Case report

A Unique Case of Diffuse Metastatic Neuroendocrine Cancer with Subcutaneous Nodules on ¹⁸F-Fluorodeoxyglucose Positron Emission Tomography/Computer Assisted Tomography

Mickaila J. Johnston, Archana Sachedina¹, James E. McDonald¹

Department of Radiology, Nuclear Medicine Division, Naval Medical Center San Diego, San Diego, California, Department of Radiology, Division of Nuclear Medicine, University of Arkansas for Medical Sciences, Little Rock, Arkansas, USA

Abstract

Neuroendocrine tumors (NETs) account for 8-10% of cases of carcinomas of unknown primary. Most of these cases are poorly differentiated with metastatic disease at the time of diagnosis. However, cutaneous metastatic presentation is rare. We present an interesting case of a 74-year-old woman presenting with cutaneous metastatic involvement from high grade poorly differentiated NET of unknown origin. She was referred to us with a diagnosis of lymphoma. 18F-fluorodeoxyglucose positron emission tomography/computer assisted tomography imaging at our institution offered a differential diagnosis, including neuroendocrine cancer. Repeat skin lesion biopsy demonstrated "non-Merkel cell" carcinoma, favoring metastatic high-grade neuroendocrine carcinoma.

Keywords: 18F-fluorodeoxyglucose positron emission tomography/computer-assisted tomography, neuroendocrine tumors, subcutaneous nodule

Introduction

Presented is a unique case of a 74-year-old white female, who was referred to our clinic for evaluation of multiple subcutaneous nodules. She was admitted with a diagnosis of subcutaneous lymphomatous nodules, based on an outside facility biopsy. Subsequent biopsy at our institution demonstrated metastatic high-grade neuroendocrine carcinoma (non-Merkel cell). Neuroendocrine tumors (NETs) have been shown to have cutaneous involvement.[1,2] ¹⁸F-fluorodeoxyglucose (¹⁸F-FDG) positron emission tomography/computer assisted tomography (PET/CT) proved useful in reassessment of the diagnosis. She was

found to have a significant disease burden with multiple organ involvements in addition to the nodules.

Case Report

Whole body maximum intensity projection (MIP) [Figure 1] and select axial [Figures 2-4] ¹⁸F-FDG PET/ CT images of a 74-year-old white female who underwent initial staging ¹⁸F-FDG PET/CT for presumed large B-cell lymphoma, based on an outside institution chest wall biopsy. At the time of injection, the patient was 5'0", 100 lbs, and she had a blood sugar of 71 mg%. Radiotracer uptake time was 71 min.

Figure 1 is an MIP image demonstrating multiple areas of the abnormal focal hypermetabolism, which corresponded to numerous cutaneous nodules throughout the chest, abdomen and extremities, retroperitoneal lymph nodes, as well as multiple osseous lesions and involvement of both adrenal glands. Figures 2 and 3 are select fused PET/CT axial images. Figure 2 demonstrates a 38 mm × 30 mm left adrenal nodule as well as two markedly hypermetabolic



Address for correspondence:

Dr. Mickaila J. Johnston, Department of Radiology, Nuclear Medicine Division, Naval Medical Center San Diego, 34800 Bob Wilson dr, suite 204, San Diego, CA 92134, United States. E-mail: mickaila2000@yahoo.com

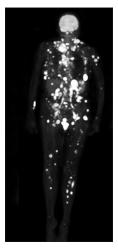


Figure 1: Whole body maximum intensity projection

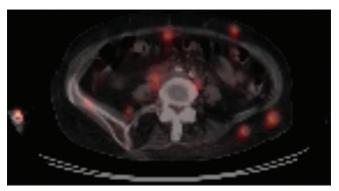


Figure 3: Select axial ¹⁸F-fluorodeoxyglucose positron emission tomography/computer-assisted tomography, subcutaneous nodules

subcutaneous nodules in the posterior abdominal wall. Figure 3 demonstrates additional subcutaneous nodule as well as retroperitoneal lymph nodes. Figure 4 demonstrates a destructive hypermetabolic osseous focus in the right femur.

Discussion

The patient underwent a repeat biopsy of the lower abdominal wall lesion. Immunostaining included multiple markers of which only synaptophysin was positive. At that time, there was no support for a diagnosis of lymphoma. The lack of CK20 expression excluded the diagnosis of a primary NET (Merkel cell carcinoma).^[3] A diagnosis of metastatic high-grade neuroendocrine carcinoma was thus favored.

The patient was started on tumor lysis protocol and chemotherapy (carboplatin/etoposide). She succumbed to her disease approximately 3 months later.

The carcinoid subset of NET has been imaged successfully with meta-iodobenzylguanidine, 6-[¹⁸F] fluorodopamine and 11-C-5-Hydroxy-L-Tryptophan. ^[4,5] Scintigraphy with 111-In-diethylenetriaminepentaacetic acid octreotide is

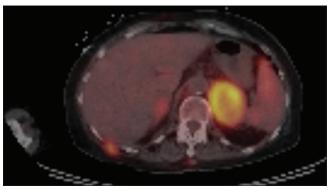


Figure 2: Select axial ¹⁸F-fluorodeoxyglucose positron emission tomography/computer-assisted tomography, soft tissue mets

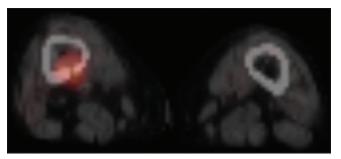


Figure 4: Select axial ¹⁸F-fluorodeoxyglucose positron emission tomography/computer-assisted tomography, bony mets

the current gold standard for NETs expressing a high density of somatostatin receptors. [6] However, poorly differentiated tumors lose their somatostatin expression. There is a growing trend to use 68-Ga labeled PET radiopharmaceuticals. Where they are available, they may prove to be more useful.

For dedifferentiated tumors, coupled with a high proliferative index, somatostatin scintigraphy is a less sensitive imaging modality. ¹⁸F-FDG PET/CT has a high sensitivity for this subgroup, which demonstrate increased glucose metabolism corresponding to the increased propensity for invasion and metastasis and an overall poorer prognosis. ^[7] Given the strong association of ¹⁸F-FDG PET/CT with tumor aggressiveness, it could be valuable for selecting treatment, monitoring therapy, and determining prognosis. ^[8] In addition, the ability of ¹⁸F-FDG PET/CT to assess carcinoma of unknown primary is well-established. ^[9]

References

- Vidulich KA, Donley SE, Duvic M. Multinodular cutaneous spread in neuroendocrine tumor of the breast: An unusual presentation. Am J Clin Dermatol 2007;8:379-83.
- Hyer SL, McAleese J, Harmer CL. Neuroendocrine carcinoma arising in soft tissue: Three case reports and literature review. World J Surg Oncol 2007;5:77.
- Chan JK, Suster S, Wenig BM, Tsang WY, Chan JB, Lau AL. Cytokeratin 20 immunoreactivity distinguishes Merkel cell (primary cutaneous neuroendocrine) carcinomas and

- salivary gland small cell carcinomas from small cell carcinomas of various sites. Am J Surg Pathol 1997;21:226-34.
- 4. Zuetenhorst JM, Taal BG. Metastatic carcinoid tumors: A clinical review. Oncologist 2005;10:123-31.
- Sundin A, Eriksson B, Bergström M, Långström B, Oberg K, Orlefors H. PET in the diagnosis of neuroendocrine tumors. Ann N Y Acad Sci 2004;1014:246-57.
- Binderup T, Knigge U, Loft A, Mortensen J, Pfeifer A, Federspiel B, et al. Functional imaging of neuroendocrine tumors: A head-to-head comparison of somatostatin receptor scintigraphy, 123I-MIBG scintigraphy, and ¹⁸F-FDG PET. J Nucl Med 2010;51:704-12.
- Garin E, Le Jeune F, Devillers A, Cuggia M, de Lajarte-Thirouard AS, Bouriel C, et al. Predictive value of ¹⁸F-FDG PET and somatostatin

- receptor scintigraphy in patients with metastatic endocrine tumors. J Nucl Med 2009;50:858-64.
- 8. Tan EH, Tan CH. Imaging of gastroenteropancreatic neuroendocrine tumors. World J Clin Oncol 2011;2:28-43.
- Breuer N, Behrendt FF, Heinzel A, Mottaghy FM, Palmowski M, Verburg FA. Prognostic relevance of (18) F-FDG PET/CT in carcinoma of unknown primary. Clin Nucl Med 2014;39:131-5.

How to cite this article: Johnston MJ, Sachedina A, McDonald JE. A Unique Case of Diffuse Metastatic Neuroendocrine Cancer with Subcutaneous Nodules on ¹⁸F-Fluorodeoxyglucose Positron Emission Tomography/Computer Assisted Tomography. World J Nucl Med 2015;14:134-6.

Source of Support: Nil. Conflict of Interest: None declared.