A case of pancreatic carcinosarcoma detected on PET/CT

Lingxiao Cheng MD,
Yao Liu MD,
Cen Lou MD,
Lingxiao Cheng MD

Department of Nuclear Medicine, Sir Run Run Shaw Hospital, Zhejiang University School of Medicine, 3, East Qingchun Road, Hangzhou 310016, China

Keywords: Pancreatic carcinosarcoma - Carcinosarcoma - PET/CT - Imaging

Corresponding author:
Lingxiao Cheng MD, Department of Nuclear Medicine, Sir Run Run Shaw Hospital, Zhejiang University School of Medicine, 3, East Qingchun Road, Hangzhou 310016, China, chenglingxiao2017@zju.edu.cn, chenglingxiao22@126.com

Received:
18 July 2021
Accepted:
27 August 2021

Abstract
Primary pancreatic carcinosarcoma is a rare and malignant neoplasm composed of a mixture of sarcomatous and carcinomatous elements. With fewer than forty cases ever reported, the recognition of this rare phenomenon can be difficult. In the present case, a73-year-old woman with pancreatitis underwent computed tomography which revealed wall-off pancreatic necrosis. Following initial and delayed fluorine-18-fluorodeoxyglucose positron emission tomography/computed tomography (^{18}F-FDG PET/CT) revealed high uptake of tracer in pancreatic mass, endoscopic biopsy revealed carcinosarcoma. The patient underwent laparoscopic pancreato-caudal resection and was confirmed to have pancreatic carcinosarcoma on microscopic evaluation. The case shows the importance of PET/CT on the early diagnosis in pancreatic mass, and suggests pancreatic carcinosarcoma should be considered as a possible differential diagnosis, which can hasten treatment and improve patient outcomes.

Hell J Nucl Med 2021; 24(3): 262-264 *Epub ahead of print: 17 December 2021* *Published online: 28 December 2021*

Introduction

Carcinosarcomas are rare neoplasms composed of a concomitant mixture of sarcomatous and carcinomatous elements. They are most commonly located in the uterus; however, many other locations have been reported, including the pancreas [1]. First described by Millis et al. (1994) [2], pancreatic carcinosarcoma reveals poor prognosis and most cases are already at a metastatic stage at the time of diagnosis. Surgical resection is the mainstay of treatment and average postoperative survival time was 6 months [3].

Conventional imaging modalities, such as computed tomography (CT) and magnetic resonance imaging (MRI), are commonly used as initial diagnostic technologies for tumor detection. However, their diagnostic capabilities to differentiate between benign and malignant lesions are limited [4]. Mszyco et al. (2017) have reported that clear radiologic differentiation of pancreatic carcinosarcoma from other likely tumor is difficult [5]. On the contrary, fluorine-18-fluorodeoxyglucose positron emission tomography/ computed tomography (^{18}F-FDG PET/CT) has attracted increasing interest. Fluorine-18-FDG PET/CT imaging of carcinosarcoma affecting uterine, gastrointestinal system prostate, and liver have been represented in a limited number of studies [6-9], whereas the PET/CT characteristics of carcinosarcoma in pancreas have been even more rarely described. Herein, we present PET/CT findings in a case of 73-year-old with primary carcinosarcoma of the pancreas.

Case presentation

A 73-year-old woman with a past medical history significant for appendectomy, rheumatic arthritis, cholecystectomy presented with 2 days of right epigastric pain as well as vomiting. Social, family, and past surgical histories were unremarkable. Laboratory studies were notable for an elevated lipase of 375.88U/L and an elevated amylase of 184U/L.

Enhanced CT demonstrated a 28mm well-circumscribed isodensity nodule in the pancreatic body which was 20mm by 11mm displayed on prior MRI 4weeks earlier (Figure1). Bile ducts appeared normal and no enlargement or enhancement of retroperitoneal lymph nodes was observed. The administration of intravenous iodinated contrast demonstrated no obvious enhancement of the nodule. At last pancreatic pseudocyst was concluded rather than malignant tumor. The following endoscopic ultrasonography revealed an heterogeneous mass 25mm by 20mm in pancreatic body, and the pancreatic

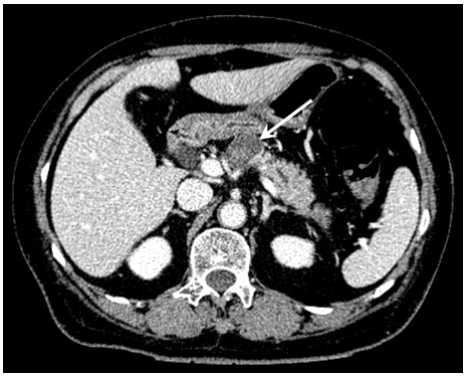

Figure 1. Abdominal enhanced CT: Non-enhanced nodule (arrow) was observed in the pancreatic body.

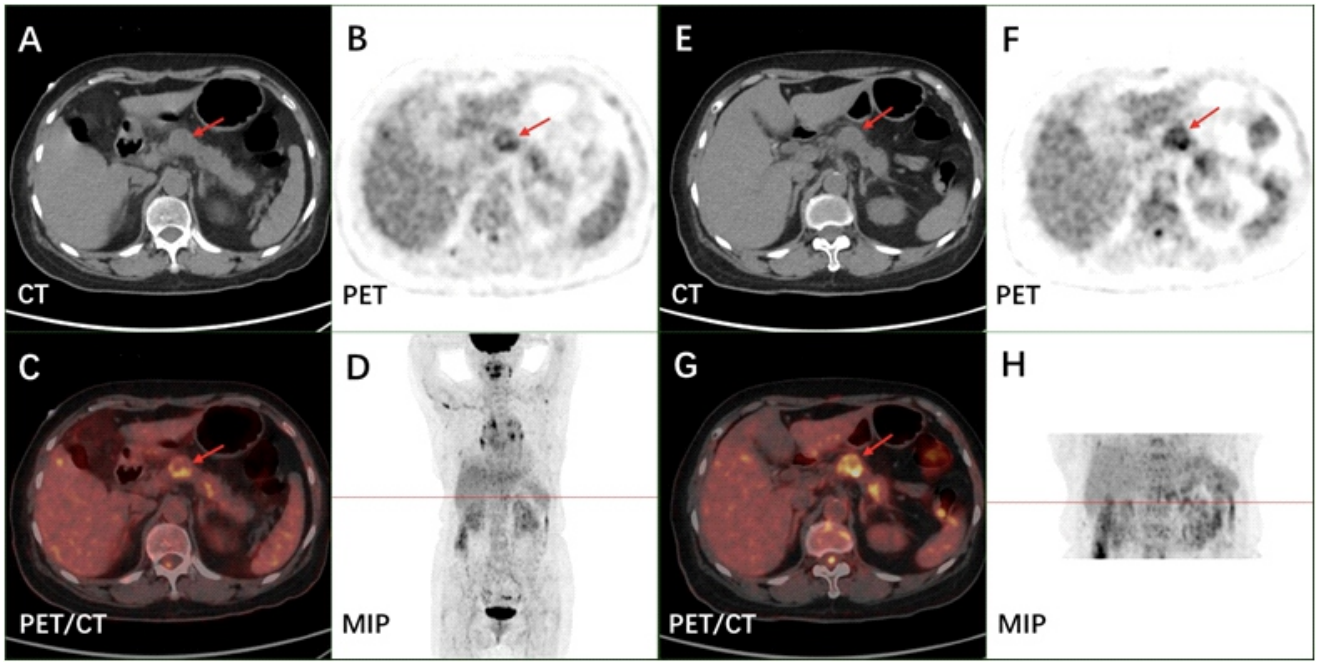

Figure 2. Initial (A-D) and delayed (E-H)^{18}F-FDG PET/CT: (A, E) transverse CT, (B, F) corresponding PET, (C, G) fusion images showed increased FDG uptake in the pancreatic body, and (D, H) maximum intensity projection (MIP) imaging.

duct and bile ducts appeared normal. Fluorine-18-FDG PET/CT displayed a 24mm soft tissue density lesion in the pancreatic body with increased ^{18}F-FDG uptake, maximum standardized uptake value (SUVmax) of early imaging was 3.7, and SUVmax of delayed imaging was 4.2 (Figure 2). The distribution of ^{18}F-FDG in the lesion was heterogeneous - higher at the edge than in the center, placing malignant tumor higher on the differential at that time.

The patient underwent alaparoscopic pancreato-caudal resection combined with splenectomy. There was no visible peritoneal lesion or intraperitoneal effusion on inspection. The surgery was followed by complications including thoracoperitoneal infection and hyperglycemia, and he was discharged on postoperative day 70. Gross pathology revealed a 20mm*13mm pancreatic body mass which is close to the burning margin, infiltrating adipose tissue around the pancreas and the nerve. Microscopic analysis established the diagnosis of carcinosarcoma (highly to moderately differentiated adenocarcinoma and pleomorphic undifferentiated sarcoma). Figure 3 demonstrates microscopic images of adenocarcinoma, pleomorphic undifferentiated sarcomaand necrosis.

Discussion

Pancreatic carcinosarcoma is a neoplasm the mechanism of which is unclear. Three possible mechanisms have been proposed: (a) Single early-stage carcinoma, and partial transformation into sarcoma [10]; (b) Tumors of different origin in close proximity, during growth, but without mutual integration (2); and (c) Single stem cell-differentiation into epithelial and mesenchymal cells [11]. The transformation theory is more widely accepted. It is a rare disease with fewer than forty cases available. And because of its rarity, it is often found near

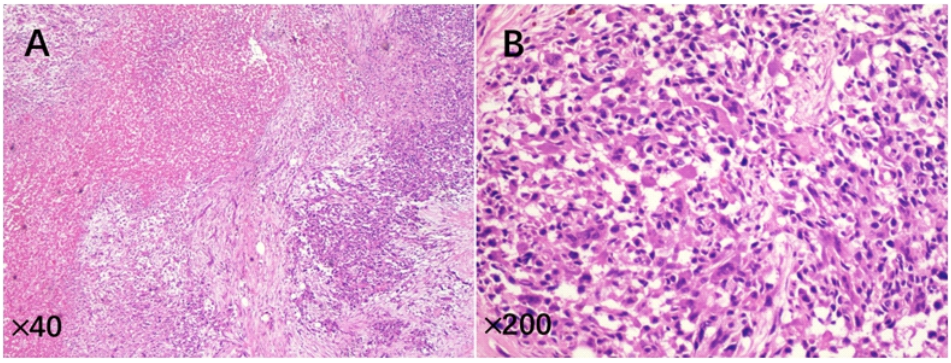

Figure 3. Microscopic analysis of resected pancreatic body. (A) HE staining 40: adenocarcinoma (middle lower part), pleomorphic undifferentiated sarcoma (right lower part) and necrosis (right upper part). (B) HE staining 200: pleomorphic undifferentiated sarcoma.

the bottom of differential for an aggressive pancreatic lesion.

Common symptoms of pancreatic carcinosarcoma include nonspecific abdominal pain, nausea, emesis, jaundice, abdominal pain, weight loss, resembling pancreatic ductal adenocarcinoma. Pancreatic carcinosarcoma has high rates of distant metastatic disease and local recurrence. The disease is fatal, with a life expectancy of 6 months postresection [3]. The longest recurrence-free survival time reported was 31 months [12]. However, the preoperative diagnosis of pancreatic carcinosarcoma is difficult owing to its rarity and biphasic nature. Early detecting and accurate staging plays an important role in deciding treatment options, however diagnostic efficiency of conventional diagnostic methods including CT and MRI is far from satisfactory [6]. In contrast, ^{18}F-FDG PET/CT is capable of capturing metabolic information, which contributes to superior diagnostic performance. Increased vascularity, cellularity, and degeneration can cause the higher ^{18}F-FDG uptake in PET/CT imaging, thus helps distinguish between benign and malignant tumors, and provides a better detection of metastases displayed as high-uptake lesions in peripancreatic lymph nodes, hepaticet al. The SUVs of carcinosarcoma in reported cases are relatively high [6-9, 13], Fukunaga et al. (1998) [14] reported that the SUV of esophagus carcinosarcoma were significantly higher than those of well, moderately, or poorly differentiated esophagus carcinoma. In our case, however, the SUVmax of primary lesion is relatively low, probably due to higher proportion of more differentiated component and necrotic. Heterogeneous distribution of ^{18}F-FDG-higher uptake at the edge than in the center, might be related to ischemia and necrosis in the center, abundant blood supply and high glycolysis metabolism at the edge.

In conclusion, pancreatic carcinosarcoma is a rare and fatal tumor with short life expectancy. Although accurate diagnosis is often made after pathologic analysis of the surgical specimens, accurate qualitative diagnosis at the early stage could improve outcomes through accelerated resection. Diagnostic efficiency of conventional diagnostic methods including CT and MRI is far from satisfactory, while PET/CT is capable of capturing metabolic information and has superior diagnostic performance.

The authors declare that they have no conflicts of interest.

Bibliography

1. Silverberg SG, Major FJ, Blessing JA et al. Carcinosarcoma (malignant mixed mesodermal tumor) of the uterus: A gynecologic oncology group pathologic study of 203 cases. *Int J Gynecol Pathol* 1990; 9(1): 1-19.
2. Millis JM, Chang B, Zinner MJ et al. Malignant mixed tumor (carcinosarcoma) of the pancreas: A case report supporting organ-induced differentiation of malignancy. *Surgery* 1994; 115: 132-7.
3. Gelos M, Behringer D, Philippou S et al. Pancreatic carcinosarcoma. Case report of multimodal therapy and review of the literature. *JOP* 2008; 9: 50-5.
4. Shi HY, Xie J, Miao F. Pancreatic carcinosarcoma: First literature report on computed tomography imaging. *World J Gastroenterol* 2015; 21(4): 1357-61.
5. Mszyco S, Teng L, Annunziata J et al. Pancreatic Carcinosarcoma: A Case Report Highlighting Computed Tomography Characteristics. *Curr Probl Diagn Radiol* 2017; 46(4): 342-5.
6. Kim S, Kim YT, Kim S et al. Diagnostic Value of ^{18}F-FDG PET/CT and MRI in the Preoperative Evaluation of Uterine Carcinosarcoma. *Nucl Med Mol Imaging* 2018; 52(6): 445-52.
7. Oldan JD, Chin BB. FDG PET/CT Imaging of Prostate Carcinosarcoma. *Clin Nucl Med* 2016; 41(8): 629-31.
8. Li B, Zhang Y, Hou J et al. Gastric Carcinosarcoma and ^{18}F-FDG PET/CT. *Clin Nucl Med* 2015; 40: e506-7.
9. Li B, Zhang Y, Hou J et al. Primary Liver Carcinosarcoma and ^{18}F-FDG PET/CT. *Clin Nucl Med* 2016; 41: e383-5.
10. Yamazaki K. A unique pancreatic ductal adenocarcinoma with carcinosarcomatous histology, immunohistochemical distribution of hCG-beta, and the elevation of serum alpha-feto-protein. *J Submicrosc Cytol Pathol* 2003; 35(4): 343-9.
11. van den Berg W, Tascilar M, Offerhaus GJ et al. Pancreatic mucinous cystic neoplasms with sarcomatous stroma: molecular evidence for monoclonal origin with subsequent divergence of the epithelial and sarcomatous components. *Mod Pathol* 2000; 13(1): 86-91.
12. Jia Z, Zhang K, Huang R et al. Pancreatic carcinosarcoma with rare long-term survival: Case report and review of the literature. *Medicine* 2017; 96(4): e5966.
13. Ho KC,Lai CH,Wu TI et al. ^{18}F-fluorodeoxyglucose positron emission tomography in uterine carcinosarcoma. *Eur J Nucl Med Mol Imaging* 2008; 35(3): 484-92.
14. Fukunaga T, Okazumi S, Koide Y et al. Evaluation of esophageal cancers using fluorine-18-fluorodeoxyglucose PET. *J Nucl Med* 1998; 39(6): 1002-7.