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Hepatocellular Carcinoma Mimicking Neuroendocrine Tumor Metastasis on ^{68}Ga -DOTATATE PET/CT

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Abstract

^{68}Ga -DOTATATE is a radiolabeled somatostatin analog used for the detection and characterization of somatostatin receptor (SSR)–overexpressing tumors, particularly well-differentiated neuroendocrine tumors. We present a case of a 65-year-old man with well-differentiated pancreatic neuroendocrine tumor post–Whipple surgery and a new liver lesion on CT. ^{68}Ga -DOTATATE PET/CT was performed for SSR characterization and restaging, which demonstrated the lesion to be intensely SSR positive and interpreted as a neuroendocrine metastasis. However, subsequent pathology proved the lesion to be a hepatocellular carcinoma. This case adds hepatocellular carcinoma as a potentially DOTATATE-avid malignancy to be considered in the differential diagnoses of SSR-positive liver lesions.

Keywords

DOTATATE; ^{68}Ga ; hepatocellular carcinoma; NETSPOT; somatostatin receptors

REFERENCES

1. Bodei L, Ambrosini V, Herrmann K, et al. Current concepts in ^{68}Ga -DOTATATE imaging of neuroendocrine neoplasms: interpretation, biodistribution, dosimetry, and molecular strategies. *J Nucl Med.* 2017;58:1718–1726. [PubMed: 28818983]
2. Virgolini I, Ambrosini V, Bomanji JB, et al. Procedure guidelines for PET/CT tumour imaging with ^{68}Ga -DOTA-conjugated peptides: ^{68}Ga -DOTA-TOC, ^{68}Ga -DOTA-NOC, ^{68}Ga -DOTA-TATE. *Eur J Nucl Med Mol Imaging.* 2010;37: 2004–2010. [PubMed: 20596866]
3. Lequoy M, Desbois-Mouthon C, Wendum D, et al. Somatostatin receptors in resected hepatocellular carcinoma: status and correlation with markers of poor prognosis. *Histopathology.* 2017;70:492–498. [PubMed: 27391928]
4. Nguyen-Khac E, Ollivier I, Aparicio T, et al. Somatostatin receptor scintigraphy screening in advanced hepatocarcinoma: a multi-center French study. *Cancer Biol Ther.* 2009;8:2033–2039. [PubMed: 19738430]
5. Dimitroulopoulos D, Xinopoulos D, Tsamakidis K, et al. The role of sandostatin LAR in treating patients with advanced hepatocellular cancer. *Hepatogastroenterology.* 2002;49:1245–1250. [PubMed: 12239914]

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6. Treiber G, Wex T, Rocken C, et al. Impact of biomarkers on disease survival and progression in patients treated with octreotide for advanced hepatocellular carcinoma. *J Cancer Res Clin Oncol*. 2006;132:699–708. [PubMed: 16835748]
7. Borbath I, Lhommel R, Guiot Y, et al. Lanreotide treatment of metastatic hepatocellular carcinoma resulting in partial regression and more than 3 years of progression-free survival. *Acta Gastroenterol Belg*. 2012;75:270–273. [PubMed: 22870795]
8. Abdel-Rahman O, Lamarca A, Valle JW, et al. Somatostatin receptor expression in hepatocellular carcinoma: prognostic and therapeutic considerations. *Endocr Relat Cancer*. 2014;21:R485–R493. [PubMed: 25336571]

FIGURE 1.

A 65-year-old man with well-differentiated pancreatic neuroendocrine tumors (NETs) post–Whipple surgery underwent CT for staging. **A**, Axial arterial phase and **(B)** axial portal venous phase CT images on a liver window demonstrated a new liver lesion in segment 2 with arterial enhancement and portal venous washout (arrows). Given known history of pancreatic well-differentiated NET, a ^{68}Ga -DOTATATE PET/CT was performed for characterization.

FIGURE 2.

^{68}Ga -DOTATATE PET/CT performed for lesion characterization. **A**, ^{68}Ga -DOTATATE MIP demonstrated intense avidity overlying the left lobe of the liver (arrow). **B**, Axial noncontrast CT and **(C)** axial ^{68}Ga -DOTATATE PET images demonstrate the intense SSR expression (SUV 33) localized to a low-attenuation liver lesion in segment 2 (arrows), which corresponds to the arterially enhancing lesion seen on the prior CT. This was interpreted as a neuroendocrine metastasis to the liver. However, subsequent pathology proved the lesion to be a hepatocellular carcinoma (HCC). ^{68}Ga -DOTATATE is a radiolabeled somatostatin analog used for the detection and characterization of somatostatin receptor (SSR)-overexpressing tumors, particularly well-differentiated NETs.^{1,2} ^{68}Ga -DOTATATE PET/CT has been proven valuable for well-differentiated NET localization, staging, tumor response assessment, and characterization of SSR expression for treatment with “cold” or radiolabeled somatostatin analogs.^{1,2} However, ^{68}Ga -DOTATATE images need to be interpreted cautiously, as there are multiple physiologic, benign, and malignant conditions that may be DOTATATE avid.¹ In this case, the SSR-positive liver lesion was incorrectly interpreted as neuroendocrine metastasis on PET/CT. While not previously identified as typically intensely DOTATATE avid, HCC is known to express SSRs. Immunohistochemistry studies have documented membrane SSRs in more than one-third of HCCs, most commonly SSR2.³ Prior somatostatin scintigraphy of advanced HCC similarly demonstrated uptake in approximately one-third of primary HCC tumors.⁴ Somatostatin receptor expression in HCC has led to the application of somatostatin analogs for the treatment of HCC with mixed success.^{5–8} The current clinical availability of radiolabeled somatostatin analogs might represent a therapeutic alternative to be explored systematically in prospective trials. This case demonstrates that HCC may overexpress SSRs and may be difficult to distinguish from neuroendocrine metastases without pathologic proof. Hepatocellular carcinoma should be considered in the differential diagnoses of tracer-avid liver lesions at ^{68}Ga -DOTATATE.