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Intrapancreatic accessory spleen mimicking malignant tumor: three case reports

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Abstract

Intrapancreatic hypervascular lesions may represent metastases, neuroendocrine tumors, or intrapancreatic accessory spleens. The benign intrapancreatic accessory spleen can be difficult to separate from a malignant neuroendocrine tumor or metastasis. We report three cases of pancreatic lesions that underwent pancreatic surgery due to suspicion of malignancy on imaging; all cases were histologically intrapancreatic accessory spleens. Our cases point to the importance of performing single-photon emission computed tomography with heat-damaged Tc-99m-pertechnetate labelled erythrocytes to identify splenic tissue, even though small lesions can show a false-negative result.

Keywords

Accessory spleen, pancreatic neuroendocrine tumor, renal cell cancer, Ga-68-Dotatoc, positron emission tomography, Tc-99m-pertechnetate SPECT

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Introduction

Intrapancreatic hypervascular lesions may have different etiologies, including metastasis, neuroendocrine tumor (NET), or intrapancreatic accessory spleen (IPAS). Pancreatic metastases account for $<2\%$ of all pancreatic malignancies, with the most common metastases being renal cell carcinoma (RCC), followed by malignant melanoma, colorectal carcinoma, and breast cancer. RCC may appear up to eight years after the treatment of the primary tumor (1). Pancreatic NETs (PNET) are rare neuroendocrine neoplasms (incidence $<1/100{,}000$). PNETs can secrete hormones, such as insulin, gastrin, glucagon, VIP, and somatostatin, and are divided into functional (hormonal syndrome) and non-functional (no hormonal syndrome) groups (2). Accessory spleens are common, benign congenital, or acquired anomalies, found in 10% of the population; in up to 20% of cases, they are located in the tail of the pancreas (3,4) and are typically <3 cm in size (5). An IPAS represents a clinical challenge, radiologically mimicking PNET and RCC, which can lead to surgical interventions and surgery-related risks (6). We report three cases, with informed consent from the patients, of IPAS that underwent pancreatic surgery due to a suspicion of malignancy (7), two were suspected to be PNETs and one was suspected to be RCC.

Case reports

Case 1

Case 1 was a 60-year-old man who was admitted to the department of neurosurgery after a cerebral injury. A full-body computed tomography (CT) scan revealed

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an intrapancreatic hypervascular lesion (2 cm in diameter) in the tail of the pancreas. The next CT scan, with a late arterial contrast phase and a venous phase raised suspicion of PNET, as it showed a slightly hyperenhancing mass in the venous phase. The patient had no symptoms of a PNET and the tumor was suspected to be an incidentalome. A Ga-68-Dotatoc positron emission tomography (PET)/CT scan (Fig. 1) was performed that demonstrated a lesion with abnormally high tracer uptake in the tail of the pancreas with no other Dotatoc active foci. This was interpreted as a solitary PNET and the patient underwent distal pancreatectomy with splenectomy. It was decided to perform surgery due to the size of the tumor and the risk of malignancy. Histopathology revealed an IPAS containing normal red and white pulp; no malignancy was observed. The patient had a small leakage from the pancreatic remnant, which was successfully treated.

Case 2

Case 2 was a 68-year-old woman who was previously diagnosed with RCC that was treated with nephrectomy. A follow-up CT was performed every 3–6 months after the nephrectomy. Thirty-two months after nephrectomy, a small (8 mm) hypervascular lesion in the tail of the pancreas was detected by CT in the early venous phase. Abdominal magnetic resonance imaging (MRI) (Fig. 2a) was performed which revealed a T2 and diffusion isointense signal (with diffusion restriction) in the lesion compared to the spleen, as well as similar enhancement as the spleen after contrast. Splenic tissue was suggested and single-photon emission CT with heat-damaged Tc-99m-pertechnetate labelled red blood cell (spleen-SPECT) was performed (Fig. 2b). This investigation was negative, as it did not show uptake of heat damaged blood cells. The lesion was then interpreted as RCC and a distal pancreatectomy with splenectomy was performed. The postoperative course was uneventful. Histopathology revealed an IPAS and no malignancy.

Case 3

Case 3 was a 54-year-old man with a previous history of ulcerative colitis and total colectomy. He presented with six months of nausea, fatigue, and hand tremor. Endocrinological disease was excluded. Biochemistry revealed elevated plasma Chromogranin A and a Ga-68-Dotatoc PET/CT scan was performed, which showed pathologic tracer uptake in the tail of the pancreas, but with an indefinite CT correlate. MRI showed

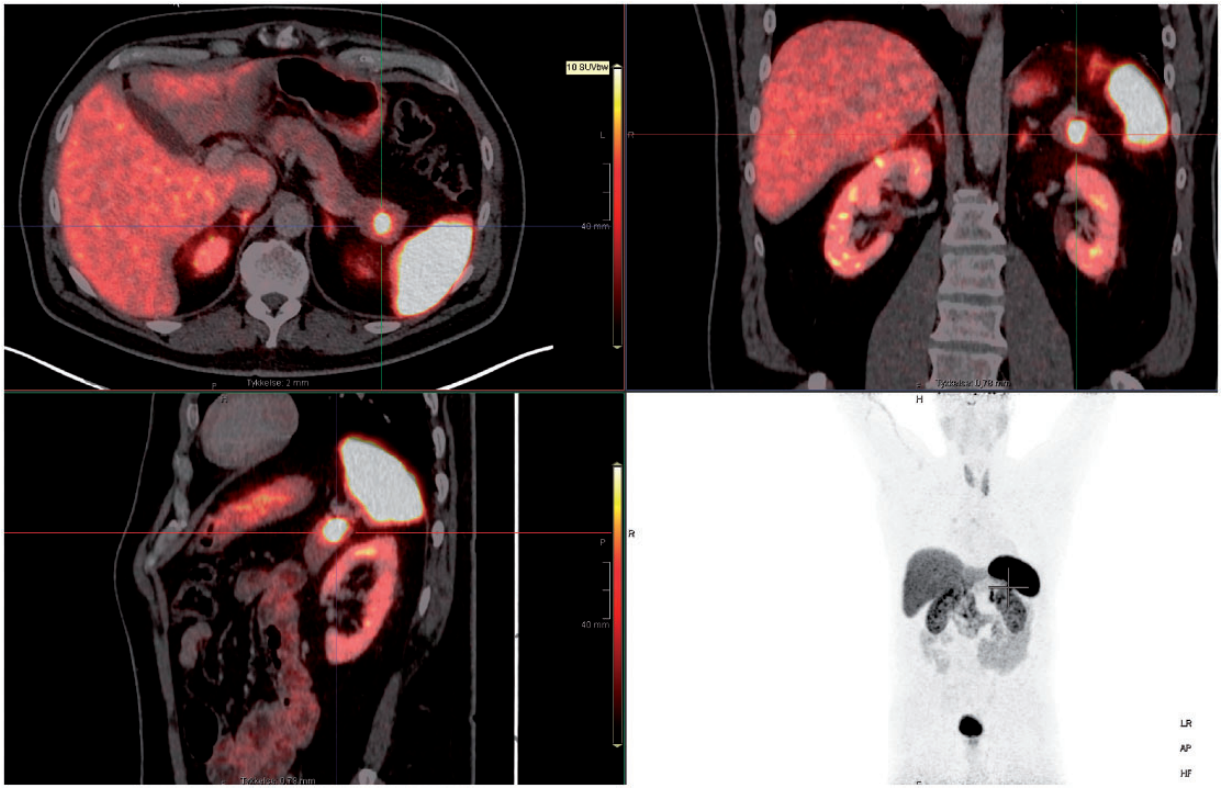

Fig. 1. Case 1: Ga-68-Dotatoc PET/CT scan demonstrating a pathologic uptake in the tail of the pancreas with similar attenuation to the (physiologic) attenuation of the spleen.

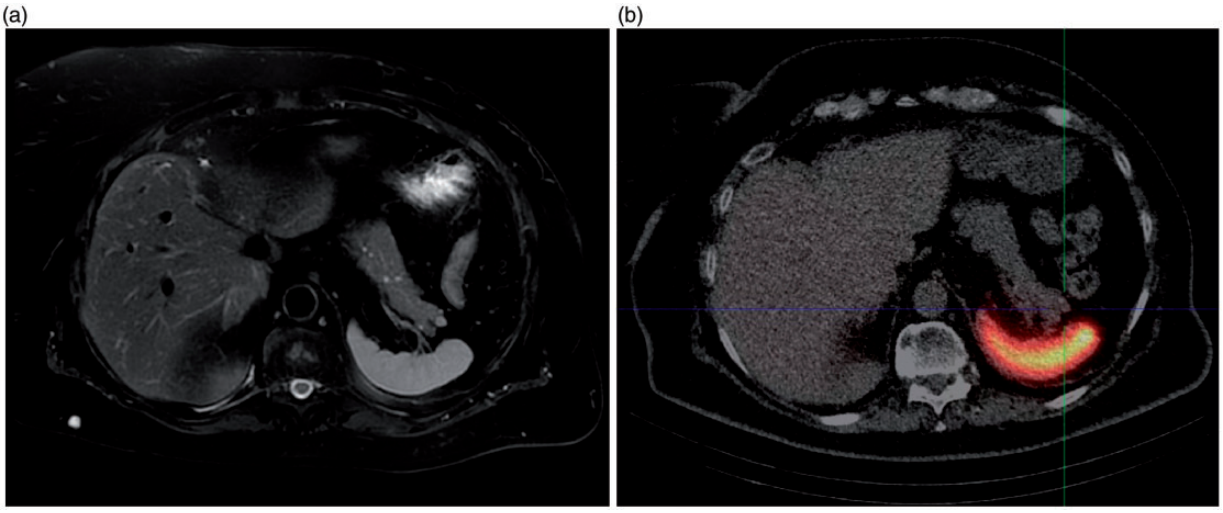

Fig. 2. (a) T2 fat-saturation MRI sequence with the intrapancreatic process of similar intensity to that of the spleen. (b) The negative spleen-SPECT of the intrapancreatic process due to its small size.

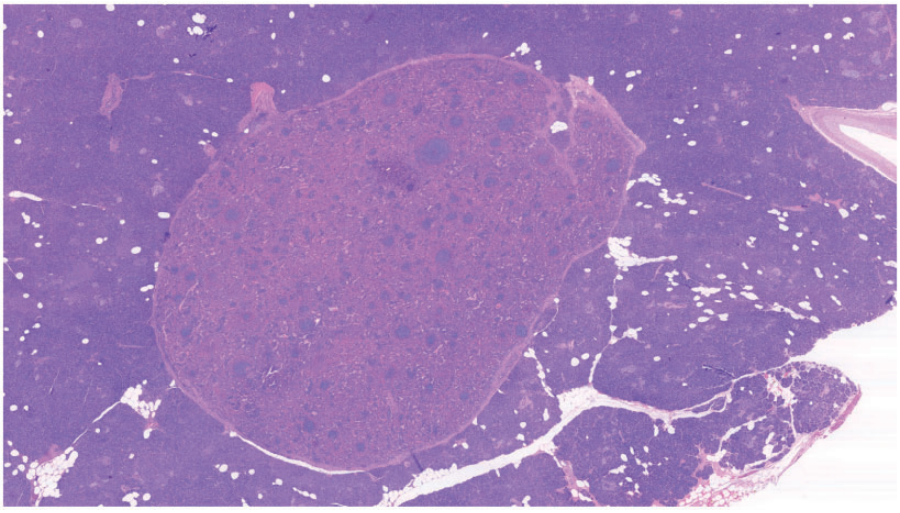

Fig. 3. Intrapancreatic splenic tissue, H&E stain ×1.25.

a 1.2-cm T2 isointense lesion in the tail of the pancreas and high diffusion signal with diffusion restriction in the lesion. The lesion was hypointense on T1-weighted sequences and showed an isointense enhancement after contrast compared to the surrounding pancreatic parenchyma. A PNET was suggested; due to the age of the patient, he underwent distal pancreatectomy. Histopathology revealed an IPAS; no malignancy was observed. The patient had postoperative pancreatic duct-leakage, which was successfully treated.

Discussion

We described three cases of IPAS, which were mistaken for malignancy on imaging. All lesions were hypervascular on contrast-enhanced CT.

One patient was suspected to have an asymptomatic PNET (case 1), another a symptomatic PNET (case 3), and a third patient was suspected to have a metastasis from a RCC (case 2).

In general, diagnosing RCC in the pancreas usually relies on findings from CT and ultrasonography. Most RCC are hypo- to isodense on unenhanced CT, are often hyperdense in the arterial phase, and iso- to hyperdense in the venous phase (8). Most cases do not present with clinical symptoms but are recorded during follow-up or accidentally on CT scan for other indications, but clinical manifestations could be upper abdominal pain, fatigue, loss of appetite, and other unspecific symptoms (9). Case 2 had unspecific symptoms when the lesion was detected. Abdominal MRI raised suspicion of splenic tissue, with the same T2- and

diffusion-weighted signal as the spleen. Consequently, a spleen-SPECT was performed, but the result was negative. The next histological examination finally did confirm the tissue to be splenic, so the spleen-SPECT had shown a false-negative result. Smaller accessory spleens (<2 cm) may not be detectable at spleen-SPECT, especially in patients still having their native spleen (10).

If CT performed for other reasons shows a pancreatic hypervascular tumor (as in case 1) or a neuroendocrine tumor is suspected based on clinical or biochemichal findings (case 3), the next step in the imaging work up is a somatostin receptor functional imaging with Ga-68 or Cu-64 somatostatin analog tracer PET/CT. These tracers are highly specific for NET (11), but as the tracers are also taken up by normal spleen, a finding with tracer uptake in the pancreatic tail, measuring < 3 cm, should raise the possibility of an IPAS as a differential diagnosis.

If the enhancement of the focal lesion follows the spleen in all phases at CT, especially if the typical "zebra" pattern of the spleen is seen in the arterial phase, a diagnosis of IPAS can be made with confidence at CT, but frequently this typical pattern is not visible in the IPAS, either because of small size or because of a different mixture of red and white pulp than the spleen itself (12).

At MRI, the IPAS is typically isointense with spleen at T1- and T2-weighted imaging and has a similar enhancement pattern at dynamic imaging, but the same features may be seen in PNETs (5). Two recent retrospective studies of IPAS versus PNET at MRI focus on signal intensity at diffusion-weighted imaging (DWI) with high b values and especially apparent diffusion coefficient (ADC) for differentiating the two entities. In both studies, the PNETs have significantly higher ADC values than IPAS (5,13). This result is understandable, as the spleen has been shown to have the lowest ADC among the upper abdominal organs (13). In one of the studies, 27 of the 31 PNETs were benign, although specific tumor grade is not mentioned (5). The other study does not include any information on tumor grade (13). Other studies have focused on ADC values in different grades of PNETs and found a lower ADC in more malignant tumors (Ki-67 index- > 5% or WHO tumor grade II or III) (14,15) in absolute values comparable to the values of IPAS in the aforementioned studies (5,13).

Thus, MRI with DWI and ADC measurements should be used with caution in the diagnosis of IPAS, but if the pancreatic lesions follow the spleen in every aspect, it is the most likely diagnosis. Another potential technique to differentiate IPAS from PNET could be textural analysis on contrast-enhanced CT. A recently published exploratory study from Xubo Lin et al. (16) aimed to identify the potential of texture features in differentiating IPAS from small hypervascular PNET. They found that IPAS usually showed heterogeneous enhancement in the arterial phase and the same degree of enhancement as the spleen in the portal phase, greater than those of PNET. Also, they found that entropy and uniformity were significantly different between IPAS and PNET at moderate to high sigma values, indicating that texture parameters have potential in differentiating IPAS from PNET.

In case 3, the MRI retrospectively showed isointensity with the spleen in all imaging sequences and a diagnosis of IPAS could have been suggested and maybe confirmed by spleen-SPECT. This was not performed and because of the patient's relatively young age, it was decided to perform a distal pancreatectomy and splenectomy. ENETS (European Neuroendocrine Tumor Society) guidelines recommend watchful waiting for non-functioning PNET < 2 cm in diameter (17). However, this strategy has been disputed and in our institution we favor surgery in younger patients and only follow pancreatic neuroendocrine incidentalomas in patients aged > 60 years.

In conclusion, when evaluating intrapancreatic lesions, imaging plays a crucial role in the clinical decision-making. Our three cases point to the importance of considering IPAS as a potential diagnosis when detecting an asymptomatic lesion in the pancreatic tail in order to avoid unnecessary surgery (18). To diagnose an IPAS, a spleen-SPECT should be performed. Unfortunately, there is a size-related threshold for the detection of splenic tissue with spleen-SPECT. In general, if a small pancreatic tail tumor shows matching characteristics to the spleen, a biopsy to rule out IPAS is recommended before surgery, despite a negative spleen-SPECT.

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