CASE REPORT

MR Imaging of Primary Leiomyosarcoma of the Liver : A Case Report

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We report a case of primary leiomyosarcoma of the liver in a 65-year-old man without cirrhosis. Only about 40 cases of this neoplasm have been reported, and MR imaging has not been performed[1)~4)]. The tumor had a multiloculated appearance, contained homogeneous fluid, and with little solid area on CT, but MRI showed the unhomogeneous appearance, and seemed to have more solid part. As for the depiction of the macroscopic features by imaging modalities, CT was proved inferior to MRI except in the negation of calcification. US was superior to MRI in depicting the parenchyma *in vivo*, but US could not distinguish two types of parenchyma. Intralocular bleeding could be diagnosed only by MRI and vascularity could not be evaluated by US, so MRI and US may have a complementary role at present.

INTRODUCTION

Primary leiomyosarcoma of the liver (PLSL) is a rare neoplasm. Until now, MR imaging of PLSL has not been performed. This neoplasm occurs primarily in elderly people, regardless of gender. Most reports describe the macroscopic findings as a unilocular or multilocular cystic mass with mural thickening, making differential diagnosis of this neoplasm from biliary cystadenoma and cystadenocarcinoma[5)] or cystic hepatocellularcarcinoma[6)] necessary.

We report the case of a patient in whom the appearance of PLSL on CT, sonography (US), MRI *in vivo*, and MRI of the resected specimen was correlated with the pathological features.

CASE HISTORY

key word : liver, tumor, primary, leiomyosarcoma, MRI

A 65-year-old man without liver cirrhosis noted right hypochondralgia. The liver was palpated 2qfb at the right midclavicular line. Laboratory tests revealed no hematologic abnormalities or increase in AFP.

RESULTS (table)

US (fig.1-c) : A multiloculated cystic tumor that was 11×9×8cm in diameter was disclosed at S6-7 in the liver. The right hepatic vein was displaced, but not involved by the tumor. The echogenicity of the solid part, occupying about 50% of the tumor, was heterogeneous, but without calcification.

CT (Fig.1-a, b) : Plain scan, incremental bolus dynamic scan[7] (1-s. scan speed, 2s. interscan delay) with bolus injection of 100ml of Iopamidol-300, and delayed-phase CECT were performed. The tumor had a cystic appearance with little solid area, and a CT value of 30HU. Septa were clearly shown after contrast enhancement, but no calcification, degenerated parenchyma or bleeding was detected.

MRI : Performed by a Siemens MAGNETOM H15 (1.5T, superconducting system). Axial spin echo (SE) T_1-weighted images (TR/TE=500/15, T_1WI), T_2-weighted images (2000/90, T_2WI), breath-holding dynamic sagittal scan with 0.1mmol/kg of Gd-DTPA bolus injection by FLASH (90/12, flip angle=60), and again axial SE T_1WI (600/15) of delayed phase (about 4min.) of

Table : Comparison between pathology and images

macroscopic	① yellowish parenchyma	② cystic lesion	③ brownish parenchyma
microscopic	● markedly degenerated ● wide intercellular spaces	● cyst wall was composed of leiomyosarcoma cells ● hemosiderin deposits were seldom seen	● leiomyosarcoma cells with little degeneration ● vimentin-positive tumor cells (+)
CT	● both ① and ② were shown to be near-water density area and indistinguishable ● revealed no enhancement		● enhanced especially on delayed phase CECT
US	hyperechoic parenchyma	homogeneous cystic lesion	indistinguishable from ①
MRI *in vivo*	● suspected to be solid parts on T_2WI, but indistinct when compared with US results	● intralocular bleeding was suspected on T_1WI ● high intensity on T_2WI	● shown clearly on T_1WI without enhancement ● same findings fron CECT were depicted with higher contrast resolution on CE-T_1WI
MRI of resected specimen	● intermediate signal intensity both on T_1WI and T_2WI ● easy to distinguish from ②	● cyst wall has the same signal intensity as ③ on T_2WI	● shown to be of less intensity than ① on T_2WI

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enhancement (CE-T_1WI) were obtained *in vivo* (Fig.2). On the resected specimen, SE T_1 WI (500/15) and SE T_2WI (2000/90) were obtained (Fig.3). Slice thicknesses were 8㎜ for the *in vivo* scan, and 3㎜ for the resected specimen. On T_1WI *in vivo*, the tumor was shown to be multiloculated, and intralocular bleeding was clearly seen. On T_2WI *in vivo*, septa, bleeding, parenchyma with intermediate signal intensity were shown. However, the existence of parenchyma other than septa were not shown as distinctly as under US.

No additional findings were revealed by the dynamic study and CE-T_1WI, but the contrast resolution was better than that of CT.

On T_1WI of the resected specimen, the tumor was also shown to be multiloculated, with intralocular bleeding. Parenchyma other than septa were revealed with intermediate signal intensity. On T_2WI, the septa were clearly revealed as iso-intense structures with liver parenchyma.

Angiographically, the tumor was hypovascular with little tumor stain. No vascular encasement was seen (Fig.1-d).

Macroscopic findings of the resected specimen : The tumor had three components (Fig. 4-a) ; 1) a yellowish, soft parenchyma resembling pudding, 2) cystic lesions containing clear serous fluid (protein 5.3g/dl, glucose 116g/dl cholesterol 136㎎/dl, LDH 1177U), or

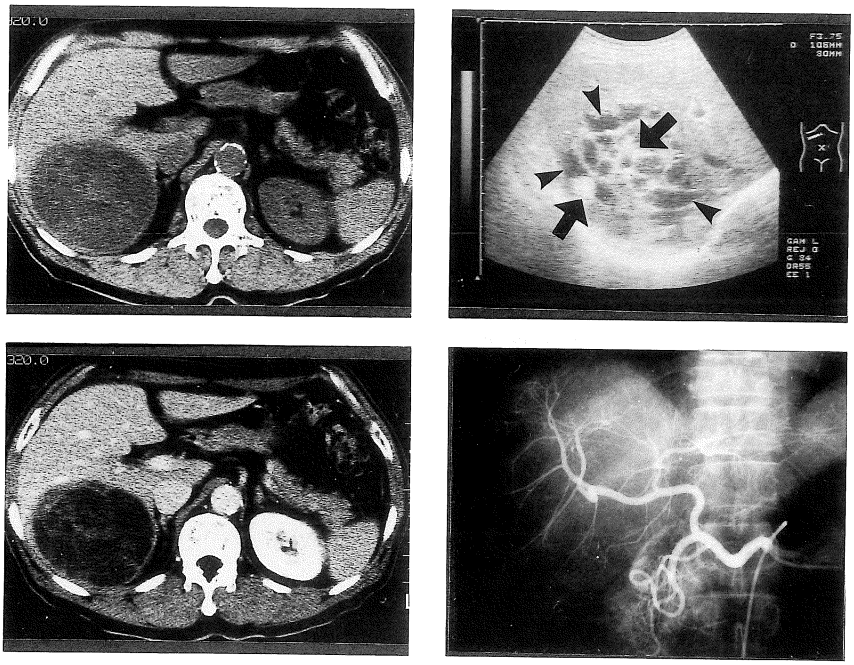

Fig.1.
a : Plain CT ; The tumor had the apperance of a cystic tumor with few solid area.
b : Delayed phase ; Septa are demonstrated clearly.
c : US shows a multiloculated tumor. Solid part occupies about 50% of the tumor. arrows : solid part, arrowheads : cystic part.
d : Common hepatic arteriography shows the tumor to be hypovascular.

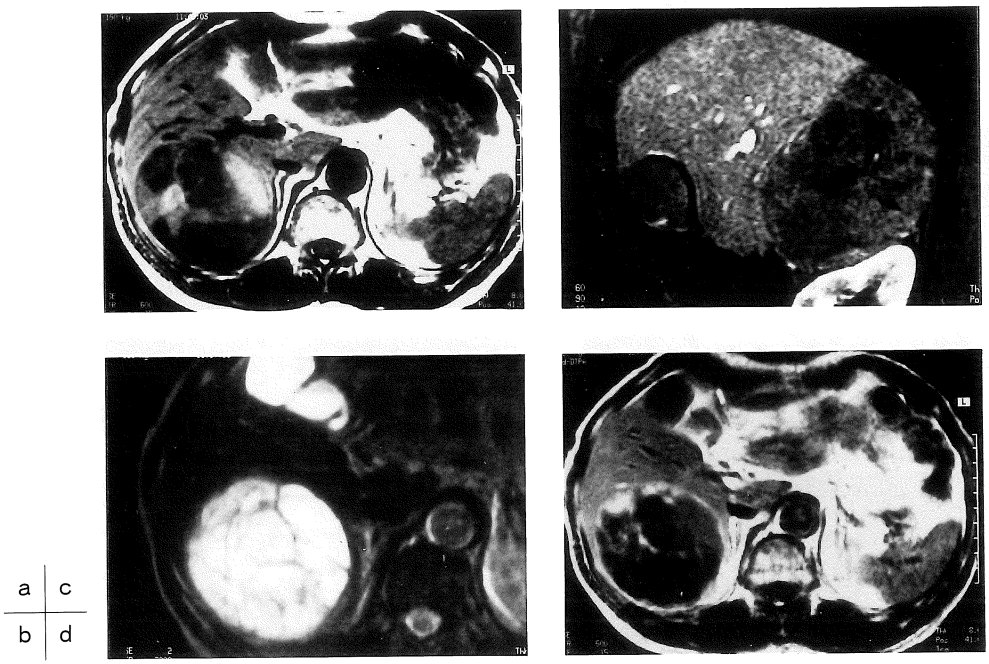

Fig.2. MRI *in vivo*

a : Axial T_1WI shows a multiloculated tumor with intralocular bleeding.

b : Axial T_2WI ; Septa are depicted clearly.

c : Sagittal breath-holding dynamic MRI(FLASH, TR/TE=90/12, flip angle=60, with 0.1mmol/kg of Gd-DTPA bolus injection)shows little vascularity.

d : Axial CE-T_1WI depict the septa clearly.

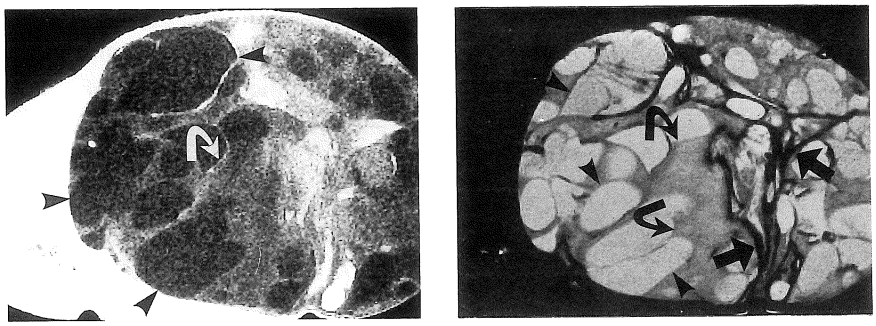

Fig.3. MRI of the reseted specimen.

a : T_1WI, b : T_2WI. curved arrows : degenerated yellow parenchyma, arrowheads : cystic part. straight arrows : brownish parenchyma. T_2WI clearly demarcate two types of parenchyma.

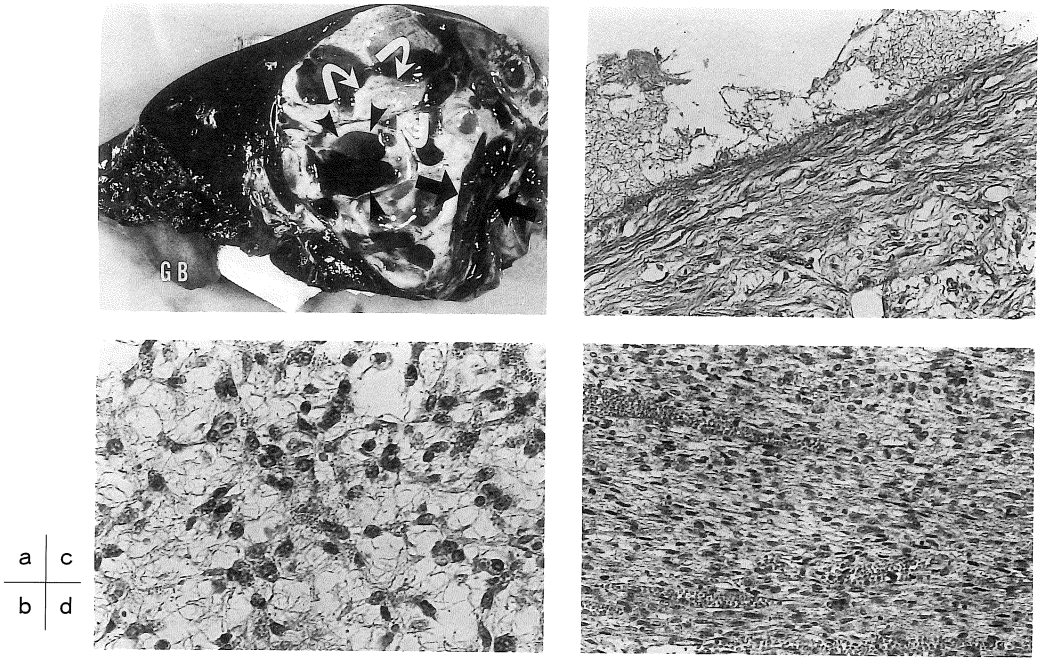

Fig.4.

a : Macroscopic finding of resected spcimen. curved arrows : degeneratcd yellowish parenchyma, arrowhdads : cystic part, arrows : brownish parenchyma.

b : Photomicrograph of yellowish parenchyma shows degenerated leiomyosarcoma cells with wide intercellular spaces.

c : The cystwall is constructed of leiomyosarcoma cells. Hemosiderin deposits are very seldom seen.

d : Brownish parenchyma shows the tumor cells are elongated and arranged in bundles. Nuclear pleomorphism and increased mitotic activity are noted. Hemosiderin deposits are also very seldom seen.

semitransparent reddish bloody fluid, and 3) small amount of brownish streaks of parenchyma.

Microscopic pathology : 1) (Fig.4-b) ; photomicrograph of the yellowish parenchyma snows degenerated leiomyosarcoma cells with wide intercellular spaces. 2) (Fig. 4-c) ; the cyst walls were constructed of leiomyosarcoma cells. Hemosiderin deposits were seldom seen. 3) (Fig.4-d) ; brownish parenchyma shows the the tumor cells are elongated and arranged in bundles. Nuclear pleomorphism, increased mitotic activity, and Vimentin-positive tumor cells were observed. Hemosiderin deposits were seldom seen. The diagnosis was typical leiomyosarcoma.

Barium studies of upper and lower gastrointdstinal tract and a whole body Ga-67 citrate scan were performed, but no other leiomyosarcoma lesion was evident.

DISCUSSION

PLSL is a rare neoplasm ; only about 40 cases have been documented in Japan, Eur-

ope, and the United States[1)~4)]. Scattered case reports describing the lesions suggest that they have no characteristic macroscopic appearance. Many reports describe the lesions as unilocular or multilocular cystic masses with varying degrees of mural thickening, and they are often revealed to be hypovascular by angiography. It is of interest that in some cases the cysts have contained necrotic matter, but in our own case and that of Tashiro *et al.*[1)] , they contained serous fluid. In our case, the cyst wall was composed of leiomyosarcoma cells with little degeneration. Capillaries were abundant in parenchyma with little degeneation while in other parts of the parenhyma degeneration was so marked that they were not distinguishable from cystic lesions on CT. This suggests that cystic lesions with serous fluid originate from the degenerated parenchyma with little vascularity.

As for the depiction of the macroscopic findings by imaging modalities, CT was proved inferior to MRI except in the negation of calcification. The yellowish parenchyma may not have been distinguishable from the cystic part of the tumor on CT because of the existence of wide intercellular spaces caused by degenaration. US was superior to MRI in depicting the parenchyma *in vivo*, but US could not distinguish brownish pbrenchyma from yellowish parenchyma. Intralocular bleeding could be diagnosed only by MRI and vascularity could not be evaluated by US, so MRI and US may have a complementary role at present. To our knowledge, there is no report describing the MRI appearance of biliary cystadenoma, cystadenocarcinoma[5)], or cystic hepatocellularcarcinoma[6)]. And there are many types of macroscopic features of PLSL. So it is impossible to differetiate these disease from PLSL at present. However, MRI of the resected specimen depicted the macroscopic findings in faithful detail, so MRI *in vivo* may have a more important role in diagnosing PLSL as MRI equipment improves.

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