

Ultrasound Features of Hepatic Lesions: Correlation with CT/MRI Findings

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Introduction

Ultrasound (US) remains the first-line imaging modality for the liver due to its accessibility, cost-effectiveness, and lack of ionizing radiation. However, US often has limited specificity and sensitivity for characterizing focal liver lesions. Consequently, CT and MRI serve as problem-solving tools, while contrast-enhanced US (CEUS) offers superior sensitivity and specificity for lesion detection and characterization compared to grayscale US.

US Spectrum of Focal Liver Lesions

Focal hepatic lesions are categorized by echogenicity, but US appearances often overlap and represent vastly different diagnoses. While US easily distinguishes cystic from solid lesions, the spectrum is complex. Cystic lesions range from simple anechoic cysts to complicated cases like abscesses, cystic neoplasms (MCN, IPNB), or cystic metastases. Solid lesions exhibit even greater variety. Hypoechoic patterns may indicate primary malignancies like HCC or intrahepatic cholangiocarcinoma, as well as metastases and atypical hemangiomas. Conversely, while hyperechogenicity is classic for hemangiomas, fat-containing tumors (including HCC, adenomas, and angiomyolipomas) or certain metastases can appear similarly bright. Isoechoic lesions are particularly challenging, often blending into the parenchyma. While FNH may show a "spoke-wheel" Doppler pattern and specific MRI uptake, other isoechoic masses like HCC or metastases may be challenging to diagnose. Similarly, some infiltrative malignancies may be challenging to identify. In these cases, indirect signs like parenchymal distortion, vessel displacement or a bulging/irregular hepatic contour may raise suspicion. Features such as a hypoechoic halo, solid hypoechoic morphology, or multiplicity should heighten suspicion of malignancy, especially in patients with a known history of cancer.

Mimickers (Pseudolesions)

Focal fat deposition (hyperechoic) and focal fat sparing (hypoechoic) can simulate true hepatic masses on US and should be recognized as pseudolesions rather than true focal lesions, avoiding unnecessary workup. These findings usually show geographic shape, a lack of mass effect, and allows hepatic vessels to pass through undisturbed ("vessels-through-sign"). Recognizing these features in typical locations, such as S4 or the gallbladder fossa, allows for a confident diagnosis of focal fat deposition or sparing, even without contrast-enhanced CT or MRI.