Interesting Image

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Intense FAPI Uptake of Pancreatic Tissue Can Mask the Tumor Activity of Pancreatic Cancer: The Importance of Dual-Tracer PET Imaging

Pankreatik Dokunun Yoğun FAPI Tutulumu Pankreas Kanserinin Tümör Aktivitesini Maskeleyebilir: Çift İzleyici PET Görüntülemenin Önemi

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Abstract

Fibroblast activation protein (FAPI), a type II transmembrane glycoprotein is a promising target to image epithelial originated cancers. Pancreatic cancer is characterized with [^{68}Ga]Ga-FAPI-04 and ^{18}F-fluorodeoxyglucose (^{18}F-FDG) uptake in varying degree. However physiologic uptake and uptake associated with acute/chronic pancreatitis makes interpretation challenging. We would like to present a case of pancreatic cancer whose tumor could not delineated from rest pancreatic tissue in [^{68}Ga]Ga-FAPI-04 positron emission tomography/computed tomography (PET/CT) images due to intense FAPI uptake in whole pancreas but more remarkable in ^{18}F-FDG PET/CT images.

Keywords: FAPI, Gallium-68, pancreatic cancer, FDG, PET/CT

Öz

Tip II transmembran glikoprotein olan fibroblast aktivasyon proteini (FAPI), epitel kökenli kanserlerin görüntülenmesinde umut vadeden bir hedeftir. Pankreas kanseri, değişen derecelerde [^{68}Ga]Ga-FAPI-04 ve ^{18}F-florodeoksiglukoz (^{18}F-FDG) tutulumu ile karakterizedir. Ancak fizyolojik tutulum ve akut/kronik pankreatit ile ilişkili tutulum, yorumlamayı zorlaştırır. Tümörünün tüm pankreasın tamamında yoğun FAPI tutulumu olmasına rağmen ^{18}F-FDG pozitron emisyon tomografisi/bilgisayarlı tomografi (PET/BT) görüntülerinde daha belirgin olması nedeniyle [^{68}Ga]Ga-FAPI-04 PET/BT görüntülerinde kalan pankreas dokusundan ayırt edilemediği bir pankreas kanseri vakasını sunmak istiyoruz.

Anahtar Kelimeler: FAPI, Galyum-68, pankreas kanseri, FDG, PET/BT

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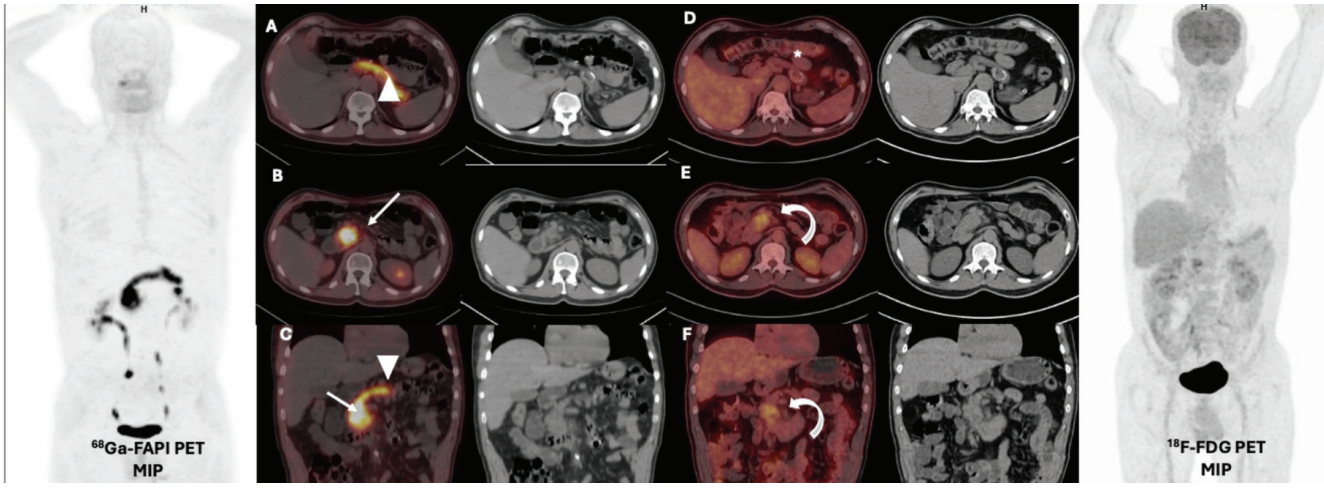

Figure 1. Fifty-eight-year-old man presented with abdominal pain. The clinician did not reveal any findings requiring urgent abdominal surgery with clinic examination. Abnormal laboratory test results were; carcinoembryonic antigen: 32.3 mg/L (normal mg/l <3), cancer antigen 125: 42.9 u/mL (normal <35 u/mL), carbohydrate antigen 19-9: 16065 U/mL (normal <35 U/mL). Abdominal magnetic resonance imaging confirmed the pancreatic head located tumoral lesion with malignancy suspicion. Upon this, the clinician planned ^{18}F-fluorodeoxyglucose positron emission tomography/computed tomography (^{18}F-FDG PET/CT) for initial staging. In order not to waste time, the patient with uncontrollable hyperglycemia (fasting blood glucose level was over 350 mg/dL), underwent [^{68}Ga]Ga-fibroblast activation protein (FAPI)-04 PET/CT imaging (line A, B, C). Whole pancreatic tissue showed diffuse intense [^{68}Ga]Ga-FAPI-04 uptake (line A and C; arrow-head). The tumor could not be discriminated from the rest of pancreas tissue on PET images (line B and C; arrow). After controlling of the fasting-blood glucose level ^{18}F-FDG PET/CT performed (line D, E, F). Pancreatic head located tumor showed mild ^{18}F-FDG uptake (line E and F; curved-arrow). However, rest of the pancreatic tissue did not show pathological activity uptake neither focal nor diffuse (line D; asterix). It is accepted as an important finding to exclude the tumor induced acute pancreatitis.

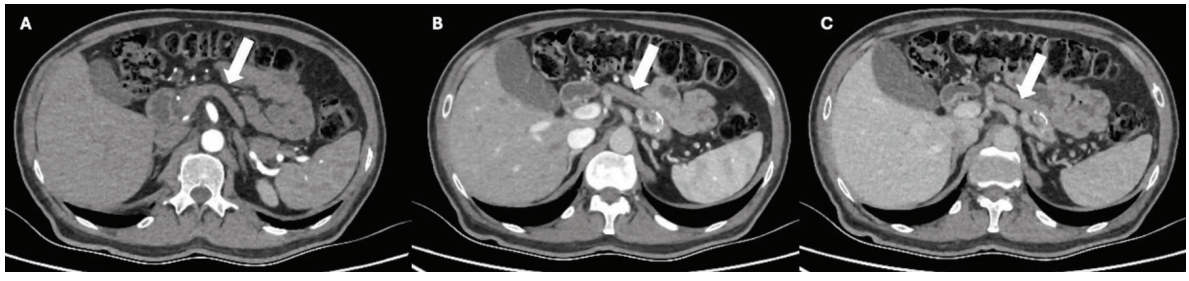

Figure 2. Clinic examination findings, laboratory test results did not point acute pancreatitis [amylase: 45.8 U/L (28-100), lipase: 13.3 U/L (0-67) aspartate aminotransferase: 18 U/L (0-50), alanine aminotransferase: 22 U/L (0-50) C-reactive protein: 0.4 mg/L (0-5), white blood cell: 7.02 10^9/L (4-10)]. No findings, such as swelling, peripancreatic fluid, abnormal enhancing, fat stranding, suggestive of acute pancreatitis were detected in contrast-enhanced abdominal computed tomography (CT) images (A: arterial phase, B: portal venous phase, C: delayed phase; arrows). Body and tail part of the pancreatic tissue was atrophic. Histopathologic examination of the pancreatic head located tumor was consistent with adenocarcinoma. Neoadjuvant chemotherapy was planned.

In this case due to high [^{68}Ga]Ga- fibroblast activation protein (FAPI)-04 uptake in the whole pancreatic tissue delineating the tumor from non-cancerous parenchyma was not possible. Although tumor showed low degree hypermetabolism, the tumor border was clearer in ^{18}F-fluorodeoxyglucose positron emission tomography (^{18}F-FDG PET) images compared with [^{68}Ga]Ga-FAPI-04 PET images.

[^{68}Ga]Ga-FAPI-04 has several advantages over ^{18}F-FDG PET in terms of patient preparation. [^{68}Ga]Ga-FAPI-04 PET is a promising alternative to ^{18}F-FDG PET in cases with uncontrolled hyperglycemia like ours'. Superiority of [^{68}Ga]Ga-FAPI-04 PET in most epithelial cancer originating from the gastrointestinal tract especially in identifying lymph nodes and peritoneal metastasis have shown in the literature (2-4). Similar to ^{18}F-FDG, both focal and diffuse [^{68}Ga]Ga-FAPI-04 uptakes are a pitfall in cases with pancreatic carcinoma suspicion. Non-cancerous pathology of the pancreas could show high [^{68}Ga]Ga-FAPI-04 uptake (5,6). Moreover, tumor induced acute pancreatitis made more complex the delineation of the tumor (7). Non-specific prominent [^{68}Ga]Ga-FAPI-04 uptake compared with ^{18}F-FDG could be detected probably due to fibrotic or chronic inflammatory changes of pancreas (8). In most cases, the physiologic [^{68}Ga]Ga-FAPI-04 uptake of pancreas is lower compared with ^{18}F-FDG (1). There is limited data in the literature suggesting that high-degree [^{68}Ga]Ga-FAPI-04 uptake in pancreatitis may mask the tumor (7). Our case was diagnosed with diabetes and pancreas appeared atrophic on CT images. Both findings could support chronic pancreatitis. In our case, diffuse intense [^{68}Ga]Ga-FAPI-04 uptake and low-grade ^{18}F-FDG uptake were thought to be secondary to chronic pancreatitis inducing fibrosis. [^{68}Ga]Ga-FAPI-04 uptake in the fibrotic tissue is well known in literature. In selected cases, dual-tracer PET imaging could increase our knowledge about the cancer and concomitant pathologies.

Ethics

Informed Consent: Informed consent was obtained from all subjects involved in the study.

Footnotes

Authorship Contributions

Surgical and Medical Practices: E.A., A.E.Ö., G.A., M.M.S., Es.A., Concept: E.A., Design: E.A., Es.A., Data Collection or Processing: E.A., M.M.S., Analysis or Interpretation: E.A., M.M.S., Literature Search: E.A., A.E.Ö., Writing: E.A.

Conflict of Interest: No conflicts of interest were declared by the authors.

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