RADIOLOGICAL CASE

CLINICS IN DIAGNOSTIC IMAGING (14)

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CASE REPORT

A 64-year-old woman presented with abdominal discomfort and distension 6 months following modified radical hysterectomy for Stage IIIA carcinoma of the cervix. Adjuvant treatment had included external radiotherapy and caesium implantation to the vaginal vault. At the time of presentation, she was undergoing chemotherapy. Apart from mild epigastric tenderness and distension, no significant abnormality was evident on physical examination. Her blood parameters were normal except for slight anaemia (11.5 g/dL).

Fig 1 – Unenhanced CT of the liver.

Unenhanced computed tomography (CT) scans of the liver were performed (Fig 1). This was followed by a dynamic post-intravenous contrast study of the abdomen and pelvis as a screening procedure (Fig 2). What abnormality can you see? What are the possible diagnoses? What further radiological technique should be applied here?

Fig 2 –Enhanced CT of the liver (45 seconds after start of contrast injection).

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IMAGE INTERPRETATION

The unenhanced scan showed a 25mm by 16mm oval hypodense lesion located subcapsularly in the lateral segment of the left lobe of the liver (Fig 1). Its CT number was 38 HU, compared to 31 HU for the inferior vena cava. This mass displayed intense peripheral enhancement on the dynamic post-contrast images (Fig 2). No other liver lesion was demonstrated. At this stage of the investigation, two possible diagnoses may be made, namely a solitary metastasis from the known primary or a cavernous haemangioma. To further characterise this mass, delayed scans were performed. At 3 minutes post-contrast injection, the lesion appeared homogeneously enhanced and at 10 minutes, it became isodense with respect to the liver parenchyma (Fig 3 and Fig 4).

DIAGNOSIS

Cavernous haemangioma of the liver

CLINICAL COURSE

The other CT findings included mild para-aortic lymphadenopathy and minimal para-rectal post-radiation changes. The CT diagnosis of an incidental cavernous haemangioma was accepted as conclusive, with no further investigation deemed necessary. The patient was treated with oral analgesics and continued on chemotherapy. She is currently under follow-up.

DISCUSSION

The reported incidence of hepatic cavernous haemangiomas ranges from 1.4% to as high as 7.3%[1,2]. They are found at any age although a prevalence for middle-aged women is recognised [1-3]. While they are usually asymptomatic, larger tumours may cause abdominal discomfort and/or distension, hepatomegaly, and very rarely (<1%), spontaneous haemorrhage. Haemangiomas normally measure less than 3cm in diameter at diagnosis, but may attain sizes greater than 5cm. They may occasionally enlarge secondary to bleeding, thrombosis and vascular ectasia. Multiple tumours are present in 10% to 30% of cases[1-3].

Histologically, cavernous harmangiomas are composed of blood-filled sinusoids separated by fibrous septa. Blood percolates slowly through these sinusoids, flowing centripetally from the periphery. Central thrombosis is common, resulting in central scarring, while haemorrhage and calcification are rare. The characteristic imaging features of these lesions reflect their structural morphology and haemodynamics.

The most readily accessible non-invasive imaging modality is ultrasound. Typical sonographic features consist of a well-defined, homogeneously hyperechoic mass with posterior acoustic shadowing but without a hypoechoic peripheral border (Fig 5). Fifteen percent to 20% of cavernous haemangiomas are iso- or hypoechoic relative to the liver parenchyma, particularly in hepatic fatty infiltration where the liver parenchyma appears more echogenic. In giant cavernous haemangiomas (5-6 cm or more in diameter), a more heterogeneous echopattern may be detected, reflecting degeneration, haemorrhage, thrombosis or fibrosis[4,5].

Several CT features of hepatic cavernous haemangiomas have been described[5,6]. On unenhanced scans, they are typically hypodense with CT attenuation values within 7 HU of the inferior vena cava[7]. Where liver is infiltrated by fat or in patients with high haematocrit values, haemangiomas may appear iso- or hyperdense in relation to the liver parenchyma on plain CT scans[7]. The characteristic features crucial to the diagnosis of cavernous haemangiomas are seen following a rapid bolus injection of contrast medium, when a pattern of sequential opacification emerges. Initially, there is opacification of small

Fig 3 – CT of the liver (3 minutes delay) showing homogeneous enhancement of the left lobe lesion. It is similar in density to the inferior vena cava (IVC) and intra-hepatic veins.

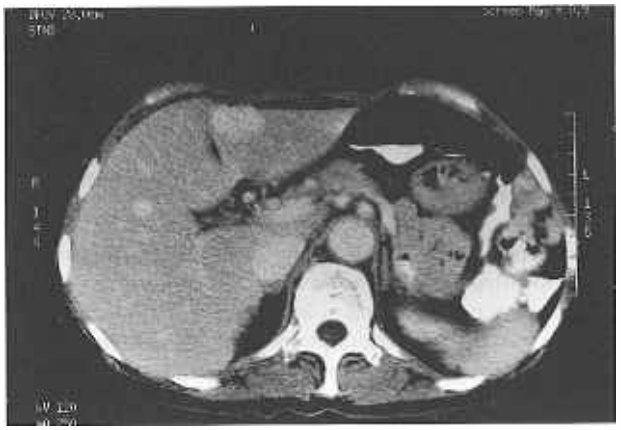
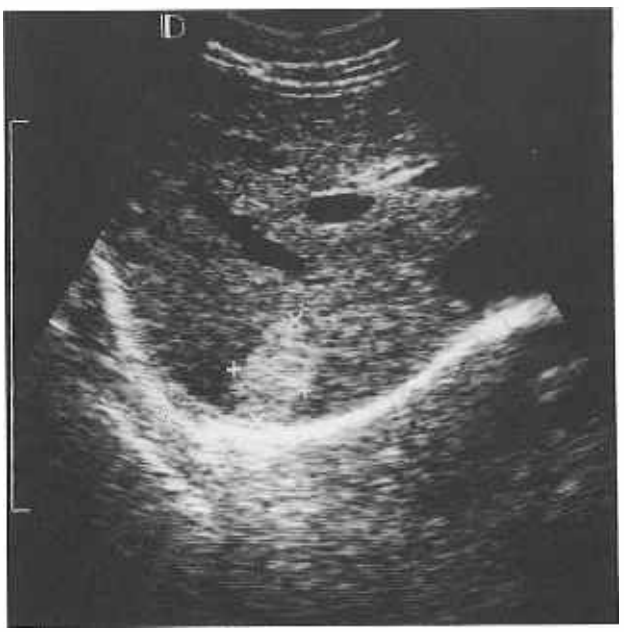


Fig 4 – CT of the liver (10 minutes delay) showing that the lesion is isodense compared to the liver parenchyma.

Fig 5 – Ultrasound of the liver in a 45-year-old woman. The haemangioma is seen as a well-marginated, hyperechoic subcapsularly-located mass. Posterior acoustic shadowing is present.



vascular lakes or puddles at the lesion periphery (15 to 40 seconds post injection). As more sinusoids fill with iodinated blood, the opacification progresses in a centripetal fashion towards the centre of the lesion. It takes a minimum of 3 minutes for the tumour to fully opacify, with larger lesions requiring a longer period for opacification. The lesion eventually assumes an isodense appearance[8]. Although most haemangiomas fulfill the above criteria, others may display atypical patterns, namely opacification initiating from the centre, mixed pattern of central and peripheral enhancement or none at all[9]. Similarly, the presence of central low density non-enhancing components should not preclude the diagnosis as these may represent fibrotic scars, thrombosis or haemorrhage[8].

The role of the unenhanced CT study is two-fold: to indicate the level(s) at which to perform characterisation studies with contrast enhancement, and to demonstrate intrinsic morphological features and attenuation values. With conventional CT scanners, the enhanced series is performed after intravenous bolus injection at a rapid flow rate (3 to 5 mL/s). Stationary dynamic scanning at predetermined level(s) is initiated after a time delay of 20 to 30 seconds. Timing of the scans after injection is influenced by the size of the lesion, with smaller ones "filling in" more rapidly than larger ones. After the initial scans performed at 2, 3, 4 and 5 minutes post-injection, the time delay between successive scans can be assessed from the degree of opacification seen on the CT monitor[1]. Spiral (helical) CT scanners offer the advantage of a greater volume of liver being imaged within a shorter scan time.

The CT scans should be carefully interpreted, especially when metastases are clinically suspected. Hypervascular metastases are hyperdense during the early phase of contrast enhancement but the density fades rapidly on delayed images, returning to baseline levels within 2 minutes[8]. Some metastases may even demonstrate a centripetal pattern of opacification[8,9]. However, careful analysis of the images will show that lesional opacification is less intense than that of a hepatic vessel.

Diagnostic problems remain with tumours that cannot be categorically classified as haemangiomas. Other imaging modalities like ultrasound, MRI, single photon emission computed tomography (SPECT) scans or angiography may be helpful. Multiple lesions may also present a problem as stationary dynamic scanning at the correct level is not always possible. On magnetic resonance imaging (MRI), cavernous haemangiomas appear as round or elliptical masses with smooth borders which are homogeneously hyperintense ("light bulb" sign) on T2 weighted images and hypointense on T1 weighted images. The "light bulb" sign is, however, not 100% specific as hypervascular metastases can produce a similar appearance. The typical pattern of enhancement seen on contrast enhanced CT may be reproduced with gradient-echo MRI sequences after injection of intravenous gadolinium DTPA[1]. Compared to MRI, ^{99m}-Technetium (Tc) red blood cell scanning with SPECT is superior in differentiating hypervascular metastases from haemangiomas. It is however less reliable in detecting lesions that are less than 2.5cm in size and those situated near the dome of the diaphragm or adjacent to blood vessels[1].

The diagnosis of solitary hepatic cavernous haemangioma based on either classical imaging appearances alone or together with colluding results of another imaging modality obviates the need for further investigation[1]. However, pursuance of a definite diagnosis of a haemangioma will depend on the clinical setting. For example, a patient with an incidental finding of a hyperechoic lesion on ultrasound, but without known or suspected malignancy, may require no further diagnostic work-up other than ultrasonic follow-up every 6 to 12 months. While haemangiomas less than 5cm in size can be observed; features which may warrant consideration for surgical excision include tumours larger than 5cm, particularly if a potential for exposure to trauma exists; tumours which are symptomatic, display rapid growth or impending rupture, and presence of the Kasabach-Merritt syndrome[10]. Alternative techniques like irradiation, hepatic artery ligation and embolisation are less effective in symptomatic control and may be associated with an increased risk of infection and ischaemia.

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ABSTRACT

A 64-year-old woman, being managed for carcinoma of the cervix, was incidentally found to have a solitary liver lesion on computed tomography (CT). The rounded lesion was well-defined and hypodense on unenhanced CT. Dynamic and delayed contrast CT demonstrated the typical enhancing pattern of cavernous haemangioma. The role of imaging in the diagnosis of hepatic haemangiomas is discussed.

Keywords: *cavernous haemangioma, computed tomography (CT), liver neoplasm, ultrasound*