to have a hepatic lesion during his medical checkup. The lesion was 50 × 57 mm in size and was detected in S8 of the liver with US. The patient was diagnosed with hepatic lesion 20 years ago, but it was left unresolved. The patient had no symptoms, liver dysfunction, hepatitis virus antibody, or tumor marker elevation. Plain CT showed a well-defined lesion in S8 of the liver. The central and peripheral areas of the lesion primarily exhibited fat density and hypodensity, respectively. MRI revealed a capsule-like structure. Biopsy was performed to address the probability of hepatocellular carcinoma. The lesion was pathologically confirmed as

a myelolipoma. Bone marrow scintigraphy performed using $^{111}InCl_3$ revealed accumulation of the radiopharmaceutical in the soft tissue component, except in the fat-dominant part of the tumor, as well as in the surrounding liver parenchyma due to the presence of reticuloendothelial cells in the liver.

CONCLUSION

This is the first report on the diagnosis of hepatic myelolipoma using $^{111}InCl_3$ scintigraphy. The effectiveness of bone marrow scintigraphy for diagnosing hepatic myelolipoma might be limited. As radiopharmaceuticals accumulate in both hematopoietic and reticuloendothelial cells, the accumulation of radiopharmaceuticals in the lesion is obscure.

Key Words: Case report; Liver; 111InCl3; Myelolipoma; MRI; Benign tumor

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Core Tip: We attempted to perform bone marrow scintigraphy for hepatic myelolipoma to determine whether $^{111}InCl_3$ accumulates in the lesion. We found that the radiopharmaceutical accumulated in the soft tissue component, except for the fat-dominant part. However, the radiopharmaceutical also accumulates in the surrounding liver parenchyma, which comprises reticuloendothelial cells. Therefore, the effectiveness of bone marrow scintigraphy in diagnosing hepatic myelolipoma may be limited.

INTRODUCTION

Myelolipoma is a rare, nonfunctioning benign tumor that comprises mature fat tissue and hematopoietic cells. It is usually detected in the adrenal cortex and rarely outside

the adrenal gland. When the lesion develops in the adrenal gland, it is most often detected in the anterior sacral region [1]. According to previous reports, myelolipomas of liver origin are lesions with fatty and soft tissue density components accompanied by capsular-like structures [2-4]. Therefore, it is crucial to differentiate it from other tumors, including hepatocellular carcinoma. Yamamoto *et al* reported that bone marrow scintigraphy is helpful in the diagnosis of adrenal myelolipoma as indium chloride ($^{111}InCl_3$) accumulates in hematopoietic cells in myelolipoma [5]. However, no study has diagnosed hepatic myelolipoma with bone marrow scintigraphy. In this study, we report a rare case of hepatic myelolipoma who underwent various imaging techniques, including bone marrow scintigraphy.

CASE PRESENTATION

Chief complaints

None.

History of present illness

This study included a 44-year-old obese male (BMI 32.0) who showed no symptoms. Twenty years ago, he was diagnosed with a hepatic mass but neglected it. In July 2020, during an abdominal ultrasound examination at a medical checkup, a 50 × 57 mm hyperechoic lesion was observed in segment 8 (S8) of the liver. He came to our hospital on the suspicion of hepatocellular carcinoma.

History of past illness

Age 24 systemic lupus erythematosus and lupus nephritis; age 32 type 2 diabetes and hypertension.

Personal and family history

None.

Physical examination

All normal.

Laboratory examinations

His blood tests showed mild inflammatory reaction and renal dysfunction but no liver dysfunction. This patient did not have hepatitis virus or detect the tumor marker elevation. Urinalysis showed mildly elevated urine protein but no other abnormalities.

Imaging examinations

Ultrasonography revealed a hyperechoic mass with a 79 mm oval halo in S8 of the liver (**Fig 1**). An abdominal plain CT scan indicated a heterogeneous low-density mass lesion with internal fat (**Fig 2**). The patient suffered from renal dysfunction and could not undergo contrast-enhanced CT. We performed an abdominal MRI of the T1-weighted image using the Dixon method. The T1-weighted opposed phase image showed an apparent signal drop at the peripheral area of the lesion. The center of the lesion showed a predominant fat component, and the surrounding area is a mixed fat component. The T2-weighted image showed hyperintensity, the diffusion-weighted image (DWI) showed a hyperintensity area at the peripheral place on the lesion, and the ADC map showed hypointensity corresponding to the hyperintensity area on DWI at that area, which indicates restricted diffusion. The central fat-predominant area showed hypointensity on the DWI and mixed hypo- and hyper-intensity on the ADC map (**Fig 3**).

Pathology

The lesion contained erythroblastosis cells by glycophorin C staining, granulocytic cells by myeloperoxidase staining, and megakaryocytes by CD61 immunostaining. Hematoxylin and eosin staining showed fat droplet deposition in the background liver tissue, which suggested chronic liver inflammation (**Fig. 4**).

FINAL DIAGNOSIS

Myelolipoma with the background liver tissue of nonalcoholic fatty liver disease (NAFLD).

TREATMENT

He had no subjective symptoms and few objective symptoms. The clinician then has the consent to follow up with the patient.

OUTCOME AND FOLLOW-UP

The patient was diagnosed with myelolipoma and underwent bone marrow scintigraphy with $^{111}InCl_3$ to confirm the presence of bone-marrow elements radiologically. $^{111}InCl_3$ bone marrow scintigraphy showed a mild accumulation of radiopharmaceutical in areas of poor fatty tissue at the peripheral region of the lesion. The radiopharmaceutical accumulation was absent in the center of the mass corresponding to the fat-dominant part. $^{111}InCl_3$ also mildly accumulated in the bone marrow and spleen (**Fig 5**). The tumor has been in a stable condition and did not cause new symptoms.

DISCUSSION

This is the first report to diagnose a case of hepatic myelolipoma with $^{111}InCl_3$ scintigraphy. The etiology of hepatic myelolipoma is unknown, but several hypotheses exist. Among the most promising ideas are that it is due to an ectopic adrenal gland, an alteration of hepatocytes, or embryonic stem cells remaining in the liver [1,4]. Extra-adrenal myelolipomas tend to occur after middle age, with a male-to-female ratio of 1:2 [4]. Symptoms of myelolipoma are usually asymptomatic in the case of a small lesion, but spontaneous rupture due to mass effect, acute abdomen, and bleeding may occur as the lesion grows [1]. Resection is unnecessary unless the diagnosis is unclear or the lesion is symptomatic [6].

The radiological diagnosis of hepatic myelolipoma using US, CT, and MRI is challenging. Myelolipoma has a capsule-like structure at the lesion periphery and intratumoral fat [4]. These radiological findings are similar to hepatocellular carcinoma. Therefore, we used bone marrow scintigraphy to facilitate the distinction between these two entities [5,7].

Bone marrow scintigraphy showed accumulation of the radiopharmaceuticals into the lesion's soft tissue components, except for the fat-dominant part. Therefore, the efficacy of the radiopharmaceutical was confirmed. However, the conspicuity of the accumulation of radiopharmaceutical was weak, because it accumulated in the surrounding liver parenchyma owing to the presence of reticuloendothelial cells [6].

$^{111}InCl_3$ radiopharmaceutical accumulates in bone marrow and the reticuloendothelial system in the liver parenchyma [8]. Therefore, $^{111}InCl_3$ may mildly accumulate in well-differentiated hepatocellular carcinoma as in myelolipoma since it accumulates in the reticuloendothelial system. This prediction is based on previous reports indicating that superparamagnetic iron oxide (SPIO) accumulates in well-differentiated hepatocellular carcinoma with reticuloendothelial cells in SPIO-enhanced MRI [9]. Such hepatocellular carcinomas have less aggressiveness [10]. To our knowledge, no study has applied $^{111}InCl_3$ to diagnose hepatocellular carcinoma. However, it could be suggested that hepatic lesions with an accumulation of $^{111}InCl_3$ are less aggressive as the differential diagnosis includes myelolipoma and well-differentiated hepatocellular carcinoma.

CONCLUSION

Bone marrow scintigraphy has limited utility in diagnosing hepatic myelolipoma. As radiopharmaceuticals accumulate in both hematopoietic and reticuloendothelial cells, the accumulation of radiopharmaceuticals in the lesion is obscure.

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