

## CT and MR Findings of Primary Hepatic Leiomyosarcoma : A Case Report<sup>1</sup>

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We describe the CT and MR findings of primary leiomyosarcoma of the liver and review the radiological findings of the previous reports of this disease. A 35-year-old woman presented with discomfort in the right upper quadrant of the abdomen. On contrast-enhanced CT, a well circumscribed and lobulated, homogeneously hypoattenuating solid mass with slight peripheral enhancement was identified in the caudate lobe of the liver. On spin-echo MR imaging, the tumor showed homogeneous hypointensity on T1-weighted images and hyperintensity on T2-weighted images. Contrast-enhanced T1-weighted imaging showed markedly heterogeneous enhancement throughout the mass.

**Index words :** Liver neoplasm, MR  
Liver neoplasm, CT

Leiomyosarcoma is an uncommon malignant neoplasm of smooth muscle origin that tends to arise in the alimentary tract, retroperitoneum, genitourinary tract, or soft tissue(1). Primary leiomyosarcoma of the liver is exceedingly rare; in fact, leiomyosarcomas found in the liver are generally metastatic. To the best of our knowledge, fewer than 60 cases have been sporadically reported in the literatures, and in only a few of these have the radiological findings been described(2-6). We present the radiological findings of primary leiomyosarcoma, emphasizing those based on CT and MRI, and compare them with those of previous reports.

### Case Report

A 35-year-old woman presented with discomfort in the right upper quadrant of the abdomen; physical examination showed tenderness of this area. Routine hematological and biochemical tests, including those for liver function, were normal. An ultrasound scan

demonstrated a large, lobulated, homogeneously hypoechoic solid mass in the caudate lobe of the liver, with more hypoechoic portions within the tumor. On unenhanced CT, a well-circumscribed, lobulated, hypoattenuated mass measuring 9-cm in diameter with encasement of the hepatic vein was identified in the caudate lobe of the liver(Fig. 1A). On contrast-enhanced CT, the tumor showed slight peripheral enhancement and appeared much lower than normal hepatic parenchyma(Fig. 1B). Selective right hepatic arteriography demonstrated a hypervascular mass of the right hepatic lobe, with multiple abnormal tumor vessels throughout, and tumor stain. There was no evidence of early venous shunting, or obstruction of the main portal vein, but the left portal vein had been narrowed by tumor invasion. On spin-echo MR imaging, T1-weighted images showed a sharply defined, homogeneously hypointense mass approximately 9×11 cm in size, in the caudate lobe of the liver (Fig. 1C). On T2-weighted images, the tumor changed to high signal intensity(Fig. 1D), and a patent right portal vein running adjacent to the anterior surface of the mass was shown. The IVC was compressed by the tumor but was patent, with demonstrable flow. Contrast-enhanced T1-weighted imaging using Gd-DTPA showed markedly heterogeneous enhancement throughout the mass(Fig. 1E). Surgical exploration was

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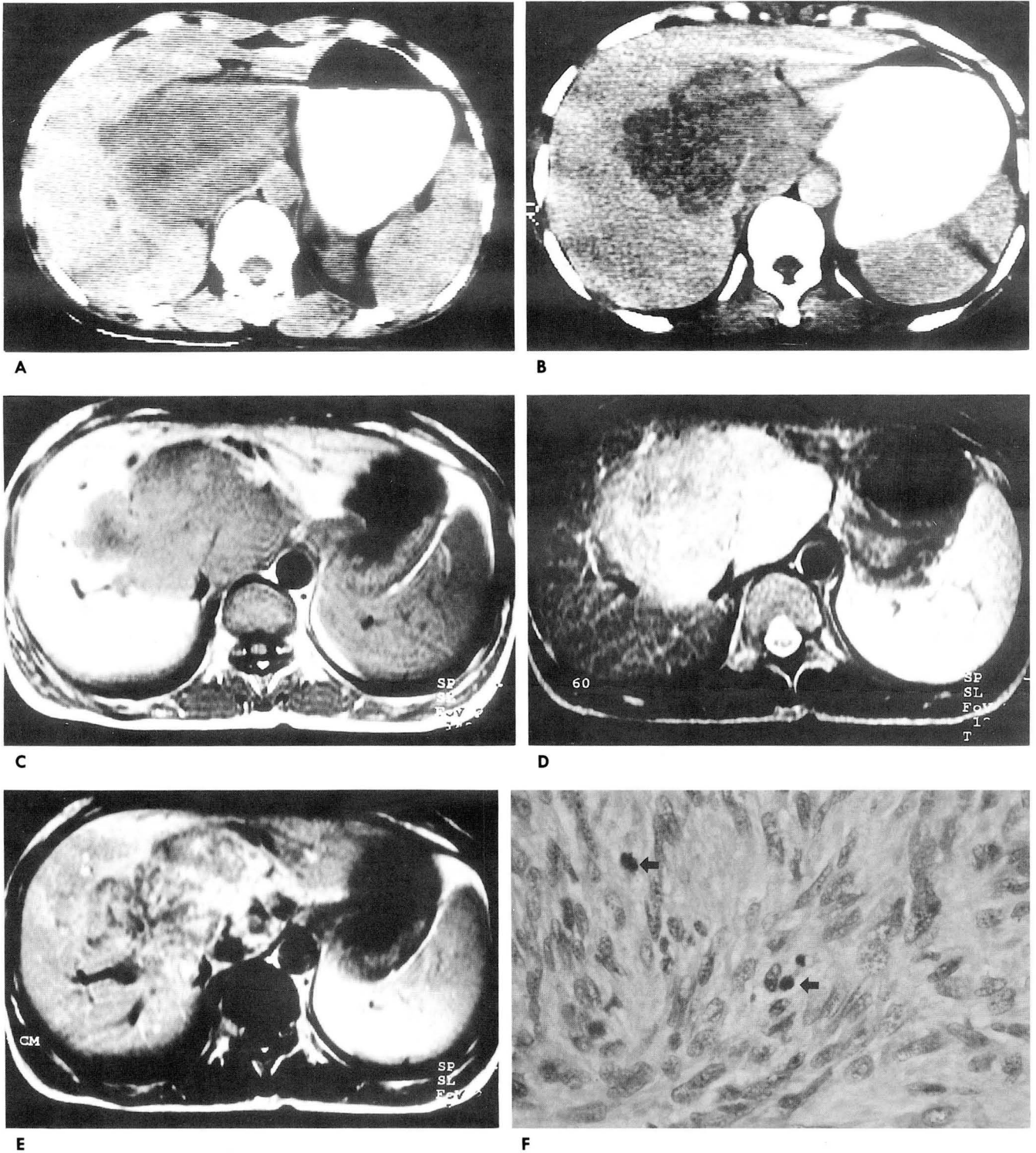
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**Fig. 1.** A 35-year-old woman with primary hepatic leiomyosarcoma.

- A.** Unenhanced CT scan of the abdomen reveals a well defined and lobulated, homogeneously hypoattenuating mass with lower attenuated foci in the caudate lobe of the liver.
- B.** Contrast-enhanced CT scan reveals slight peripheral enhancement with encasement of middle hepatic vein.
- C.** Axial T1 weighted spin-echo (600/15) MR image shows a homogeneously hypointense lobular mass lesion with a sharp margin with compression of the IVC and encasement of hepatic vein in caudate lobe.
- D.** Axial T2 weighted spin-echo (1600/80) MR image shows a well-demarcated hyperintense lobular lesion. The right portal vein is displaced by the tumor.
- E.** Contrast-enhanced axial T1 weighted spin-echo (600/15) MR image shows a heterogeneous enhancement of the mass.
- F.** Microscopic photomicrograph shows moderate nuclear pleomorphism and mitotic figures (arrows). Intersecting fascicles of spindle cells characteristic of a smooth muscle tumor were noted (H&E x400).

undertaken, and the caudate lobe of the liver was replaced by a multinodular, firm mass. There was a local invasion into the right renal capsule and retropancreatic portion. Partial hepatectomy was tried, but because of extensive invasion of adjacent tissue, this was not successful. Pathologic examination of a small piece of tumor obtained during surgery showed intersecting fascicles of spindle cells characteristic of a smooth muscle tumor with moderate nuclear pleomorphism, as well as mitotic figures, and yielded a diagnosis of primary leiomyosarcoma (Fig. 1F).

## Discussion

Primary malignant mesenchymal tumors of the liver are much rarer than epithelial neoplasm (2). Because primary leiomyosarcoma of the liver is exceedingly rare, this diagnosis can be assumed only if a careful search has excluded all other possible sites of origin, including the more frequent inferior vena cava and ligamentum teres (3). Patients with leiomyosarcoma of the liver are usually aged between 50 and 60, with approximately equal representation of the sexes (2). The most frequent presenting sign is an abdominal mass with or without abdominal pain; these tumors are silent, and by the time they are diagnosed, are usually large. Hepatic leiomyosarcomas probably arise from smooth muscle in vascular structures or bile ducts.

During the past two decades, the CT features of a variety of both benign and malignant neoplasms of the liver have been extensively described. The CT features of primary leiomyosarcoma of the liver have been infrequently reported, however, and this is probably due to its rarity (2-6). To our knowledge, furthermore, the radiologic literature contains only one report describing the MR findings of this tumor (6). The case we described illustrates the CT and MR findings of primary hepatic leiomyosarcoma, and a review of other reports is included. We believe this is the second report of MR findings of primary hepatic leiomyosarcoma.

An analysis of the CT findings of primary hepatic leiomyosarcoma, based on previous reports (2-6) and ours, shows that in five out of ten cases (50%) large, well-delineated, solid masses with homogeneous (n=4) or heterogeneous (n=1) low attenuation were seen on unenhanced scan. On enhanced scan, these tumors showed heterogeneous internal and peripheral (n=3) or only peripheral (n=2) enhancement. The other five cases (50%) had a pseudocystic appearance; i. e. an enhancing thick wall with an internal area of nonenhancing low attenuation due to extensive central necrosis

or cystic degeneration.

In addition, our case showed a discrepancy in the contrast-enhancement pattern of the mass and this was seen on both CT and on MRI. Mild peripheral enhancement was seen on CT but marked heterogeneous enhancement throughout on MRI, and we believe that this discrepancy could be related to the different enhancement mechanism of contrast agents for CT and MRI, and/or the delay from the start of injection of contrast agent to the start of scanning.

Ferrozzi et al. (6) described the MR findings in one case of leiomyosarcoma; a homogeneous hypointense mass with focal areas of high signal intensities was seen on T1-weighted images, and a heterogeneous hyperintense mass on T2-weighted images. The discrete foci of hyperintensity on the T1-weighted image probably represented foci of necrosis containing bloody by-products. In our case, however, the tumor appeared homogeneously hypointense on T1-weighted images and hyperintense on T2-weighted images and showed inhomogeneous and intense enhancement on enhanced T1-weighted images. During surgery we were unable to obtain the entire tumor and thus could not explain by direct comparison the different MR findings of our case and the one previously described (6). In theory, however, a primary leiomyosarcoma originating from another solid organ such as the kidney might show imaging features similar to those of primary hepatic leiomyosarcoma. Ochiai et al. (7) described the MR appearance of primary renal leiomyosarcoma, and explained that the pattern of signal intensity of the tumor depended on the degree of fibrosis; the areas of predominantly fibrous tissue were of lower signal intensity than those that contained more spindle muscle cells. We therefore believe that the difference in MR findings between our case and the one previously described (6) is likely explained by the difference in tumoral composition, as in primary renal leiomyosarcoma. To determine the MR features of primary hepatic leiomyosarcomas, considerable further study is required; it is likely, however that these features would not show the uniformity described in previous reports.

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## 간의 원발성 평활근육종의 CT와 MR 소견: 1예 보고<sup>1</sup>

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저자들은 간의 원발성 평활근육종의 CT와 MR소견을 기술하였고 기존의 보고의 방사선학적 소견들과 비교하였다. 35세 여자가 우상복부 불편감을 주소로 내원하였다. 자기공명영상에서 조영증강 CT상 분엽상의 명확한 경계를 가지는 비교적 균일한 저밀도의 고형종괴가 미약한 조영증강을 보이며 간미엽에서 관찰되었다. 종괴는 T1 강조영상에서 균일한 저신호강도를 보였으며, T2 강조영상에서는 고신호강도로 바뀌었다. 조영제주입 후 얻은 T1 강조영상에서 매우 불균질한 강한 조영증강이 종괴내에서 관찰되었다.