Solitary necrotic nodule of the liver: imaging and correlation with pathologic features

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Received: 13 October 2001/Accepted: 7 November 2001

Abstract
We describe two cases of solitary necrotic nodule of the liver, an uncommon nonmalignant lesion that can mimic a metastasis. The nodule appeared hypoechoic, or target-like, on sonography, hypodense without contrast enhancement on computed tomography, and hypointense on magnetic resonance imaging, including diffusion-weighted images. These features, peculiar when considered together, are explained by the coagulative type of necrosis.

Key words: Solitary necrotic nodule—Liver, focal lesions—Ultrasound—Computed tomography—Magnetic resonance imaging—Diffusion weighted imaging—Coagulative necrosis.

Solitary necrotic nodule (SNN) of the liver was originally described by Shepherd and Lee in 1983 as an uncommon nonmalignant lesion of uncertain etiology, usually localized in the subcapsular region of the liver, that often can be misinterpreted as a single metastasis [1]. We report the radiologic features in two cases of SNN and their correlation with the pathologic findings.

Case reports

Case 1
A 52-year-old man underwent abdominal ultrasound (US) for staging of gastric cancer. US showed a diffusely bright, fatty liver with a hypoechoic nodular lesion 8 mm in diameter localized in segment VII (Fig. 1A).

Case 2
A 30-year-old woman underwent abdominal US for dyspeptic symptoms. Routine blood and urine analyses were
normal. She had no history of trauma, neoplasm, tuberculosis, syphilis, or parasitic infestations.

US showed a 15-mm hypoechoic nodular lesion resembling a secondary solitary mass in the subcapsular portion of segment VI (Fig. 2A). Doppler US showed no flow within or surrounding the lesion.

Dynamic triple-phase CT of the liver was performed on a Somatom Plus-4 scanner (Siemens). The lesion appeared slightly hypodense compared with the normal liver parenchyma, without detectable enhancement on all contrastographic phases (Fig. 2C).

The patient also underwent MRI on a 1.5-T Gyroscan ACS NT (Philips). Axial images 5–8 mm thick were obtained with breath-hold FFE T1W (TR = 110 ms, TE = 1.8 ms, FA = 80°), respiratory gated TSE T2W (TR = 4000 ms, TE = 180 ms, TF = 22), and breath-hold GRASE SPIR T2W (TR = 1387 ms, TE = 105 ms, TF = 12, EPI factor = 3; Fig. 2D) sequences. All MRI sequences confirmed the presence of a hypointense nodule.

Breath-hold diffusion-weighted (DW) images (TR = 2115 ms, TEd = 70 ms, b = 500) were also acquired and the apparent diffusion coefficient (ADC) map was calculated. The nodule appeared hypointense in DW (Fig. 2E) and ADC images. The ADC values were 0 within the lesion and 0.90 × 10⁻³ mm²/s ± 0.25 in the surrounding liver parenchyma.

The patient underwent mammography, CT of the thorax and pelvis, US of the neck, and measurements of principal serum markers to exclude malignancies. All examinations were negative.

Four months after the initial observation, a full biopsy of the lesion was performed under US guidance, with collection of two samples. The US appearance of the lesion had changed, consisting of a 15-mm targetlike nodule (Fig. 2B), with a hyperechoic core surrounded by a thin, well-defined hypoechoic ring.

The biopsy specimens were stained with hematoxylin and eosin, elastic van Gieson, and reticulin. Histologically, the lesion composed mainly of coagulative necrosis with a homogeneous periphery, and the central zone had a rough patchy appearance with cellular debris. The coagulative necrosis was surrounded by a thin boundary of collagen fibers with scanty mononuclear inflammatory cells and elastic fibers. No vessels were demonstrated. The hepatic tissue surrounding the lesion was normal (Fig. 2F). Special stains, such as Grocott, Ziehl–Neelsen, and periodic acid–Schiff, excluded bacterial, fungal, and parasitic infections. The final histopathologic diagnosis was SNN of the liver.

Due to the lack of signs of malignancies, surgery was not proposed to the patient. Three US and one MRI examinations over the following 12 months demonstrated no changes in size, morphology, and signal intensity of the lesion.

Discussion

In 1983 Shepherd and Lee reported five cases of an unusual lesion of the liver characterized by a necrotic core surrounded by a dense collar of hyalinized collagen, incorporating elastic fibers [1]. Possible etiopathogeneses of the lesion include sclerosing hemangiomas, trauma, and sequelae of previous infections such as tuberculosis, syphilis, amebiosis, and visceral larva migrans Toxocara and Linguatula [1–3].

To our knowledge, this is the first report combining US, CT, and MRI findings of two cases of SNN of the liver. All imaging features can be explained on the basis of histologic findings.

With regard to US, the nodule in case 1 and the nodule border in case 2 appeared hypoechoic due to homogeneity of the coagulative necrosis. In contrast, the central portion in case 2 was hyperechoic because of multiple interfaces in the rough patchy core, probably as a result of more rarefied zones of progressive dehydration. In our opinion, this progressive dehydration of the...