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Sclerosis of Hepatic Carvernous Hemangioma : CT Findings and Pathologic Correlation

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We report a case of hepatic carvernous hemangioma with computed tomographic findings of well demarcated nodular lesser attenuation foci within the main low attenuation mass on precontrast scans and non-enhancement of the foci even on the delayed contrast scans. These have been described as one of the atypical findings of carvernous hemangioma earlier in the literature. Surgery proved that sclerosis accounted for the hypodense nodular densities within the hepatic carvernous hemangioma.

Key Words : *Liver, Carvernous hemangioma, Sclerosis, CT, Pathology*

INTRODUCTION

Hemangioma is the most common benign tumor of the liver and its frequency of detection has increased with the widespread application of ultra-sonography and computed tomography (CT).

Several investigators have described the typical CT findings of hepatic cavernous hemangioma (Barnett et al., 1980 ; Freeny and Marks, 1986a ; Freeny and Marks, 1986b ; Ashida et al., 1987). However the previous reports included cases with atypical findings such as incomplete fill-in on delayed contrast scans, or lesser attenuation areas within the tumor on pre-contrast scans and non-enhancement of the lesser attenuation areas on delayed contrast scans (Barnett et al., 1980 ; Itai et al., 1983 ; Freeny and Marks, 1986a ; Freeny and Marks, 1986b ; Ashida et al., 1987). In addition, the exact pathological nature of the atypical findings was not well documented. We describe a case of hepatic cavernous hemangioma with large, non-enhancing, well demarcated, nodular areas on CT scans. And we proved that the sclerotic nodules in the hemangioma accounted for the atypical CT findings. Although the fibrotic nodules have been known to be found in cavernous hemangioma, when they are big enough, the tumor can be confused with other tumors with necrosis.

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CASE REPORT

A 41-year-old woman was referred to this hospital for evaluation of a hepatic mass . She had visited a

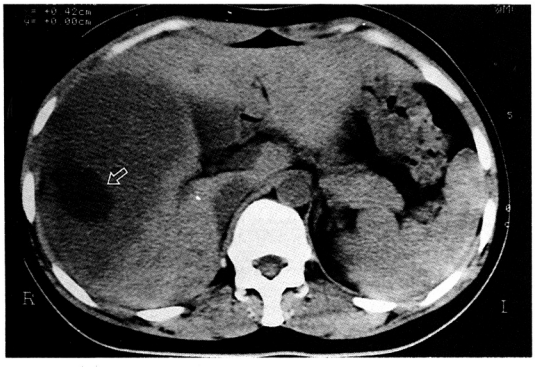

Fig. 1A. Precontrast scan shows low attenuation mass containing a nodular shaped lesser attenuation area (arrow) at a scan level.

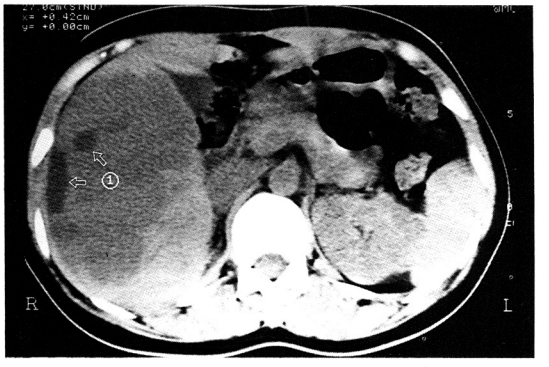

Fig. 1B. Precontrast scan shows a crescent shaped and small round lesser attenuation areas (arows) at another scan level.

local clinic because of right upper quadrant abdominal pain 3 weeks earlier and a hepatic mass was disclosed on a CT scan. She denied fever, weight loss or any previous history of liver disease. Physical examination showed no significant abnormalites. Liver function tests were normal. HBsAg, anti-HBs, and anti-HCV were negative. Alpha-fetoprotein was 1.9 ng/ml. Ultrasound demonstrated a huge echogenic mass in the right lobe of the liver. Precontrast CT scan showed a 12X9X13cm sized low attenuation mass with well demarcated nodular lesser attenuation foci within the mass (Fig. 1A, 1B). Immediately after the rapid intravenous infusion of contrast medium, serial scans were obtained at the preselected levels. The tumor began contrast enhancement from the periphery to the center. However, the nodular lesser attenuation foci were not enhanced on delayed contrast scans (Fig. 2A, 2B). In ^{99m}Tc-labelled RBC scintigraphy the tumor showed typical hot uptake of the radioisotope and a cold defect at the corresponding location of the lesser attenuation areas on precontrast CT scans (Fig. 3). Right lobectomy was performed because the lesion was symptomatic and the patient was afraid of the slight chance that the tumor was an angiosarcoma (Itai and Teraoka, 1989). The resected specimen contained a well defined 5X3X3 cm sized piece of pale yellow sclerotic tissue which was adhered to the liver capsule (Fig. 4 A, B). The location and size of the sclerotic foci corresponded well with those of the lesser attenuation foci on precontrast CT scans. Microscopically, the sclerotic nodule consisted of a central acellular sclerotic zone and an outer less sclerotic transitional zone (Fig. 4C). The central zone was composed of dense collage-

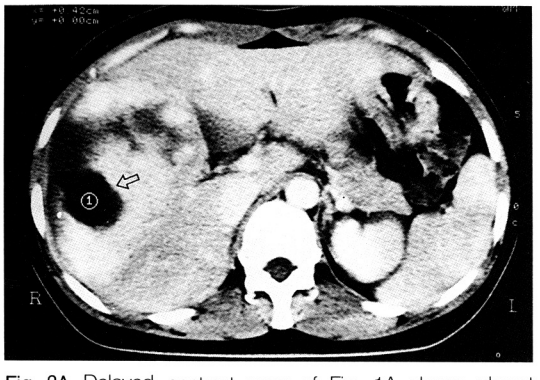

Fig. 2A. Delayed contrast scan of Fig. 1A shows almost complete fill-in of the mass, cleft like non-enhanced area and no fill-in of the lesser attenuation area (arrow).

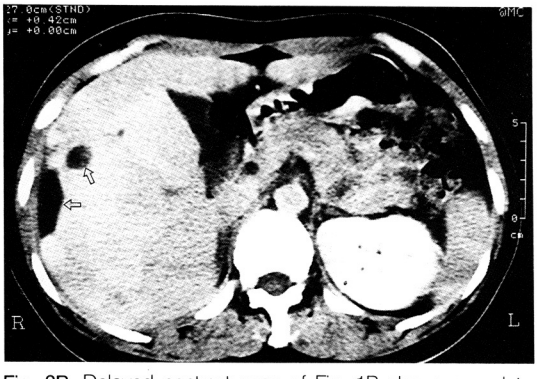

Fig. 2B. Delayed contrast scan of Fig. 1B shows complete fill-in of the mass and no fill-in of the lesser attenuation areas (arrows).

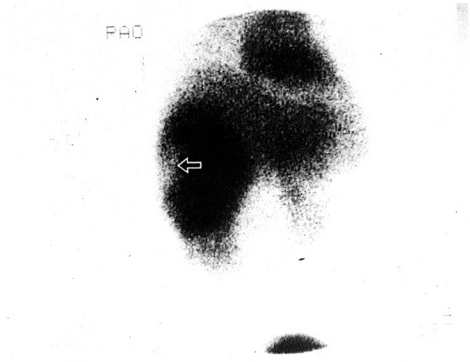

Fig. 3. ^{99m}Tc-labelled RBC scintigraphy shows increased uptake by tumor, confirming hemangioma but also shows a cold defect (arrow) at the corresponding location with the lesser attenuation foci on CT scan.

Fig. 4A. External surface of the resected specimen shows an ill defined dark area of the hemangioma containing a well defined pale yellow sclerotic area in its center.

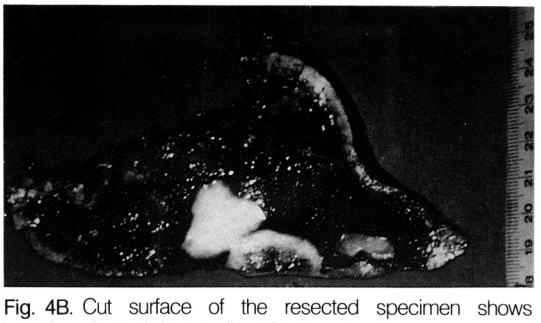

Fig. 4B. Cut surface of the resected specimen shows irregular shaped but well defined sclerotic areas, corresponding to the lesser attenuation area shown in Fig. 1 A and 2A.

nous tissue. The outer transitional zone was composed of loosely arranged collagenous tissue, collaped vascular channels and some elastic meshwork around the slit like vascular spaces.

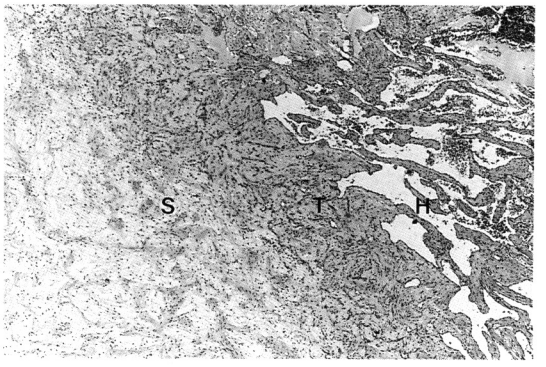

Fig. 4C. Photomicrograph of an area of the tumor containing a sclerotic nodule shows central sclerotic zone (S) and outer transitional zone (T) of the sclerotic nodule, and surrounding usual hemangioma zone (H) (Hematoxylin and eosin stain ;original magnification : × 10).

DISCUSSION

Cavernous hemangioma is the most common benign tumor of the liver. Pathologically it consists of endothelium-lined blood-filled spaces separated by fibrous septae. The characteristic CT findings to diagnose hepatic cavernous hemangioma have been well established by several investigators (Barnett et al., 1980 ; Freeny and Marks, 1986a ; Freeny and Marks, 1986b ; Ashida et al., 1987). These findings are : 1) low attenuation mass on precontrast scan ; 2) early peripheral contrast enhancement ; 3) progressive opacification from the periphery to the center ; and 4) eventual isodense fill-in on delayed contrast scan. However, only 54% to 55 % of all hemangiomas show these typical patterns (Freeny and Marks, 1986a ; Freeny and Marks, 1986b). In the series of Itai et al., 43 % of the lesions contained areas of lower density on precontrast scan (Itai et al., 1983). There are several atypical enhancement patterns on dynamic CT scans such as central or mixed enhancement , non-enhancemnt, and cleft like or nodular non-enhanced foci within the tumor (Barnett et al., 1980 ; Itai et al., 1983 ; Freeny and Marks, 1986a ; Freeny and Marks, 1986b ; Ashida et al., 1987). Ashida et al. insisted that the thin cleft like area of non-enhancement is rather a consistent finding in hemangiomas than an atyipical finding (Ashida et al., 1987). Unlike the cleft like non-enhancement area, the nodular non-enhancement in hemangiomas seems not to be a frequent atypical finding.

Although the atypical patterns are believed to be

related to certain histologic characteristics of the tumor, the exact pathological etiologies for the findings have not been well documented. It has been postulated that central non-opacified areas might be related to slow blood flow in the central sinusoids, necrosis, fibrosis, central thrombosis, or hemorrhage, which are particularly seen in large hemangiomas (Barnett et al., 1980 ; Ashida et al., 1987). In this case, the well demarcated nodular lesser attenuation area within the main low attenuation mass on precontrast scan was not opacified even on the delayed contrast scan. The surgical specimen showed that the hemangioma contained sclerotic nodules, which corresponded well in size and location with the lesser attenuation foci seen within the mass on precontrast CT scans. The shape of the sclerotic nodule on the cut surface (Fig. 4B) was not exactly the same as that of the lesser attenuation area on CT scans (Fig. 1A, 1B). This is due to slightly different levels between the CT scan and the cut section of the tumor specimen. Thus we believe that sclerosis of hepatic hemangioma accounts for the nodular hypodense elements within the main mass in our case and probably in the case of Fig. 4 of Freeny and Marks (Freeny and Marks, 1986b). However, other causes such as hemorrhage or necrosis, which can exhibit similar CT findings, should be excluded in any additional cases with similar CT findings. Magnetic resonance imaging may play the role of noninvasive histological characterization for such atypical findings in hepatic hemangiomas. Nodular areas of decreased signal intensity within a hyperintense tumor on T2-weighted images corresponded to fibrosis (Ros et al., 1987).

Microscopically, the sclerotic nodule was composed of two zones, a central densely fibrotic zone and an outer less fibrotic transitional zone. This might suggest that a small sclerotic nodule in hepatic hemangioma may evolve by growing towards the outside. With aging, the hemangioma may undergo fibrosis, begining in its central portion (Edmonson and Craig, 1987). Sometimes the sclerotic nodule can grow big enough to replace the whole hemangioma mimicking other solid tumors(Haratake et al., 1992).

Of particular importance in this case is that the CT appearances of sclerotic nodule in hepatic hemangioma might be confused with other malignant tumors with necrosis by radiologists and clinicians, although a correct diagnosis can be made when supported by other diagnostic modalities.

Thus, we have described a case of hepatic hemangioma with the CT findings of well demarcated nodular lesser attenuation foci within the main low attenuation mass on precontrast scans and non-enhancement of the foci on delayed contrast scans, which have been described as one of the atypical findings. And we proved that the sclerotic nodules in the hepatic carvernous hemangioma accounted for the atypical CT findings.

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