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^{68}Ga-NOTA-exendin-4 PET/CT in localization of an occult insulinoma and appearance of coexisting esophageal carcinoma

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Abstract

A 61-year-old woman with biochemically proven endogenous hyperinsulinemic hypoglycemia and negative conventional imaging underwent ^{68}Ga-NOTA-exendin-4 PET/CT for localization of insulinoma. Focal intense radioactivity in the tail of the pancreas was observed that was subsequently confirmed as insulinoma pathologically after surgical resection. Additionally, esophageal carcinoma with lymph node and hepatic metastases was found by FDG PET/CT in the same patient. Neither the primary carcinoma nor the metastases showed increased radioactivity on ^{68}Ga-NOTA-exendin-4 PET/CT.

Keywords

glucagon-like peptide-1 receptor; exendin-4; insulinoma; esophageal carcinoma; PET/CT

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Conflict of interest: no

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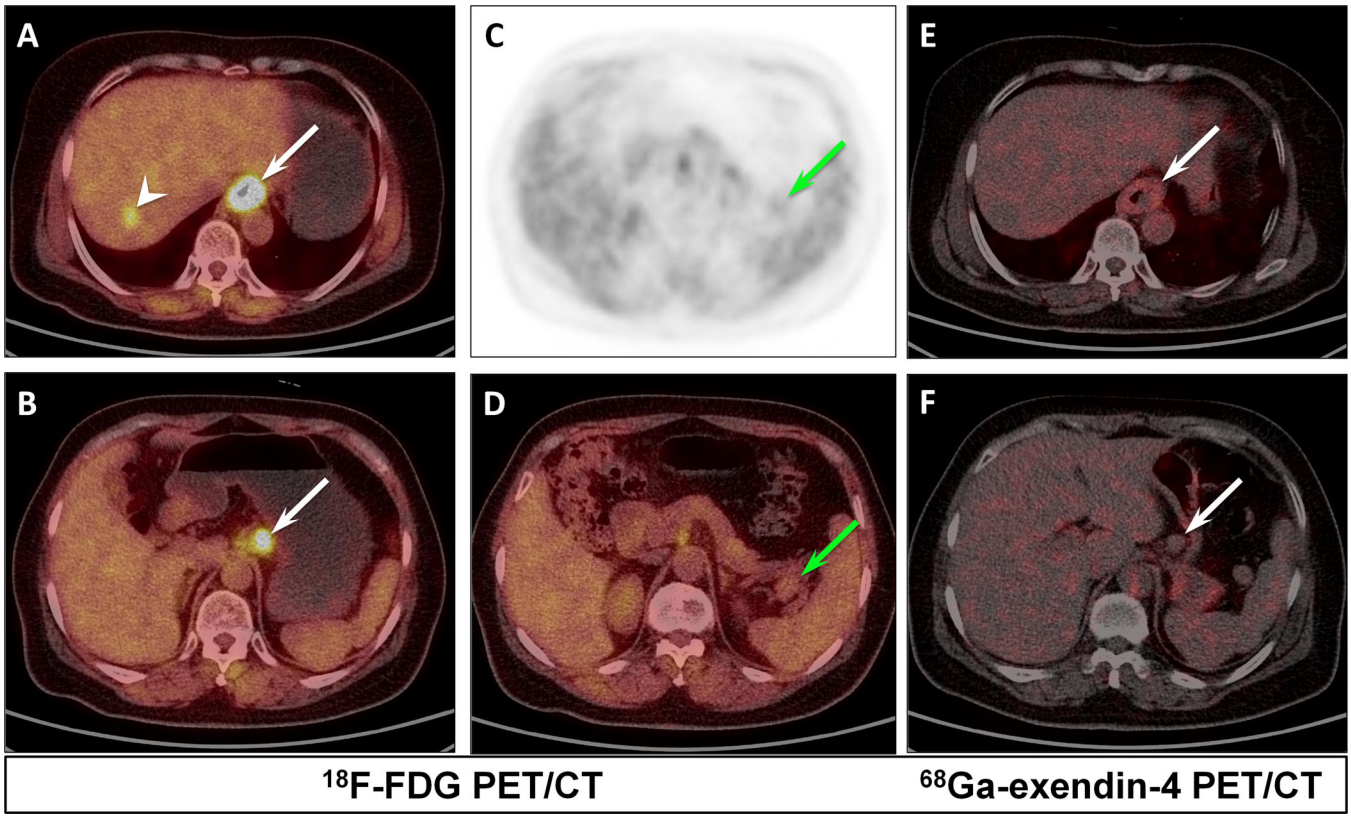

FIGURE 1.

A 61-year-old woman presented symptoms of neuroglycopenia for 11 years. Whipple's triad (recorded lowest serum glucose level 0.8 mmol/L) with inappropriately high serum insulin and C-peptide level was repeatedly documented during the course of disease. Insulinoma was considered as the most common etiology of endogenous hyperinsulinemic hypoglycemia in this patient without a known history of diabetes. However, contrast-enhanced CT, MRI, endoscopic ultrasound, arteriography of superior mesenteric artery, and somatostatin receptor scintigraphy showed no evidence of insulinoma. She was then referred for ^{68}Ga-NOTA-exendin-4 PET/CT for localization of insulinoma, which was approved by the institutional review board of our hospital, and written informed consent was obtained from the patient. ^{68}Ga-NOTA-exendin-4 is a novel PET tracer targeting glucagon-like peptide-1 receptor (GLP-1R), which is highly overexpressed on benign insulinoma cell surface in very high incidence and extremely high density[1, 2]. GLP-1R imaging with exendin-4 based tracer was recently reported to be very sensitive for localization of insulinomas[3–8]. PET/CT images were acquired 50 min after intravenous injection of 51.8 MBq of ^{68}Ga-NOTA-exendin-4. On MIP image of the PET (A), a focal lesion with intense radioactivity in the left upper abdomen (arrow) was clearly seen. Both kidneys and bladder showed physiological uptake. On axial images (B, PET; C, fusion), this intense radioactivity corresponded to a lesion in the tail of the pancreas (arrow), with the average and maximum SUV of 20.0 and 52.9, respectively. The ^{68}Ga-exendin-4 PET/CT finding was interpreted as insulinoma in the tail of the pancreas. This tumor was iso-enhanced on arterial phase of contrast-enhanced CT image (D). T1 weighted MR image (E) showed the tumor had similar signal intensity compared with normal pancreas.

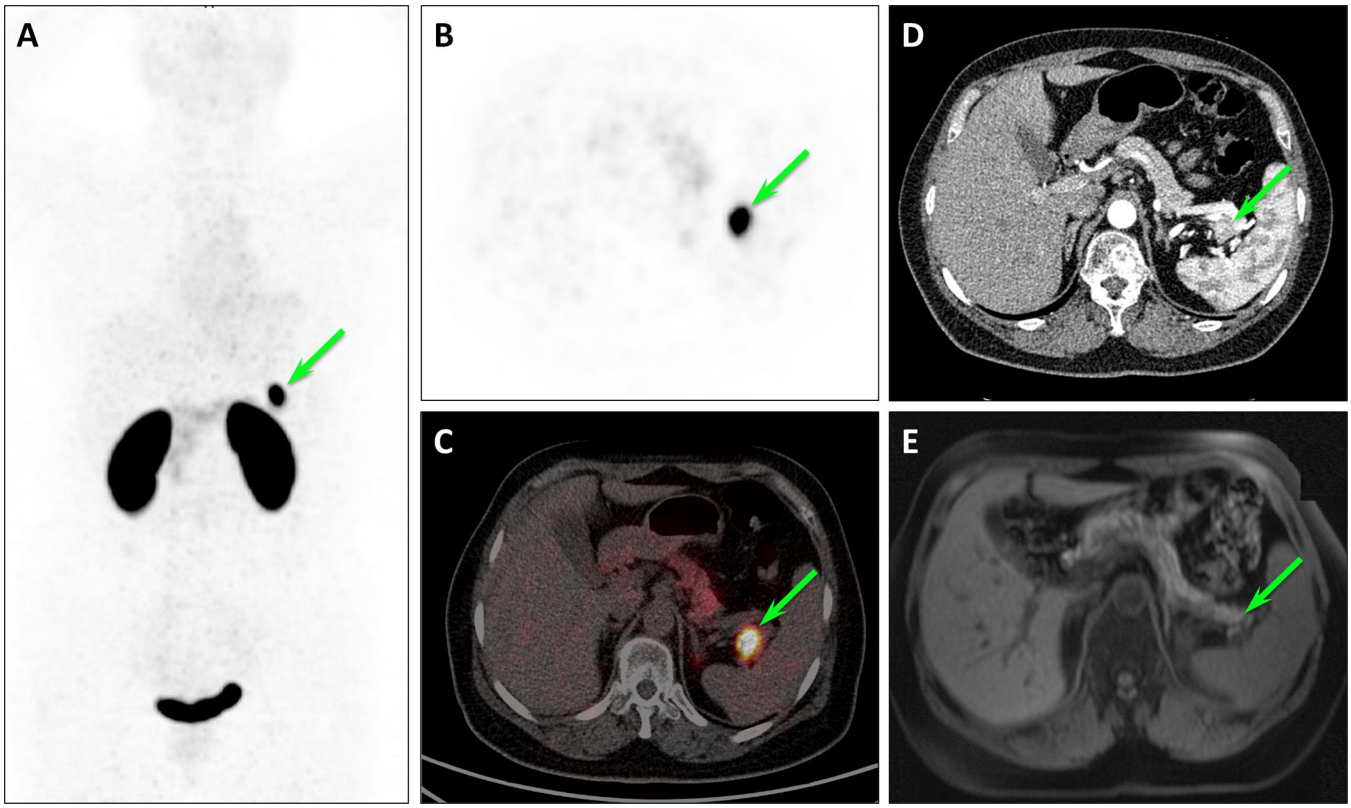

FIGURE 2.

Except for symptoms of neuroglycopenia, the same patient had complaints of slight retrosternal pain in recent 3 months. Endoscopy revealed a circumferential distal esophageal ulcer suggestive of malignancy. ^{18}F-FDG PET/CT (A-D) showed that the lower esophagus was obviously thickened with intense radioactivity (A, white arrow). A focally increased activity in the liver was also noted (A, white arrowhead). Additionally, an enlarged regional lymph node with increased FDG uptake was also detected (B, white arrow). These hypermetabolic lesions were considered as metastases from primary tumor in the esophagus. The insulinoma in the tail of the pancreas was non-FDG avid (C, D, green arrows). On ^{68}Ga-NOTA-exendin-4 PET/CT fusion images (E, F), there was no increased radioactivity in the esophageal lesion (E, white arrow) or lymph node metastasis (F, white arrow), consistent with a previous in vitro study that carcinomas do not express GLP-1R[9]. The patient subsequently underwent surgery which included resection of both insulinoma and esophageal tumor with celiac lymph node dissection. She recovered from hypoglycemia immediately after surgery. The histopathologic examination confirmed an insulinoma (WHO grade 2, size 2.5*1.5 cm) in the tail of the pancreas, with positive staining for insulin, chromogranin, and synaptophysin in immunohistochemical tests. In addition, squamous cell carcinoma (moderately differentiated) of esophagus with multiple lymph node metastases was also confirmed.