Magnetic Resonance Imaging Features of Uncomplicated Hepatic Adenoma: a case report

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Hepatic adenomas (HAs) are incidentally detected with increasing frequency after imaging the abdomen for unrelated pathology. We report the radiological findings in an asymptomatic 47-year-old female with an uncomplicated HA, who received the subcutaneous implant of contraceptive Norplan six years ago. MRI showed a well-defined mass in the liver, which was isointense in the T1-weighted and fat-suppressed T2-weighted images, but became hypointense in the fat-suppressed T1-weighted images. Enhanced dynamic scan showed minimal enhancement in the arterial phase. Recognition of such MRI features will help us to suggest the possibility of uncomplicated HAs in the appropriate clinical setting.

Key words: Adenoma; Contraceptive; Computed tomography; Magnetic resonance imaging

CASE REPORT

A homogeneous hyperechoic nodular lesion about 2 cm in size was incidentally noted in the S5 of liver in a 47-year-old female during the routine physical check-up with sonography. This nodule showed no definite calcification, cystic change or capsule formation. Subsequent CT (Picker 5000, USA) examination revealed a low attenuation nodule in the S5 region in the nonenhanced scan (Fig 1a), and mild enhancement in the arterial (Fig.1b) phase of the enhanced dynamic scans. Additionally, a small hypervascular nodule at the S8 region showed typical appearance of hemangioma with high attenuation in the arterial phase and persistent enhancement in the delayed phase. In MRI (GE Signa 1.5T, USA), the nodule in S5 was barely visible in the Fast Spoiled Gradient Echo (FSPGR) T1-weighted images (Fig. 2a), but was clearly identified in...
the fat-suppressed FSPGR T1-weighted images (Fig. 2b). In the Single Shot Fast Spin Echo (SSFSE) T2-weighted images with fat suppression, the lesion was almost isodensity compared with surrounding liver parenchyma (Fig 2c). The dynamic studies were performed with fat-suppressed FSPGR T1-weighted

Figure 1. Triphasic CT for the liver: a. is the precontrast scan, b. and c. represent arterial and delayed phases respectively. Note mild homogeneous enhancement (arrow) in the arterial phase b.

Figure 2. a. Axial FSPGR T1-weighted image (TR/TE=220/4.2 ms, flip angle=80°) and c. SSFSE fat-suppressed T2-weighted image (9232/67.7 ms) barely showed the tumor. The lesion was easily identified in the b. fat-suppressed FSPGR T1-weighted image (220/1.5 ms, flip angle=80°) (arrow)
imaging sequences with intravenous administration of Gd-DTPA 10 ml at the rate of 3 ml/sec. The hepatic arterial phase, portal venous phase and delayed phase were taken at 20 seconds, 90 seconds, and 3 minutes respectively after intravenous contrast medium injection. As in CT, this nodule showed only slightly enhancement in the arterial phase (Fig.3). Angiography of the common hepatic artery showed no definite tumor vessel or tumor stain in S5 region, while a small hypervascular nodule with dense and prolonged stain was identified in S8 region, typical for hemangioma. The laboratory data was not contributory, including the liver function test, markers for the HBV and HCV infections, and tumor markers (carcinoembryonic antigen and alpha fetal protein). Tracing the past history, this patient received the subcutaneous implant of contraceptive Norplant 6 years ago, which was removed 1 year before admission.

Subsequently, the patient received exploratory laparotomy and wedge resection for the liver nodule in the S5. The pathological report was a HA with abundant microvesicular steatosis. No definite tumor capsule, intratumoral hemorrhage or infarction was seen. The post-operative course was smooth and the patient was discharged 4 days later.

DISCUSSION

HAs are benign, rare tumors that occur primarily in women with a history of oral contraceptive use [1, 2]. Surgical treatment is recommended to reduce the risk of sudden, unpredictable hemorrhage or malignant transformation [8, 9]. The diagnostic difficulty in distinguishing HA from a well-differentiated hepatoma is another reason for an aggressive treatment [10].

The relationship between HA and oral contraceptives has been well documented and there have been several reports of tumor regression after the withdraw-
al of hormonal agents [11]. However, not all HAs regress in this manner, like what happened in our patient, who had removed the subcutaneous contraceptive one year before the admission after a six-year implantation. Moreover, in some cases of tumor regression, malignant degeneration was reported in the area of the previous HA [12, 13]. The unpopularity of contraceptive in the childbearing women may possibly explain the rarity of HA in Taiwan.

The appearance of HAs on different imaging modalities is highly variable because of their varied histopathology, and images of HAs are at times indistinguishable from those of other hepatic tumors, such as well-differentiated hepatocellular carcinoma or focal nodular hyperplasia [14].

The MRI features of the uncomplicated HA varies, but are typically only mildly hyper- or hypointense in the T1- or T2-weighted images [15], reflecting its similarity to the normal parenchyma. In the previous report (8), over half (59%) HA showed mild hyperintense in the T1- weighted images, and the degree of hyperintensity is related to the quantity of fat or the presence of hemorrhage [15]. In the T1-weighted images of our case (Fig.2a), the tumor is almost iso-intense with surrounding liver parenchyma. While less common, isointensity in the T1- weighted images did occur in 6% cases in previous reported series of HA [15]. In spite of the fact that intracellular steatosis is thought to have a shorter T1 relaxation time than normal liver, recent report has noted that different ultrastructural alterations in the subcellular organelles of hepatocytes can alter the MR tissue parameters as well [16], which may explain the diversity of signal intensities of HAs in the T1WI. Typically, the signal intensity of HA will decrease in the out-of-phase or fat-suppressed sequences due to its abundant fat [15, 17]. In our case, the lesion became hypointense in the fat-suppressed T1- weighted images (Fig 2b). The substantial fat content was confirmed in the histological specimen (Fig.4). The T2-weighted images, HA could be either mildly hyperintense or hypointense [8, 15, 17]. The lesion of our case showed almost isointensity in the fat-suppressed T2-weighted imaging (Fig.2c), supposedly would be hyperintense in the T2- weighted image without fat-suppression, which was not included in our routine imaging protocols for the liver. On the other hand, heterogeneous intensity of HA is not uncommon, reflecting the frequent occurrence of intratumoral hemorrhage and necrosis. This feature sometimes makes the diagnosis easier if it occurs in the correct clinical context (contraceptive usage). However, the histological specimen in our case (Fig.4) confirmed the absence of any intratumoral bleeding or necrosis, which was reflected in the homogeneity of the tumor in MRI. In the dynamic study, HA characteristically exhibits an immediate faint blush in the arterial phase, which rapidly fades in the venous phase [17], as shown in our case (Fig 1,3).

The intratumoral fat is not specific for HA [18]. Hepatic angiomylipoma, lipoma, hepatoma and focal nodular hyperplasia are examples of the list that might contain fat. According to Paulson [15], 68% (15/22) histologically examined HA specimen contained fat of grade 2 or 3 (defined as fat present in over one third of the cells of the HA). However, a homogeneous drop of signal intensity in the out-of-phase or fat-suppressed images rarely occurred in other tumors [19]. The differentiation of HA from focal fatty infiltration of liver is also important, which is easily accomplished by the transient enhancement after gadolinium administration in HA.

**REFERENCE**


![Figure 4. Photomicrography (PAS, x100) of the specimen showed abundant intracellular fat in the HA (arrow), in contrast to the adjacent normal liver parenchyma (arrowheads)


肝臟腺瘤的磁振造影影像：病例報告

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由於影像學的進步，無症狀的肝臟腺瘤的診出率在近年來逐漸增高。本文報告一四十七歲
女性，在體檢時偶然發現一肝臟腫瘤，經完整影像學檢查後接受手術，證實為一並未合併出血
或壞死之肝臟腺瘤。回溯病史發現病患曾在六年前接受皮下注射長效避孕藥。病灶在T1加權影
像及在抑制脂肪訊號後之 T2加權影像中均呈現與周圍正常肝臟組織相同之訊號強度，但在抑制
脂肪訊號後之 T1加權影像中則呈現一低訊號區。在動態掃描中，病灶在動脈期中呈現稍微顯影
增強。在臨床症狀及病史相符時，肝臟腺瘤在磁振造影上之表現將有助於其診斷。

關鍵詞：腺瘤，避孕藥，磁振造影，電腦斷層攝影