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Case Report

A case report of a prostate cancer metastasis in the pancreas exhibiting vascular encasement ☆

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ABSTRACT

We report a patient who presented with a 4-month history of intermittent epigastric pain. Computed tomography (CT) angiography of the abdomen demonstrated a stenotic celiac trunk but also encasement of the common proper hepatic artery, gastroduodenal artery, and proper hepatic artery by an ill-defined hypoattenuating mass of the pancreatic head. Biopsy confirmed metastatic prostate cancer to the pancreas that occurred 4 years after radiation and androgen deprivation therapy. A follow-up staging study demonstrated an osseous metastasis at the T4 spinous process. This case demonstrates an unusual case of prostate metastasis to the pancreas with the involvement of a main abdominal vessel. With treatment improvements leading to longer survival rates from prostate cancer, radiologists should be aware of atypical metastases that may arise in the long term.

Introduction

Prostate cancer is currently the second most common cancer in men worldwide. Most cases are diagnosed with local disease only. The most common locations for metastases are nonregional lymph nodes, bones, lungs, and liver. Here we present an unusual case of a prostate cancer metastasis masquerading as an advanced locally invasive pancreatic ductal adenocarcinoma with vascular encasement.

Case report

A 71-year-old man presented to an outside hospital for a 4-month history of intermittent epigastric pain. A computed tomography (CT) demonstrated critical stenosis of the celiac trunk. Balloon angioplasty was attempted but was reportedly unsuccessful. He was discharged without further intervention after his pain subsided. One week following discharge, the patient presented to the emergency room for similar acute

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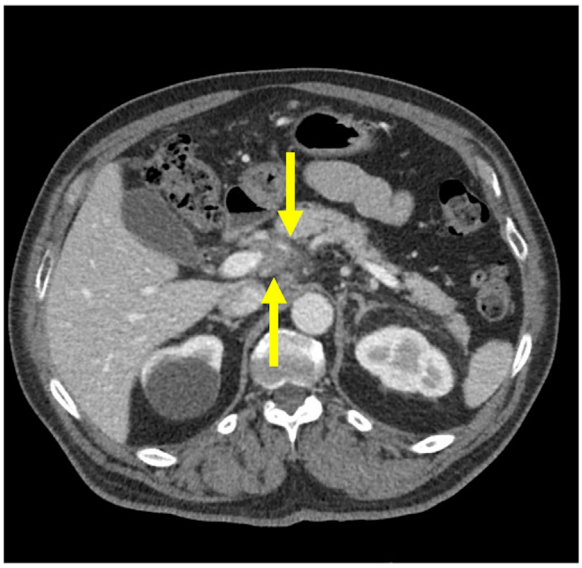

Fig. 1 – Axial contrast-enhanced CT images of the abdomen and pelvis. An ill-defined soft tissue exophytic pancreatic head mass extends superiorly to encase the common hepatic artery (arrows).

epigastric pain. His vital signs were stable, and his physical examination was benign. Vascular surgery was consulted out of concern for mesenteric ischemia, but his symptoms resolved before his assessment without further intervention. The patient was discharged with a diagnosis of celiac artery stenosis and scheduled for outpatient CT angiography and follow-up with vascular surgery.

CT angiography of the abdomen demonstrated a stenotic celiac trunk, however incidentally noted was an ill-defined hypoattenuating mass that appeared to arise superiorly from the head of the pancreas (Fig. 1). There was no pancreatic duct obstruction, as the mass was predominately exophytic. Infiltrating soft tissue encasement of the common hepatic artery, gastroduodenal artery, and proper hepatic artery was seen. The constellation of findings favored a locally invasive pancreatic ductal adenocarcinoma. Lymphoma was also considered, as there was a lack of pancreatic duct dilation, but this was felt to be less likely due to the presence of slight vascular attenuation and lack of lymphadenopathy elsewhere.

Follow-up endoscopic ultrasound demonstrated an ill-defined hypoechoic pancreatic head mass corresponding to the CT findings, and a core biopsy was taken. The sample demonstrated highly atypical epithelioid cells in an infiltrative growth pattern, suspicious for poorly differentiated carcinoma (Fig. 2). However, there was weak immunohistochemical staining for cytokeratin 7 which is atypical for pancreatic adenocarcinoma (Fig. 3). Neoplastic cells at the deeper tissue levels were found to stain for cytokeratins AE1/AE3 and CAM 5.2, suggesting an epithelial origin.

During this workup, the patient newly endorsed a remote history of prostate cancer which was treated at an outside facility. Pathology at that time had demonstrated high-risk Gleason 4+4 disease, for which he had received radiation and androgen deprivation therapy (ADT) 4 years prior to this presentation. A repeat biopsy of the pancreatic lesion was performed to obtain more tissue for evaluation. Prostate specific antigen (PSA) and prostate specific acid phosphatase (PSAP) immunostaining were positive (Fig. 3). Immunostaining with trypsin on the initial biopsy performed at an outside facility eventually returned as negative, which excluded the possibility of acinar cell carcinoma of the pancreas. PAX-8 and S-100 were also negative. Collectively, these findings supported the diagnosis of metastatic prostate cancer in the pancreas. The patient's PSA level was found to be abnormally elevated to 12.4 ng/mL. A subsequent follow-up torso staging study demonstrated an additional osseous metastasis at the T4 vertebral body and spinous process (Fig. 4).

Discussion

Here we present an unusual case of metastatic prostate cancer presenting as a locally invasive pancreatic mass. Metastases to the pancreas are rare, with reported rates from 3% to 12% at autopsy [1]. Renal cell carcinoma is the most common malignancy that metastasizes to the pancreas, followed by melanoma, colorectal cancer, breast cancer, sarcoma, and lung cancer [2]. Metastases to other organ systems often precede pancreatic involvement. Pancreatic metastases typically present as focal masses [3] without predilection to a specific pancreatic segment [4,5]. Metastases may follow an imaging pattern similar to the primary malignancy; for example, pancreatic metastases from clear-cell renal cell

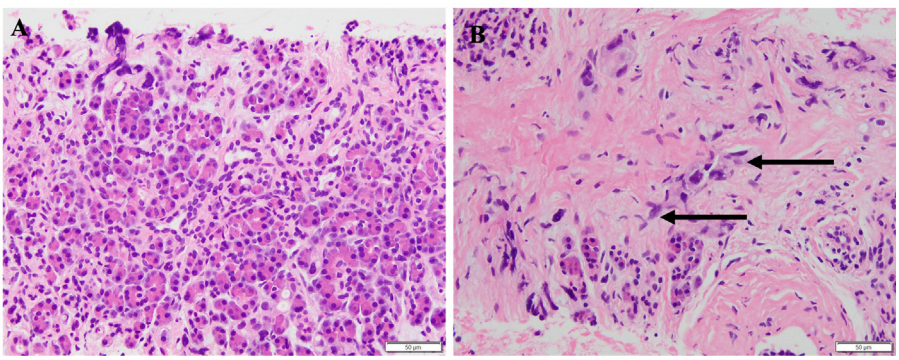

Fig. 2 – Core needle biopsy histology. (A) Normal pancreatic tissue. (B) Poorly differentiated epithelioid cells (arrows).

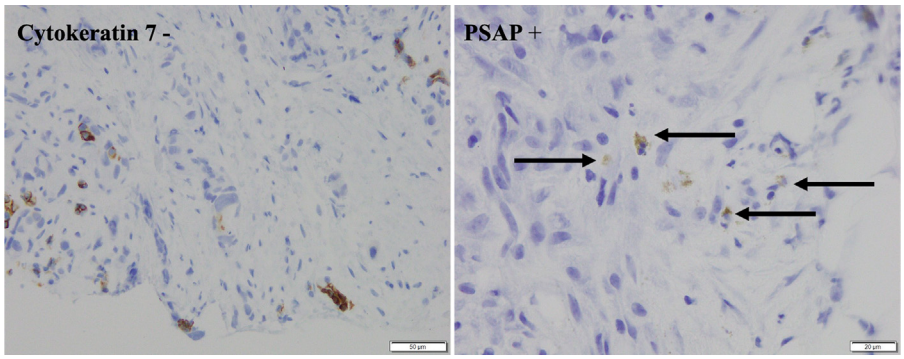

Fig. 3 – Immunohistochemical findings from the core biopsy. Left: Lack of cytokeratin 7 expression was inconsistent with pancreatic ductal adenocarcinoma. Right: PSAP positivity (arrows) supported prostate cancer metastasis.

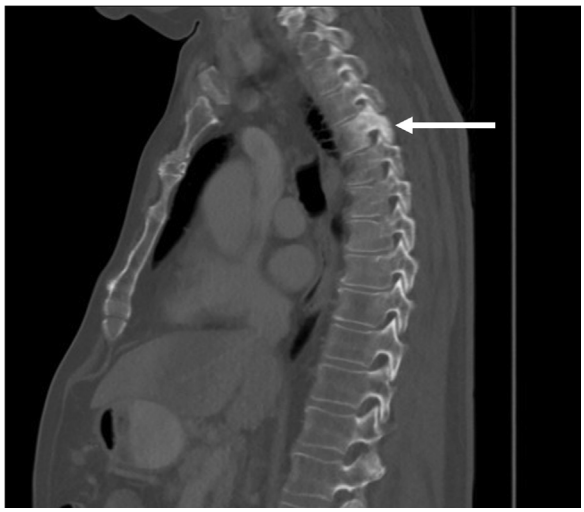

Fig. 4 – Sagittal contrast-enhanced CT image of the chest. Sclerotic metastasis at the posterior T4 vertebral body and spinous process (arrow).

carcinoma are typically hyperenhancing [6,7]. However, others, as in our case, are hypoenhancing, a feature that overlaps with pancreatic ductal adenocarcinoma. The presence of local invasion and vascular encasement, however, is highly atypical. Vascular involvement is common in primary ductal adenocarcinomas but rare with pancreatic metastases, with 10%-13% of metastases exhibiting such findings [4,8]. Several cases of metastatic prostatic cancer to the pancreas have been described to date, but to the best of our knowledge, this is the first case of infiltrative pancreatic metastases with vascular encasement being reported. Tissue diagnosis is required for definitive differentiation. Endoscopic ultrasound (EUS) is often used for further characterization, with the added benefit of biopsy [9].

Primary prostate cancer is the second most common malignancy in men worldwide. The majority of prostate cancer occurs in men over age 50 [10]. Prostate cancer metastasizes through lymphatic and hematogenous routes. The most common sites of lymphatic metastasis are para-aortic lymph nodes followed by pelvic lymph nodes. Bones are the most common site of hematogenous metastasis, followed by lung and liver. Prostate cancer metastases to the pancreas are extremely rare. Bubendorf et al. [10] reported pancreatic metastases accounting for an overall 1.4% rate of metastatic prostate cancer on autopsy studies. Pancreatic prostate cancer metastases are usually detected in the setting of known metastatic disease in other organs. In the few available reported cases, patients presented with abnormal liver function tests and normal or low-density pancreatic lesions on cross-sectional imaging, with the diagnosis requiring pathology confirmation with PSA or PSAP immunohistochemical staining [11,12]. In another reported case, a pancreatic prostate oligometastasis resulted in obstruction of the main pancreatic duct and common bile duct on imaging [13]. In our case, the patient presented with abdominal pain and an infiltrating pancreatic mass detected on CT without any laboratory abnormalities. The only other metastatic site, within the T4 vertebral body as well as spinous process, was discovered after a complete torso staging workup was initiated. A subsequent transfer of medical records revealed that our patient was initially diagnosed with gland-confined high-grade prostate cancer (Gleason 4+4) without evidence of metastasis and underwent prior radiation therapy and ADT.

Advancements in treatment and early detection of prostate cancer have improved prognosis and life expectancy of patients with prostate cancer. These patients usually undergo long-term imaging surveillance. As a result, there has been an increase in metastases detected in uncommon sites. Pancreatic metastases from prostate cancer have been reported to occur from 2 to 10 years after the initial diagnosis [11,13,14]. More recently, prostate-specific membrane antigen positron emission tomography (PSMA PET) has become increasingly utilized for the assessment of prostate cancer recurrence. However, the diagnostic performance of ^{68}Ga-PSMA PET/CT can be limited by PSMA-negative metastases which can occur in the liver and lung [15,16]. Nonetheless, there is emerging evidence for its capability of identifying rare prostatic metastases that may not be visible on conventional imaging. Harris et al. [17] reported the use of PSMA PET/CT in detecting atypical metastases located in the right inguinal nodes, the abdominal wall, the penile shaft, and the pulmonary pleura. Due to the increasing survival rate of prostate cancer, radiologists should be cognizant that prostate cancer metastases may occur beyond the common sites such as the bones.

Patient consent

A written informed consent was obtained from the patient's health care proxy.

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