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Ultrasonographically Undetectable Cavernous Hemangioma of the Liver: Can all the hemangioma be detected by ultrasonography?

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超音波断層法で認識し得なかった肝海綿状血管腫

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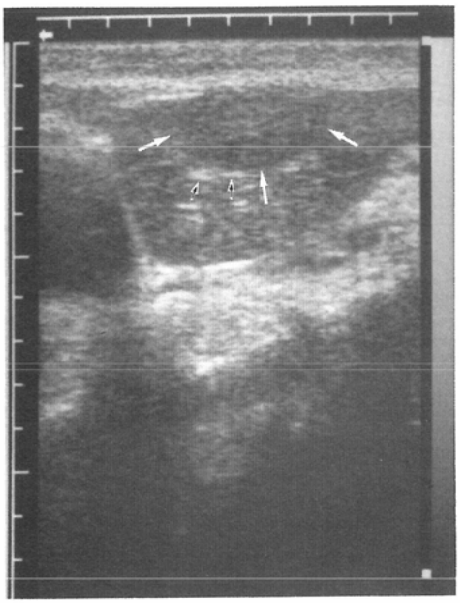
肝海綿状血管腫はもっとも多い肝腫瘍であり，超音波断層法で発見される頻度も高い．肝血管腫自体は臨床的に問題になることはほとんどないが，肝の悪性腫瘍との鑑別が必要なために，その超音波像については種々の議論がなされ，内外に多数の文献が見られる．これらの議論に共通するのは，超音波断層法で認識することができた肝海綿状血管腫のみを対象にしていることである．我々は最近，超音波断層法で認識できない可能性を示唆する興味ある2例の肝海綿状血管腫を経験した．1例は周囲肝組織と同等のエコー強度を有し，エコー強度の違いのみでは腫瘤を識別できなかったもの，他の1例はCTで肝海綿状血管腫との診断が得られた後に施行された超音波断層法で全く腫瘤を見出すことができなかったものである．

そこで我々は別の2症例でエコー強度と病理組織像との対比検討を行い，肝海綿状血管腫のエコー強度の由来とそのスペクトラムの広さについて考察した．肝海綿状血管腫のエコー強度は血管腫血管腔の大きさに依存すると考えられ，それゆえそのエコー強度は従来考えられてきたよりもずっと広く，超音波断層法で認識できないものが多数ありうると考えられた．

肝海綿状血管腫は必ずしも超音波検査で容易に見出しうるものばかりではないということを強調したい．

Extensive use of real-time ultrasonography has resulted in a marked increase in the incidence of cavernous hemangioma of the liver as well as in the number of published reports dealing with ultrasonographic diagnosis of this lesion. These reports are limited in scope, however, to those particular hemangiomas which were detectable with ultrasonography. The writers know of no preciously published description of ultrasonographically undetectable hemangioma. They did, however, encounter two patients with hemangiomas in which the echogenicity of the lesion was very close to that of the surrounding liver parenchyma, making it difficult to recognize these mass lesions. These experiences have prompted the



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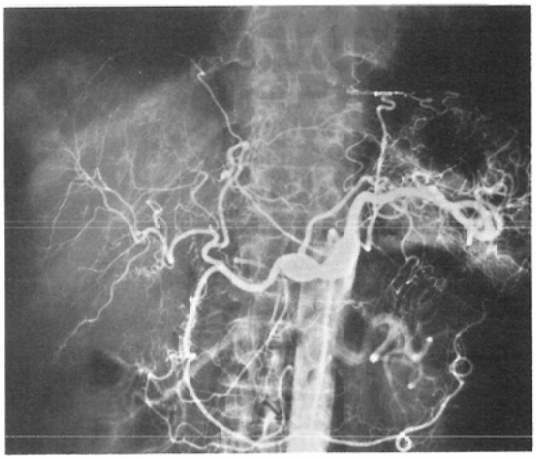

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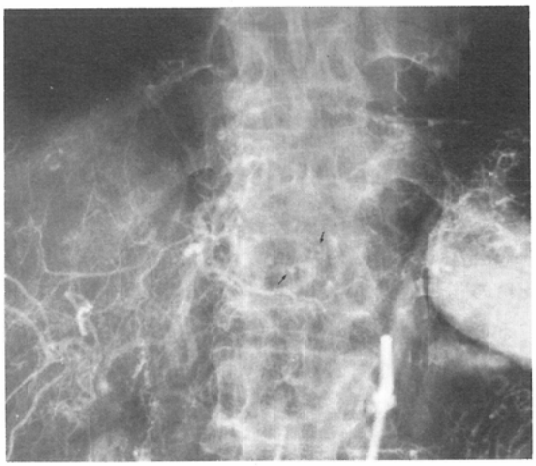

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Fig. 1 Case 1., A: An isoechoic mass lesion is identified in the left lobe of the liver in midsaggital section (large white arrows). Linear high echos just posterior to the mass (outlined arrows) represent branches of the left portal vein. B: Selective left celiac angiogram, arterial phase. C: Capillary phase. "Cotton wool" puddling of contrast material are seen (small black arrows).

presentation of this communication, which includes a discussion of the clinical implications of isoechoic hemangioma.

Case Reports

Case 1

Ultrasonographic mass-screening revealed a space-occupying lesion in the left lobe of the liver in a 68-year-old woman who was subsequently referred to Tokyo Kyosai Hospital. Fig. 1-A shows an ultrasonogram produced by this lesion when it was examined with a 3.5 MHz real-time linear array scanner. Although protrusion of the lesion above the surface of the left lobe was the basis of identification as a mass, ultrasonography did not provide a correct specific diagnosis because the echogenicity of the lesion was very close to that of surrounding liver parenchyma. Subsequent selective celiac angiography indicated characteristics typical of cavernous hemangioma: normal hepatic arteries, absence of tumor vessels, and densely stained blood-filled spaces producing a "cotton wool" appearance[1)~5)] (Figs. 1-B and 1-C).

Case 2

A 50-year-old man was admitted with clinical diagnosis of chronic pancreatitis. Plain abdominal computed tomography (CT) disclosed a well demarcated low-density mass of 2 cm in diameter in the posterior segment of the right lobe of the liver. Dynamic CT study following rapid intravenous injection of iodinated contrast material produced findings typical of cavernous hemangioma: dense accumulation of contrast material in the periphery of the lesion during the early phase, followed by gradual diffusion into the area of low density and diminution in attenuation value through time[6)~8)] (Fig. 2-A).

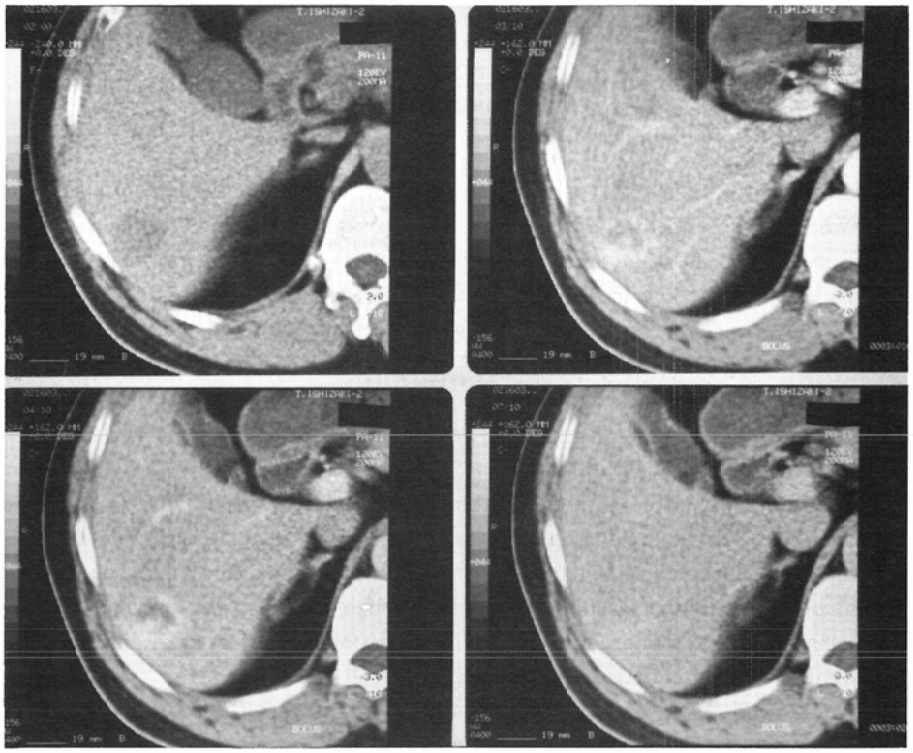
Two of the authors (T.A. and K.I.), with knowledge of the results of the dynamic CT study, independently attempted ultrasonographic demonstration of the lesion using a real-time linear array scanner, a real-time fanned array scanner, and a contact compound scanner (the frequency of 3.5 MHz was used in each investigation). No definite space-occupying lesion could be identified, however, in any sections which should encompass the site of the lesion (Fig. 2-B).

Unfortunately, because none of these two cases was indicated to surgical intervention, pathologocal finding could not be obtained, however.

Discussion

Cavernous hemangioma is the most common benign tumor of the liver[9)]. The increasing number of hemangioma discovered before laparotomy or autopsy can be attributed to the recent widespread use of real-time ultrasonography. Accurate diagnosis of the lesion is important for two reasons: the lesion has to be differentiated from malignant hepatic tumor, and catastrophic hemorrhage may result from the rupture of this lesion. Many descriptions dealing with the detection and diagnosis of cavernous hemangioma have been published. While some authors state that ultrasonography does not show specific findings of hemangioma[7)8)10)11)], others report that ultrasonography produces several findings which make fairly certain diagnosis of this entity possible. Such findings are said to include a hyperechoic portion within the lesion, enhancement posterior to a hyperchoic mass, and a central linear septum[12)~17)]. In the light of these conflicting claims, the question of whether or not specific diagnosis of this lesion is possible remains controversial. That ultrasonography can be used to detect one-hundred-percent of the cavernous hemangioma present does seem to be the generally accepted view, providing that the lesion is of sufficient size.

Most cavernous hemangiomas of the liver are between 1 and 3 cm in diameter[18)], and such small lesions have been thought to universally appear as strongly echogenic masses[8)7)14)15)19)]. This strong echogenicity is said to be produced by the multiple interfaces between the walls of the cavernous sinuses and the blood within them[12)19)]. An alternative explanation for the echogenicity of this lesion follows from the results of a recent study of the ultrasonographic and histopathological findings from the other two cavernous



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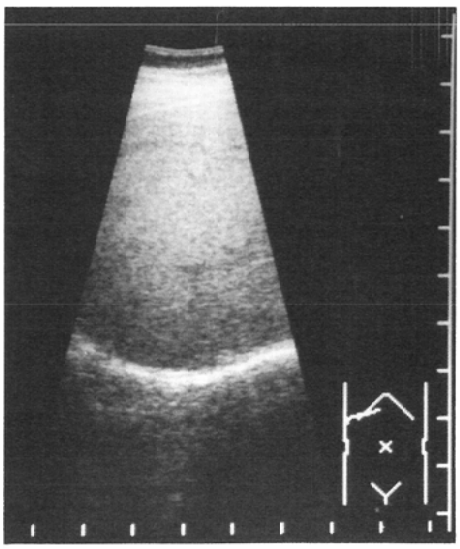

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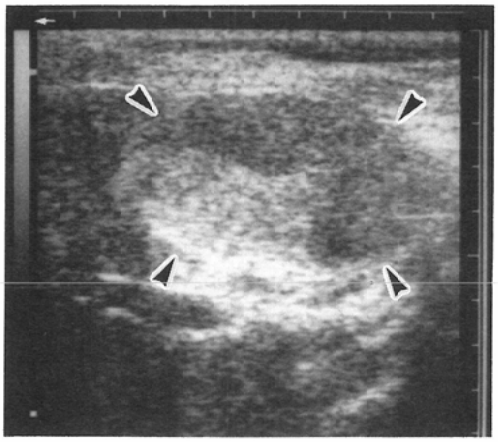
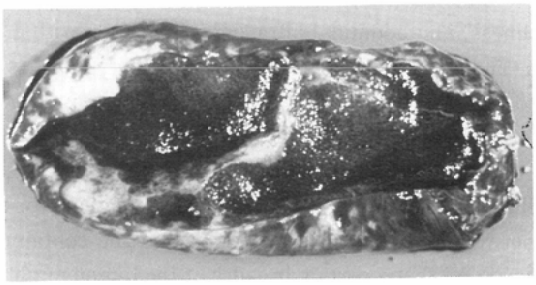
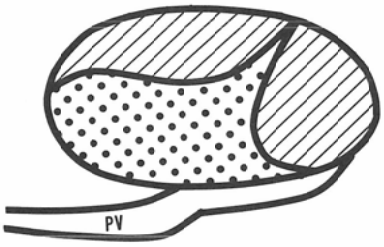
Fig. 2. Case 2., A: Dynamic CT images from upper left to lower right, before contrast enhancement, and 10 seconds, 30 seconds, and 1 minute, respectively after bolus intravenous injection of contrast material. Findings are those typical of cavernous hemangioma.
Ultrasonography of the liver by fanned-array real time scanner (B) fails to demonstrate definite mass lesion, despite the fact that the tomographic section of the ultrasonogram corresponds to a particular section of the CT.

hemangiomas conducted by the authors.

The first patient was a 44-year-old woman. A large mass (6 × 4 cm) was present close to the surface of the right lobe of the liver. Diagnosis of cavernous hemangioma had been made from laparoscopic and







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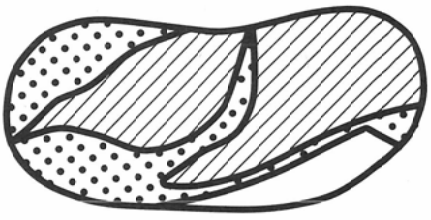

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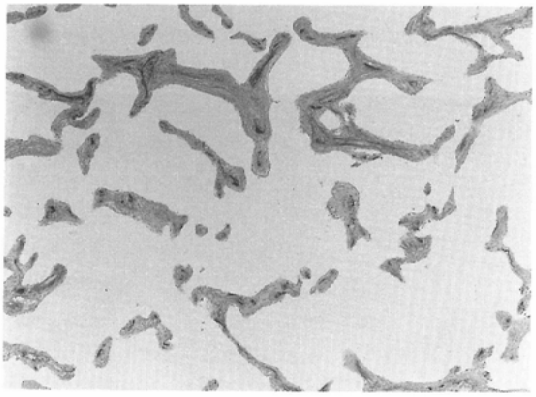

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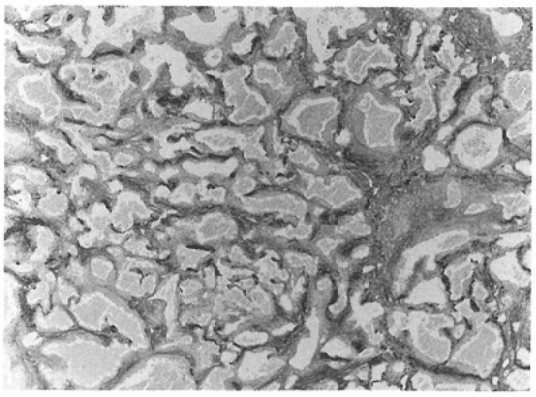

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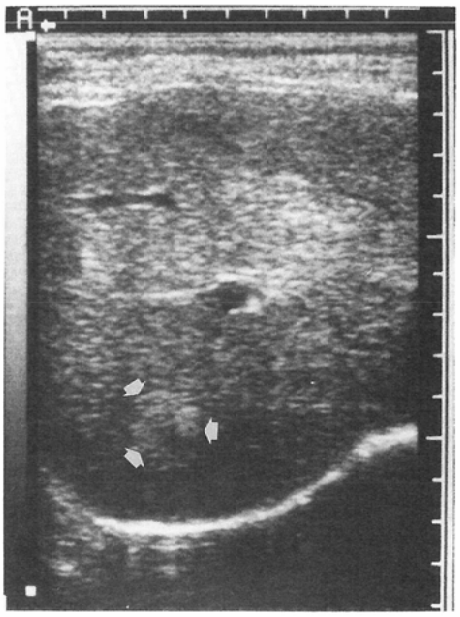
Fig. 3 A: Right intercostal liver scan of a 44-year-old woman shows a 6 × 4 cm mass lesion (outlined arrowheads) just anterior to the right portal vein (PV). The mass consists of isoechoic (shaded) and strongly echogenic (dotted) portions.
B: The macroscopic appearance of the surgical specimen sliced in a plane similar to that of Fig. 3-A, also consists of two portions grossly corresponding to the shaded and dotted areas of the echogram.
C and D: Photomicrograph of each portion. Sinus limina are broad in the isoechoic portion (C), and narrow in strongly echogenic portion(D).

angiographic findings. And because of its size and location, and the possibility of rupture followed by catastrophic bleeding, surgical extirpation was thought to be indicated. Preoperative ultrasonogram of the lesion using a 3.5 MHz real-time linear array scammer, macroscopic section, and photomicrogaph of the surgical specimen are shown in Figs. 3-A through 3-D. In the preoperative ultrasonogram, this cavernous hemangioma appears to consist of two different portions: an area in which the echogenicity is the same as that of the surrounding liver parenchyma (shaded area in the scheme in Fig. 3-A) and an area of homogenous, stronger echogenicity (dotted area in a same figure). These two areas of different echogenicity appeared to correspond closely to the macroscopic features of the surgical specimen (Fig. 3-B). And the histopathology of the isoechoic portion revealed that their lumina were broad, while those of the portion with stronger echogenicity were narrow (Fig. 3-C and 3-D).

The second patient was a 48-year-old woman with a known lung cancer. In the terminal stage of the illness, an abdominal ultrasonogram taken with a 3.5 MHz real-time linear array scanner (Fig. 4-a) showed, as an incidental finding, a strongly echogenic mass in the right lobe of the liver. At autopsy, this lesion proved to be a cavernous hemangioma with narrow lumina (Fig. 4-B) closely resembling those in the echogenic portion of the lesion in the previous case.

Although the number of cases which is the basis of this argument is limited, these two cases suggest that the echogenicity of the cavernous hemagioma of the liver is determined not only by the multiple interfaces between the walls of the sinuses and the contained blood, but also by the breadth of the lumina. It is also assumed that a certain breadth of the lumen might account for an echogenicity in the hemangioma that is the same as that of the surrounding liver parenchyma, thus explaining its escape from ultrasonographic detection.

Cavernous hemangioma of the liver was found in 2 to 7% of all cases autopsied[4)9)18)20)]. Review of 500 consecutive autopsy reports from the Department of Pathology at the Jichi Medical School Hospital over a 3-



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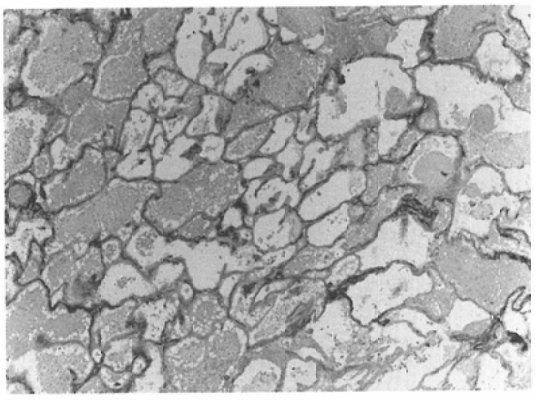

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Fig. 4 A: An ultrasonogram of the liver of a 48-year-old woman, taken with a real-time linear array scanner, shows a strongly echogenic mass in the right lobe of the liver (white arrows). B: Microscopic histopathology of this lesion shows narrow sinus lumina similar to those in Fig. 3-D.

year-and-8-month period revealed an incidence of 2.6% (13 cases, in which the smallest lesion measured 1 cm in diameter), whereas the incidence of lesion discovered by abdominal ultrasonographic screening in Japan was as high as 1.0%[21)~25)]. The considerable difference between these two incidences can not be explained by disadvantageous conditions accompanying ultrasonographic examination (e.g., anatomical dead space or excessive obesity) alone, and suggests the possibility of ultrasonographically undetected hemangioma. And we would like to emphasize that not all cavernous hemangiomas of the liver can be easily recognized by ultrasonography as generally considered.

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