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Case Report

F-18 FDG와 C-11 Acetate PET에서 서로 다른 섭취를 보인 간 혈관근육지방종 1예

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A Case of Hepatic Angiomyolipoma Showing Different Uptake on F-18 FDG and C-11 Acetate PET

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A hepatic angiomyolipoma is a rare benign tumor mainly composed of blood vessels, smooth muscle cells and fat cells in varying proportion. Hepatic angiomyolipoma is often misdiagnosed as a hepatocellular carcinoma in preoperative imaging work-up. To date, there has been little published data describing PET findings of hepatic angiomyolipoma. We report one case of hepatic angiomyolipoma that showed a high acetate and relatively low FDG uptake on PET images. (Nucl Med Mol Imaging 2008;42(3):246-248)

Key Words: angiomyolipoma, liver, C-11 acetate, F-18 FDG, PET

Introduction

Angiomyolipoma (AML) is a benign tumor that mainly occurs in the kidney but rarely in the liver. In 1976, Ishak first described two cases of hepatic AML incidentally found at autopsy.[1)] Hepatic AML is composed of blood vessel, smooth muscle cells (SMC) and fat cells. Hepatic AML is often misdiagnosed as a hepatocellular carcinoma (HCC) in preoperative diagnostic work-up, since AML with small portion of the fatty component can mimic hypervascular HCC on CT or MRI and the prevalence of HCC is relatively high in Korea.

F-18 FDG PET is useful for the detection and the differentiation of malignant and benign tumor in several organs. However, F-18 FDG PET is known to have low sensitivity in the diagnosis of a well-differentiated HCC because it shows relatively low metabolic activity in a well-differentiated HCC.[2)] Recently, C-11 acetate PET has been reported to help detection and differentiation of HCC from other liver tumors.[3-5)]

We present one case of hepatic AML mimicking a well-differentiated HCC on F-18 FDG and C-11 acetate PET and conventional radiologic images.

Case report

A 47-year-old woman with no history of liver disease was admitted to evaluate incidentally detected hepatic mass. On serologic examination, α-fetoprotein level was 2.6 ng/ml (normal range: 0-20 ng/ml). HBsAg and HBeAg level were negative. Liver function test including AST/ALT, albumin and bilirubin revealed normal range. The abdominal dynamic CT showed 4cm sized round hypervascular mass in the lateral segment of left hepatic lobe, which revealed well contrast enhancement during arterial phase and rapid washout during portal phase (Fig. 1A, 1B). MRI showed low signal intensity on T1-weighted

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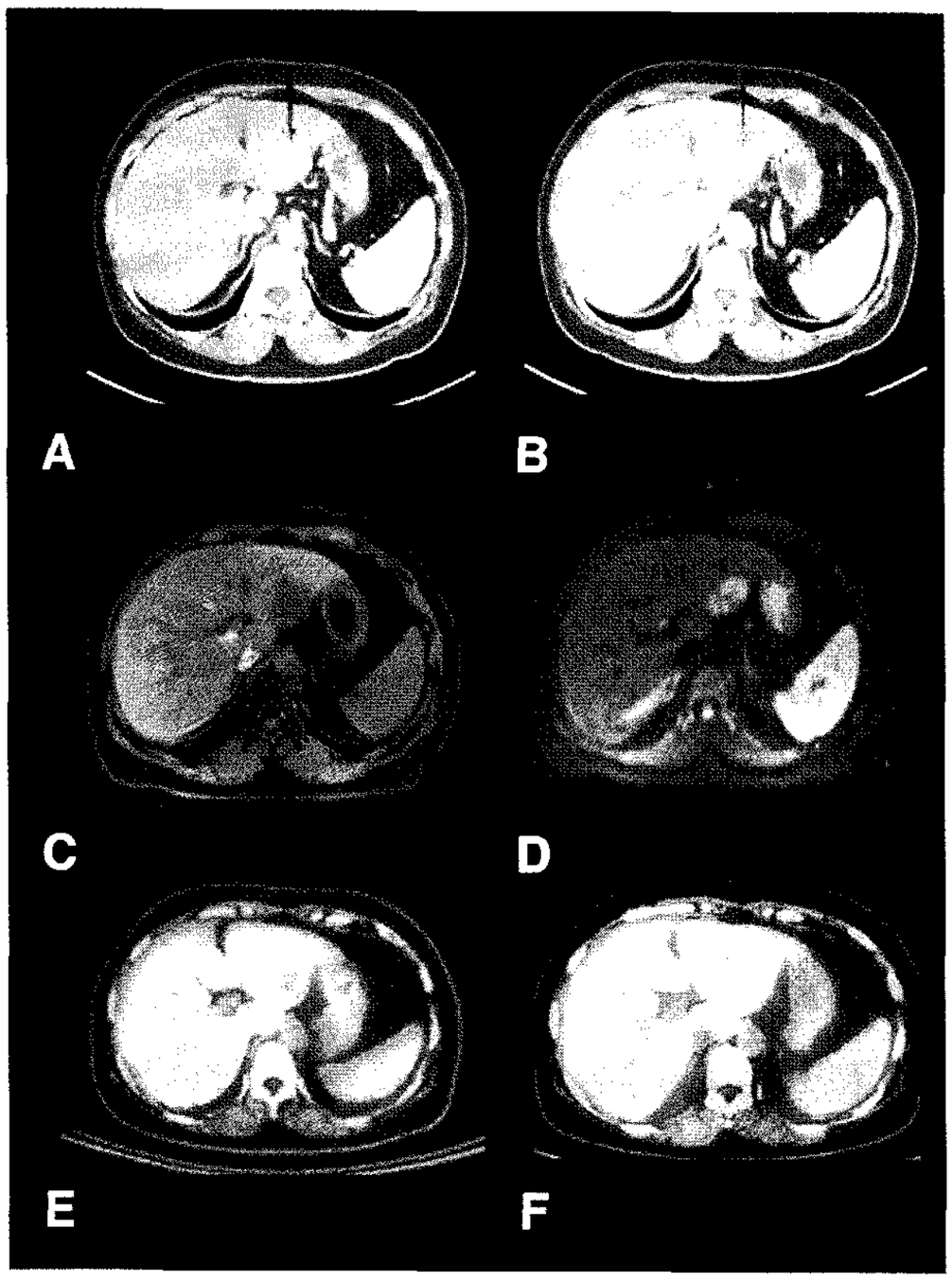

Figure 1. Imaging findings of angiomyolioma in the lateral segment of left hepatic lobe. Arterial (A) & portal phase (B) images of dynamic enhanced CT show well enhancement and rapid washout of hepatic mass (arrow). This mass shows low signal intensity on T1 (C) and high signal intensity on T2 (D) MRI, and shows isometabolic activity comparing surrounding normal hepatic parenchyma on F-18 FDG PET (E), but hypermetabolic activity on C-11 acetate PET (F), suggesting a well differentiated hepatocellular carcinoma.

image and high signal intensity on T2-weighted image with good Gadolinium-enhancement during arterial-phase (Fig. 1C, 1D). Since these radiologic imaging findings suggested a hypervascular HCC although there was no serologic or clinical finding suggesting HCC, the patient underwent F-18 FDG PET/CT for the tumor staging. F-18 FDG PET/CT was performed with a Biograph sensation 16 integrated PET/CT system (Siemens-CTI, Knoxville, TN, USA) and showed iso-metabolic activity of hepatic mass comparing normal hepatic parenchyma. SUVmean of hepatic mass was 2.5 and a lesion to liver ratio (TNT) was 1.0. And then the patient underwent C-11 acetate PET/CT because F-18 FDG PET/CT provided limited information for the differentiation of benign and malignancy, and also the detection of

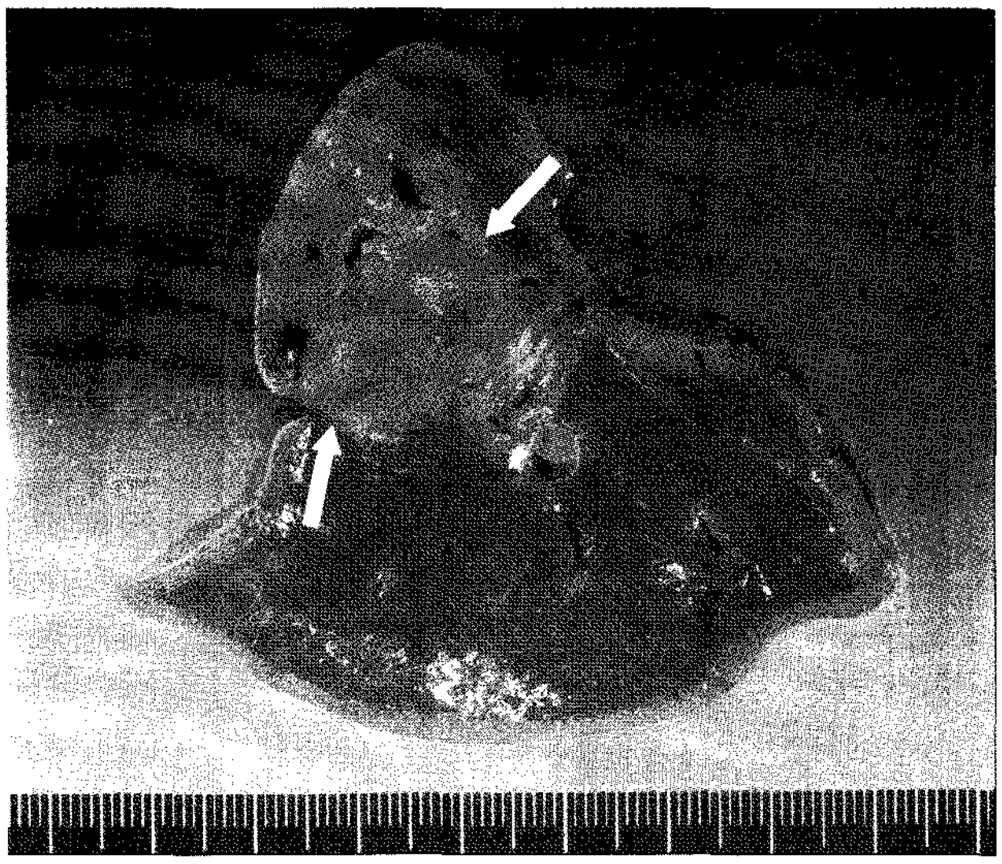

Figure 2. The cut surface of the resected specimen shows a well-circumscribed mass (arrows) composed of mainly smooth muscle component, vascular component and little adipose tissue.

extrahepatic metastasis. C-11 acetate PET/CT images were obtained 20 min after injection of C-11 acetate (555MBq) using a Biograph sensation 16 integrated PET/CT system and showed high metabolic activity of hepatic mass without extrahepatic abnormal uptake. SUVmean of the mass was 10.7 and a lesion to liver ratio was 1.9 (Fig. 1E and F). The patient underwent left lateral segmentectomy because preoperative imaging findings suggest a well-differentiated HCC although benign tumors such as adenoma and AML could not be excluded in the diagnosis. The cut surface of liver showed well-circumscribed mass with clear resection margin (Fig. 2) and immunohistochemical staining showed positivity for HMB 45, smooth muscle actin, and negativity for cytokeratin. Finally, histopathologic examination diagnoses a hepatic angiomyolipoma.

Discussion

Hepatic AML is a benign mixed mesenchymal hamartoma composed of 3 components, namely blood vessels, SMC, and adipose tissue. The SMC and adipose tissue are derived from the perivascular epithelioid cells and AML is allocated to the family of perivascular epithelioid cell tumors.[6,7] About 5% to 10% of hepatic AML are associated

with renal AML and tuberous sclerosis (Bourneville's disease). It was reported that the adipose component of hepatic AML ranges between 5% and 90%.[8] According to the predominant components, AML can be categorized into several types, including mixed (the most common type), lipomatous (≥70% fat), myomatous (≤10% fat) and angiomatous.[9]

AML shows typically early and prolonged enhancement with a special pattern of time-density or intensity curve on a dynamic CT and fat-suppression sequences of MRI.[10] In case of hepatic AML with a low fat component, it cannot be easily differentiated from adenoma, hemangioma and malignant tumors such as HCC and malignant teratoma.[10] The hepatic AML of our case showed typical findings of well-differentiated HCC on CT, MRI, and PET images. These finding may result from low fatty component in comparison with SMC and blood vessels on the histology.

F-18 FDG PET is known to have low sensitivity in the diagnosis of a well-differentiated HCC because it shows often relatively low metabolic activity in well differentiated HCC.[2] Recently, C-11 acetate PET has been reported to help detection and differentiation of HCC from other liver tumors.[3-5,11-13] Although the mechanism of C-11 acetate uptake in HCC is not wholly clear, it has been hypothesized that enhanced lipid synthesis in the tumor occurs in a low-oxygen microenvironment, in association with an increased lipid pool that accompanies rapid cell growth.[14,15] But, high C-11 acetate uptake of a hepatic AML of our case might predict β-oxidative metabolism of SMC, as it occurs similarly in myocardium.[16] Previously, Ihommel et al[13] reported a hepatic AML with a low component of fatty tissue, which showed high acetate uptake but relatively low FDG uptake on PET and typical CT findings suggesting HCC as like our case. Although there are few reports regarding PET findings of hepatic AML, a hepatic AML with a low component of fatty tissue may mimic a well differentiated HCC on FDG & acetate PET images. We suggest that a hepatic AML would be considered in the differential diagnosis of hepatic mass showing high acetate and relatively low FDG uptake on PET if patient has no history of liver disease and normal α-fetoprotein level.

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