Inhomogeneous Focal Fat Distribution as Pseudolesions in a Patient with Pancreatic Carcinoma

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Abstract

A 66-year-old patient underwent liver magnetic resonance imaging during initial staging of pancreatic adenocarcinoma. Several focal hepatic abnormalities raised concern for metastases. Their signal characteristics on T1-weighted imaging, absence of corresponding diffusion restriction, preserved hepatobiliary-phase enhancement, and benign appearance on contrast-enhanced ultrasonography supported interpretation as pseudolesions related to heterogeneous hepatic fat distribution rather than metastatic disease. The patient subsequently underwent Whipple surgery. Follow-up magnetic resonance imaging two years later demonstrated locoregional recurrence without hepatic lesions, further supporting the original benign interpretation. This case illustrates how multiparametric magnetic resonance imaging, complementary ultrasonography, and longitudinal follow-up can increase diagnostic confidence when focal fat alteration mimics liver metastases.

Keywords: hepatic pseudolesion; focal steatosis; focal fat sparing; pancreatic adenocarcinoma; diffusion-weighted imaging; hepatobiliary-phase MRI; contrast-enhanced ultrasonography

Case Presentation

A 66-year-old patient underwent liver magnetic resonance imaging (MRI) as part of the initial diagnostic workup for pancreatic adenocarcinoma to assess for liver metastases. The examination demonstrated a circumscribed, sharply marginated area in liver segment II that was markedly hypointense on the reported T1-weighted image (Figure 1A). Additional post-contrast images showed several areas of apparent enhancement near the liver capsule and close to the gallbladder (Figure 1B and C).

Imaging Findings

Diffusion-weighted imaging did not demonstrate corresponding diffusion restriction, including on the apparent diffusion coefficient map (Figure 1D). The liver parenchyma showed homogeneous enhancement in the hepatobiliary phase after administration of a hepatocyte-specific contrast agent (Figure 1E). Contrast-enhanced ultrasonography (CEUS) showed no metastatic imaging features in the initially identified areas (Figure 1F).

The combined findings supported, but did not by themselves prove, that the apparent lesions represented heterogeneous fat distribution rather than hepatic metastases. The background liver appeared steatotic, with focal areas of relative fat sparing and a sharply marginated area in segment II showing more pronounced steatosis. Such focal fat alterations can mimic metastases, including with a rounded configuration [1-3]. The absence of diffusion restriction and the preserved hepatobiliary-phase appearance increased confidence in the benign interpretation when considered together with the remaining MRI findings and CEUS, rather than serving as absolute exclusion criteria for metastasis [4,5].

Diagnostic Assessment and Follow-up

The diagnosis of hepatic pseudolesions was based on the combined MRI and CEUS appearance and was not histologically confirmed. The patient subsequently underwent Whipple surgery for the primary pancreatic adenocarcinoma. Follow-up MRI two years later demonstrated recurrence with locoregional lymph-node involvement but no hepatic lesions. This longitudinal finding further supported the original interpretation of benign hepatic pseudolesions.

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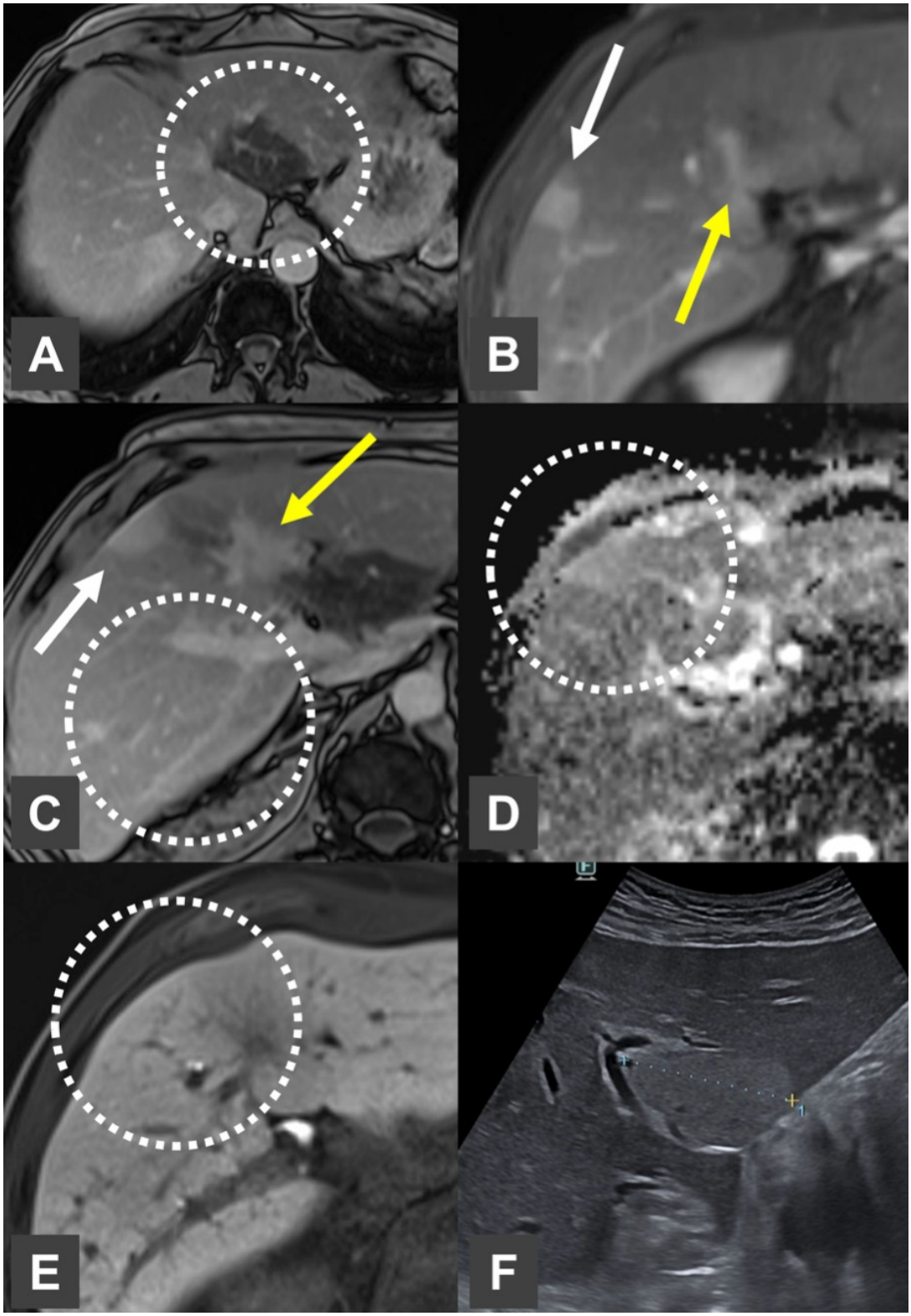


Figure 1. Multiparametric liver imaging in a patient with pancreatic adenocarcinoma. (A) Axial T1-weighted MR image showing a sharply marginated hypointense area in segment II (dotted circle). (B, C) Post-contrast T1-weighted MR images showing apparent subcapsular enhancement (white arrow) and an area adjacent to the gallbladder (yellow arrow); the dotted circle marks heterogeneous background hepatic signal. (D) Apparent diffusion coefficient map without corresponding restricted diffusion in the marked area. (E) Hepatobiliary-phase MR image showing preserved, relatively homogeneous parenchymal enhancement in the marked region. (F) Contrast-enhanced ultrasonographic image without metastatic enhancement characteristics in the assessed area. Taken together, the findings supported heterogeneous focal fat distribution as the explanation for the apparent lesions; sequence parameters and contrast-agent details were not available in the source report.

Discussion

Hepatic pseudolesions are non-neoplastic focal abnormalities that may mimic or obscure true lesions. Focal fatty change, focal fat sparing, and perfusion-related abnormalities are recognized causes of such appearances [1].

Focal hypersteatosis may be nodular and atypically located, particularly in patients with cancer and background steatosis, and may therefore resemble metastasis [2]. Careful review of all available sequences and correlation with the clinical context reduce the risk of misclassification [3].

DWI can improve diagnostic confidence because pseudolesions may lack visibility or restriction on diffusion-weighted sequences; however, a negative DWI finding is not an independent guarantee of benignity in every clinical setting [4]. Hepatocyte-specific contrast-enhanced MRI and DWI should therefore be interpreted together with unenhanced sequences, dynamic enhancement, CEUS, prior imaging, and follow-up. Published evidence indicates that adding DWI may increase confidence, while not necessarily increasing diagnostic accuracy beyond hepatocyte-specific contrast-enhanced MRI alone [5].

Conclusion

Heterogeneous hepatic fat distribution can produce focal pseudolesions that resemble metastases during oncologic staging. In this case, the combination of T1-weighted signal behavior, absence of corresponding diffusion restriction, preserved hepatobiliary-phase enhancement, supportive CEUS findings, and two-year imaging follow-up favored a benign explanation. These observations should be understood as a convergent diagnostic assessment rather than as proof based on any single imaging feature.

Declarations

Ethics statement: The authors confirmed to the journal that all applicable ethical and institutional requirements were fulfilled.

Consent for publication: The authors confirmed to the journal that written informed consent was obtained from the patient for publication of the clinical information and images.

Anonymization: The authors confirmed that the clinical and imaging data were anonymized before publication.

Transparency statement: The authors confirmed that all applicable transparency information was disclosed to the journal.

Competing interests: The authors declare that there were no conflicts of interest within the meaning of the recommendations of the International Committee of Medical Journal Editors when the article was written.

Data availability: The clinical and imaging information supporting this case is contained within the article. Further information may be requested from the corresponding author, subject to patient privacy and applicable institutional requirements.

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References

1. Ramanathan S, Raghu V, Virmani V, Sheikh A, Al Heidous M, Tirumani S. Unveiling the unreal: Comprehensive imaging review of hepatic pseudolesions. Clin Imaging. 2021;80:439-453. https://doi.org/10.1016/j.clinimag.2021.09.008

2. Metin NO, Karaosmanoğlu AD, Metin Y, Karçaaltıncaba M. Focal hypersteatosis: a pseudolesion in patients with liver steatosis. Diagn Interv Radiol. 2019;25(1):14-20. https://doi.org/10.5152/dir.2018.17519

3. Elsayes KM, Menias CO, Morshid AI, Shaaban AM, Fowler KJ, Tang A, Chernyak V, Szklaruk J, Bashir MR. Spectrum of pitfalls, pseudolesions, and misdiagnoses in noncirrhotic liver. AJR Am J Roentgenol. 2018;211(1):97-108. https://doi.org/10.2214/AJR.18.19820

4. Fruehwald-Pallamar J, Bastati-Huber N, Fakhrai N, Jantsch M, Puchner S, Herneth AM, Ba-Ssalamah A. Confident non-invasive diagnosis of pseudolesions of the liver using diffusion-weighted imaging at 3T MRI. Eur J Radiol. 2012;81(6):1353-1359. https://doi.org/10.1016/j.ejrad.2011.03.072

5. Donati OF, Fischer MA, Chuck N, Hunziker R, Weishaupt D, Reiner CS. Accuracy and confidence of Gd-EOB-DTPA enhanced MRI and diffusion-weighted imaging alone and in combination for the diagnosis of liver metastases. Eur J Radiol. 2013;82(5):822-828. https://doi.org/10.1016/j.ejrad.2012.12.005