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Case report

F-18 Fluorodeoxyglucose Positron Emission Tomography/Computed Tomography in the Staging of Linitis Plastica Caused by Primary Gastric Adenocarcinoma

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Abstract

Diffuse infiltration by a primary or metastatic malignancy into the submucosa and muscularis of the stomach (linitis plastica [LP]) has been described in literature. The authors present a case of LP caused by primary adenocarcinoma of the stomach, showing diffuse Fluorine-18 fluorodeoxyglucose uptake in the thickened wall of the stomach.

Keywords: Adenocarcinoma, fluorodeoxyglucose positron emission tomography/computed tomography, linitis plastica, stomach

Introduction

Linitis plastica (LP) is a diffuse type of adenocarcinoma of the stomach. This is a poorly differentiated tumor in scattered cell clusters, which usually secrete mucus. F-18 fluorodeoxyglucose positron emission tomography (FDG PET) is of limited use in gastric cancer because primary gastric tumors are generally not avid for this tracer. Low or absent FDG uptake in the non-intestinal subtype results from the high number of signet ring cells. We report the utility of FDG-PET/computed tomography (CT) in the staging of a case of non-intestinal type of gastric cancer which showed increased FDG uptake.

Case Report

This was a case of a 47-year-old female patient who presented to the surgical gastroenterology division of our institute with epigastric pain, decreased appetite and vomiting for the preceding 2 months. She also had six to seven episodes of hematemesis and melena. She was hemodynamically stable at the time of presentation. Laboratory tests revealed hemoglobin of 10.1 g/dl with normal renal and liver function tests. Upper gastrointestinal endoscopy showed a narrowing at the gastro-esophageal (GE) junction and edematous, friable mucosa with multiple hemorrhagic erosions and ulcerations throughout the stomach, suggestive of malignancy. However, the initial biopsy was non-contributory. The patient was subsequently put on a feeding jejunostomy. A contrast enhanced computed tomography showed asymmetric circumferential mural thickening, from the cardia to the pylorus in a less-distended stomach and extensive fat stranding in the adjacent omentum; free fluid was also noted in the perihepatic and perisplenic locations and a sclerotic focus was detected in the L4 lumbar vertebra. The patient then underwent FDG PET [Figure 1a-e] is to rule out any distant metastases. Intense diffuse FDG uptake (maximum standardized uptake value 12.1) was seen in asymmetric circumferential mural thickening involving the GE junction and the entire wall of the

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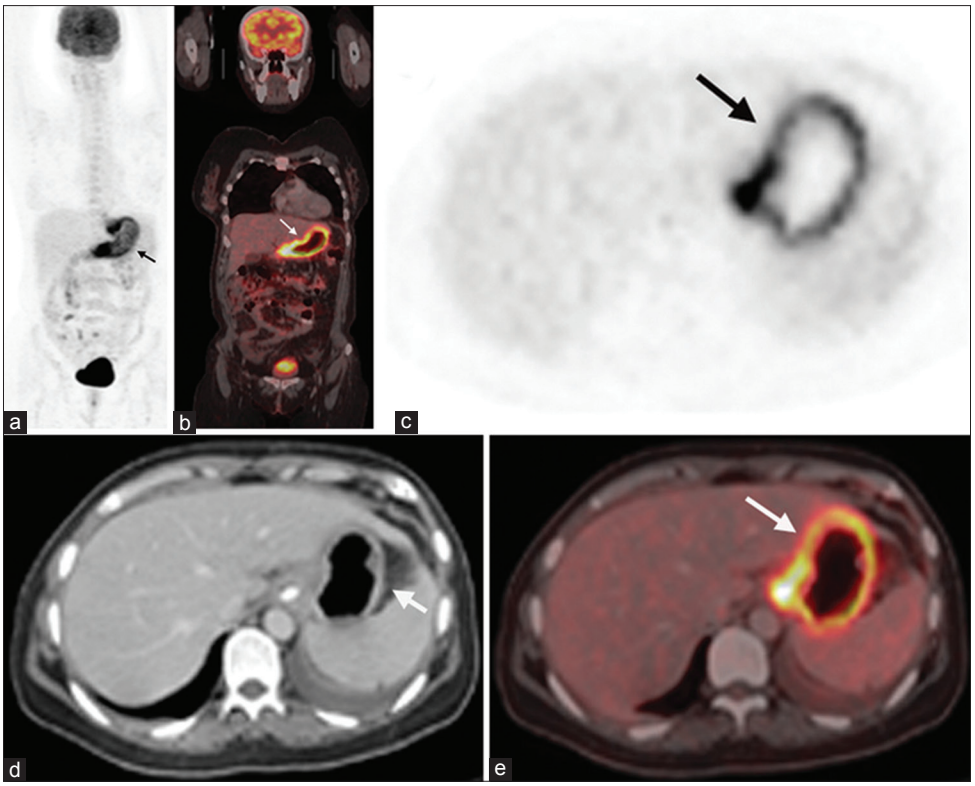

Figure 1: Fluorodeoxyglucose positron emission tomography/computed tomography (PET/CT) image showing intense tracer concentration in the wall of the stomach (arrow) in the maximum intensity projection (a), fused coronal PET/CT image (b), transaxial PET (c) and transaxial fused PET/CT image (e). The transaxial CT image (d) shows a circumferential mural thickening of the stomach wall (arrow)

stomach. FDG uptake was also noted in the perigastric fat stranding. A few faintly FDG avid supradiaphragmatic lymph nodes were also seen. The vertebral lesion did not show any FDG uptake. Subsequent biopsy from the antro-pyloric region was suggestive of a poorly differentiated adenocarcinoma of signet ring type. Faint FDG avid ascites was also noted in the pelvis, which was positive for malignancy by cytology. Thus, metastatic disease was confirmed and the patient was managed with palliative treatment, avoiding surgery.

Discussion

LP is a cause of diffuse FDG uptake with thickened gastric wall. The gastric mucosa is spared of the malignant infiltration and hence endoscopic diagnosis is difficult. Linitis shows few mucosal lesions on gross appearance.[1] Primary gastric adenocarcinoma infiltrating the submucosa and muscularis is the most common cause of LP. Although metastatic involvement is an infrequent cause, infiltrating lobular carcinoma of the breast is reported to be the most common metastatic cause of LP.[2] FDG PET patterns of LP caused by lymphoma[3] and breast cancer[4] have been previously described. Primary gastric adenocarcinomas usually show low FDG uptake and are not routinely staged with PET/CT. This is because, FDG uptake has been shown to be lower in cancers of the non-intestinal type, with signet ring cells, high mucinous content and lower cellularity.[5] However, the patient in this study showed increased FDG uptake. Published sensitivities for FDG PET range from 47 to 96% for the detection of gastric cancer and from 23 to 73% for the detection of lymph node involvement.[5]

Treatment options for patients with diffuse type gastric cancer are controversial. It is widely believed that these patients should be treated conservatively, primarily with palliative intention. In a recent study of patients with LP, 61% ($n = 73$) of all patients already had distant metastases at the time of surgery, 80% of them peritoneal carcinomatosis. A significant survival advantage for patients with diffuse gastric cancer can only be achieved after complete resection. However, meticulous pre-operative staging, to exclude peritoneal carcinomatosis and free peritoneal tumor cells before resection should be mandatory in these patients.[6] The sensitivity and specificity of FDG PET for distant metastasis detection ranges from 35-74% to 74-99%, respectively.[7] In our case, PET/CT helped in the identification of FDG avid ascites in the pouch of Douglas, which was subsequently confirmed by cytology. Thus, FDG PET/CT can be used in the initial staging of patients with diffuse type adenocarcinoma of the stomach, which can then guide the management options in these patients mainly through the identification of distant metastases.

Recently, the Japanese Gastric Cancer Association Task Force for Research Promotion has also stated that PET can contribute to the selection of a more appropriate treatment modality by detecting distant metastases and treatment response.[7]

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