



Common and Uncommon Benign Pancreatic Lesions Mimicking Malignancy: Imaging Update and Review

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There is a broad range of inflammatory, pseudotumoral, and benign lesions that may masquerade as pancreatic malignancies, often representing a challenge to the radiologist. Unawareness of these entities can lead to inadequate differential diagnoses or misdiagnosis, with important prognostic and therapeutic consequences. The purpose of this article is to revisit a spectrum of lesions, varying from common to exceedingly rare nonmalignant, that may mimic malignant pancreatic neoplasms on imaging, identifying relevant features that may contribute to reaching the correct diagnosis. Representative cases include focal fatty replacement, intrapancreatic accessory spleen, pancreatic lobulation, lipoma, autoimmune pancreatitis, focal pancreatitis, eosinophilic pancreatitis, groove pancreatitis, hemangioma, intrapancreatic aneurysm, tuberculosis, and Castleman's disease.

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Introduction

The advances and large widespread use of multimodality imaging of pancreas in the past years have improved the detection of pancreatic diseases, some of which are being increasingly discovered incidentally.¹⁻³ Currently, the roles of imaging include identifying and characterizing the lesion, ultimately helping to establish the most appropriate management. Despite these advances, however, there is a range of inflammatory, pseudotumoral, and benign lesions that may mimic a pancreatic malignancy, and they often represent a challenge for the radiologist. Unawareness of these entities can lead to inadequate differential diagnoses or misdiagnosis with important implications, as nonneoplastic lesions have different approaches and prognoses than the malignant ones.⁴

On the contrary, pseudotumoral lesions may present specific imaging features that may help to suggest a correct

diagnosis. This is particularly relevant because CA19-9, the only clinically available Food and Drug Administration-approved blood biomarker for pancreatic ductal adenocarcinoma,⁵ has a median sensitivity of only 81% and specificity of 90% when using a 37 kU/L cutoff value, whereas increasing the cutoff value to 100 kU/L improves specificity to 98% but reduces sensitivity to 68%.⁶ Moreover, CA19-9 has a high rate of false-positive results induced by obstructive jaundice, and a major limitation is that it may be markedly elevated in patients with other malignancies such as colorectal, liver, breast, and lung cancers, as well as nonmalignant diseases such as pancreatitis, cirrhosis, and lung disorders.⁷ In this sense, because CA 19-9 serum levels alone cannot distinguish between benign or malignant pancreatic lesions, the American Society of Clinical Oncology states that the diagnostic performance of CA 19-9 alone is inadequate for a reliable diagnosis of pancreatic cancer,^{7,8} which highlights, in such a context, the pivotal role of imaging studies.

The purpose of this article, therefore, is to revisit the most frequent benign lesions that may mimic malignant pancreatic neoplasms on imaging, identifying associated clinical and imaging features that are helpful in reaching the correct diagnosis.

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Mimickers of Primary Pancreatic Tumors

Fatty Replacement of the Pancreas

Fatty replacement of the pancreas is a benign process that has been associated with a myriad of diseases, such as obesity, diabetes mellitus, chronic pancreatitis, hereditary pancreatitis, obstruction of the pancreatic duct by calculus or tumor, and cystic fibrosis.⁹⁻¹¹ The natural marbling of pancreatic tissue with fat, typically seen in individuals who are middle aged or older, may occur in a heterogeneous pattern.¹² In such rare cases, the focal fatty replacement or sparing, however, may mimic masses, producing possible pseudotumors in regions of relatively less involvement, typically between the ventral (uncinate process) and dorsal pancreas.¹²

Ancillary findings that may help in the differentiation between focal fatty replacement and true tumors include the absence of mass effect, nondeformity of the configuration of the pancreatic contours, and absence of associated ductal or vascular displacement in the affected area^{13,14} (Figs. 1 and 2). On US, focal fatty infiltration is hyperechoic in comparison to the rest of the normal pancreas; in contradistinction, focal fatty sparing is hypoechoic (Fig. 2) in comparison to the surrounding fatty pancreas.^{13,14} If the lesion contains sufficient macroscopic fat to possess negative attenuation on CT, unenhanced CT can be useful (Fig. 2); contrast-enhanced CT, otherwise, is usually not helpful in such cases, as the attenuation of the lesion increases consequent to the presence of normal

parenchyma interspersed between foci of fatty infiltration, preventing the detection of fat.^{13,14} Chemical shift T1-W MR imaging in combination with fat-suppression techniques are considered the preferred modality to characterize these lesions,^{10,14} specially when the degree of focal fatty replacement is not so high, making it difficult to differentiate it from true pancreatic neoplasm on CT.¹⁰ Macroscopic fatty replacement exhibits high signal with T1- and T2-weighted (W) sequences, with signal loss in the fat-suppressed sequences.¹⁴ Microscopic fat, commonly present in fatty infiltration, is reliably detected with use of chemical shift MR imaging, the affected areas showing some degree of loss of signal intensity on the opposed-phase T1-W sequence relative to the in-phase T1-W sequence (Fig. 1).^{10,12,14}

Intrapancreatic Accessory Spleen

Accessory spleens are a congenital anomaly (consequent to a failure of fusion of the splenic anlage in the dorsal mesogastrium) found in approximately 10% of the population, with 1 out of 6 cases occurring in the pancreatic tail.¹⁵⁻¹⁷ Despite this, intrapancreatic accessory spleens (IPAS) are rarely recognized radiologically.¹⁸ IPAS are benign and usually asymptomatic lesions (except in the context of diseases like recurrent immune thrombocytopenic purpura¹⁹), and remain stable over years of follow-up imaging.¹⁷ They are currently more readily detected due to improved cross-sectional techniques, better spatial resolution, and dynamic contrast imaging. However, they are

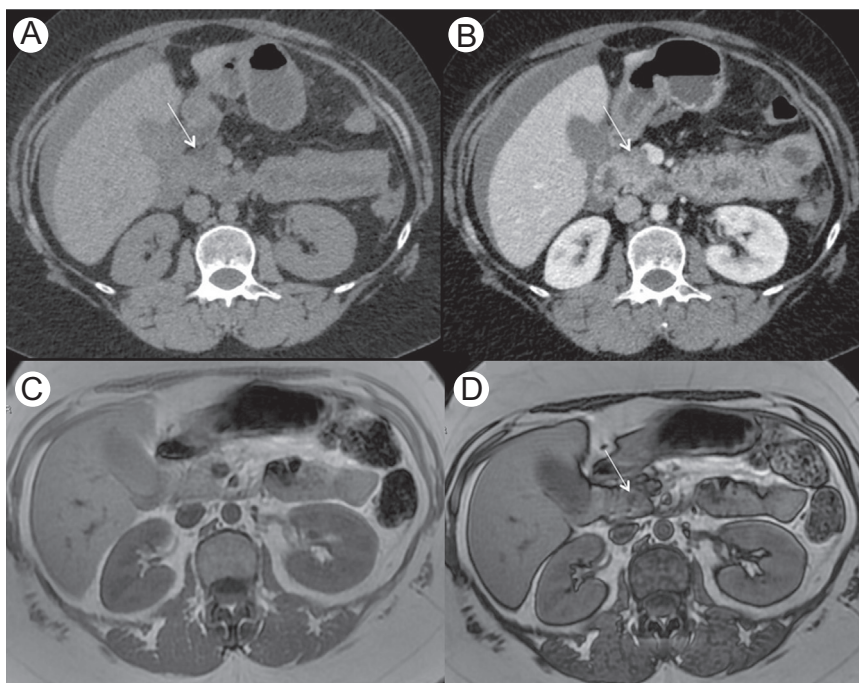


Figure 1 Focal fatty replacement in the periportal portion of the head of the pancreas in a 42-year-old woman with a history of breast cancer who presented for follow-up after chemotherapy. Axial unenhanced CT (A) scan shows an ovoid, low-attenuation lesion (arrow) that does not deform the contours of the pancreatic head. Axial contrast-enhanced CT scan in the portal phase (B) shows heterogeneous enhancement (arrow) of this area, simulating a true mass. Axial T1-W gradient-echo in-phase sequence (C) shows no focal lesion in head of pancreas, whereas the opposed-phase sequence (D) exhibits a focal signal drop in the pseudolesion (arrow), proving its fat content.

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