Coexisting Somatostatin Receptor Expressing Gastric Neuroendocrine Tumor Primary and Lymph Nodal Tuberculosis on ^{68}Ga-DOTANOC Positron Emission Tomography/Computed Tomography

Abstract

Gastric neuroendocrine tumors (G-NETs) express somatostatin receptors (SSTR), which can be imaged using radiolabeled somatostatin analogs, including ^{68}Ga-DOTA octreotide analogs. SSTR expression is also seen in activated lymphocytes and macrophages, which might result in false-positive results on SSTR imaging, in patients with coexistent granulomatous pathologies including tuberculosis, sarcoidosis, and Wegener's granulomatosis. We present a case where ^{68}Ga-DOTANOC positron emission tomography/computed tomography (PET/CT) showed primary G-NET, with SSTR expressing nonregional lymph nodes which on histopathology showed necrotizing granulomas with Langhans histiocytes. Antitubercular therapy was started, and a decrease in size and SSTR expression in involved lymph nodes was noted on follow-up ^{68}Ga-DOTANOC PET/CT.

Keywords: *Gastric neuroendocrine tumors, granulomatous pathology, somatostatin receptors, tuberculosis*

Saurabh Arora, Sameer Rastogi[1], Shamim Ahmed Shamim, Adarsh Wamanrao Barward[2], Benjamin Leroy Passah[3]

Departments of Nuclear Medicine [1]Medical Oncology and [2]Pathology, All India Institute of Medical Sciences, [3]Department of Paediatric Surgery, Dr. Ram Manohar Lohia Hospital and Post Graduate Institute of Medical Sciences, New Delhi, India

A 34-year-old man who presented with abdominal discomfort, decreased appetite, and weight loss on evaluation was found to have gastric polyps on endoscopy, elevated serum antiparietal cell antibody (titer 1:20), plasma chromogranin A level of 527 ng/ml (normal <76.3 ng/ml), and serum gastrin level of 977 pg/ml (13–115 pg/ml). He underwent ^{68}Ga-DOTANOC positron emission tomography/computed tomography (PET/CT) for the evaluation of gastric neuroendocrine tumor (G-NET). The scan [Figure 1] revealed somatostatin receptor (SSTR) expressing polypoidal lesion (maximum standardized uptake value [SUVmax]: 25.7) in gastric fundus [Figure 1a-c, arrowhead] and also noted enlarged right paratracheal lymph nodes (SUVmax: 5.23) [Figure 1d-g, white arrow]. Endoscopic biopsy of gastric lesion [Figure 2a-d] shows small round cell tumor [Figure 2a], with immunohistochemistry positive for synaptophysin [Figure 2b], chromogranin [Figure 2c], and Ki-67 index <1% [Figure 2d, white arrow], suggesting well-differentiated neuroendocrine tumor (NET) (Grade 1). Histopathology of paratracheal lymph node revealed necrotizing epithelioid cell granulomatous inflammation with Langhans giant cell [Figure 2e and f, black arrows]. Considering the clinical, imaging, and node histopathology findings, the patient was started on antitubercular therapy. Follow-up ^{68}Ga-DOTANOC PG-NET done 3 months after starting antitubercular therapy (ATT) revealed a reduction in size and SSTR expression of previously involved lymph nodes [Figure 3d-3g, white arrow] suggesting response to ATT and no significant interval change in gastric carcinoid [Figure 3a-3c, arrowhead].

G-NET is classified into four clinical types. Type 1 is most common with a lower risk of lymph nodal and distant metastases resulting in good overall prognosis.[1,2] Well-differentiated NET is known to express SSTR.[3] SSTR expression (^{68}Ga-DOTANOC uptake) can also be seen in granulomatous pathologies including tuberculosis (TB), fungal, bacterial, and protozoan infections and noninfectious diseases including sarcoidosis, Crohn's disease, and Wegener's granulomatosis.[4] In chronic inflammatory pathologies, including

Address for correspondence:
Dr. Shamim Ahmed Shamim, Department of Nuclear Medicine, All India Institute of Medical Sciences, New Delhi, India.
E-mail: sashamim2002@gmail.com

Received: 19-02-2020
Revised: 04-03-2020
Accepted: 05-03-2020
Published: 01-07-2020

Access this article online

Website: www.ijnm.in

DOI: 10.4103/ijnm.IJNM_33_20

Quick Response Code:

How to cite this article: Arora S, Rastogi S, Shamim SA, Barward AW, Passah BL. Coexisting somatostatin receptor expressing gastric neuroendocrine tumor primary and lymph nodal tuberculosis on ^{68}Ga-DOTANOC positron emission tomography/computed tomography. Indian J Nucl Med 2020;35:241-3.

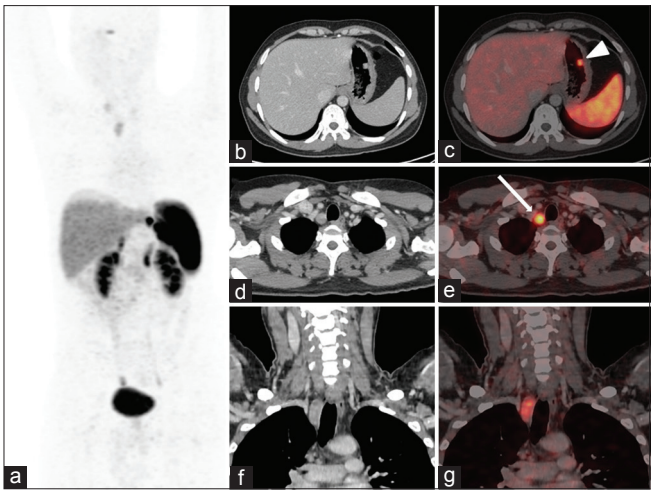

Figure 1: ^{68}Ga-DOTANOC positron emission tomography/computed tomography, maximum intensity projection image (a), axial (b-e) and coronal sections (f,g) revealing somatostatin receptor expressing polypoidal lesion (maximum standardized uptake value: 25.7) in gastric fundus (b, c: arrowhead). Enlarged right paratracheal lymph nodes with somatostatin receptor expression (maximum standardized uptake value: 5.23) (d-g, white arrow)

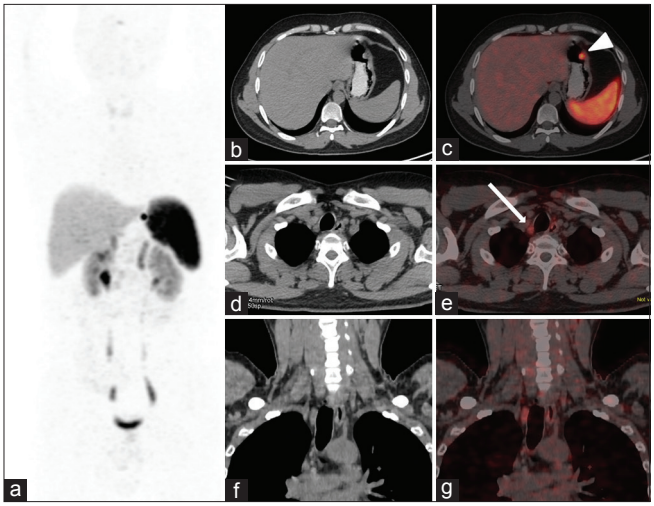

Figure 3: Follow-up ^{68}Ga-DOTANOC positron emission tomography/computed tomography, 3 months after starting antitubercular treatment, maximum intensity projection (3a), axial (3b-3e) and coronal sections (3f,3g), showing no significant interval change in gastric carcinoid (3c: white arrow),with reduction in size and somatostatin receptor expression of involved lymph nodes (3e, 3g: white arrow) suggesting response to antitubercular therapy

TB, this ^{68}Ga-DOTANOC avidity is due to the SSTR expression on activated lymphocytes and macrophages present in granulomas.[5] Although the presence of this uptake opens a window to image granulomatous pathologies as shown by Vanhagen *et al*., this might result in false-positive results in patients with NET having coexistent granulomatous pathologies; hence, the understanding of the false-positive sites is important for correct decision-making.[6] Sometimes, even after thorough histological examination and special stains, obvious infectious etiology resulting in granulomatous inflammation cannot be found, but Few histology features are suggestive of tuberculosis, such as granuloma formation by epithelioid

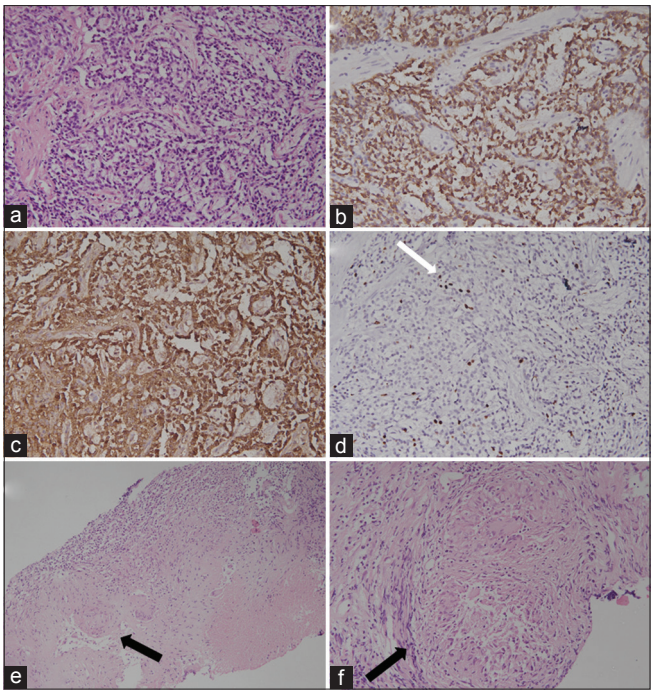

Figure 2: Histomicrophotograph of sections from gastric lesion (a), showing neuroendocrine tumor (H and E, ×100), on immunohistochemistry, tumor cells are positive for synaptophysin (b), chromogranin (c) with Ki-67 proliferative index less than 1% (d), suggesting well-differentiated neuroendocrine tumor (typical carcinoid, Grade 1). Lymph node biopsy reveals necrotizing epithelioid cell granulomatous inflammation with Langhans cell histiocytosis (e, f: black arrow)

histiocytes and Langhans type giant cells.[7-9] The diagnosis of extrapulmonary TB is sometimes difficult when bacteriological proof is lacking, but in areas with high prevalence like India (very high pretest probability), it can be assumed that granulomatous lymphadenitis is of tubercular origin after taking clinical and imaging features into consideration.[10,11] Regarding the management of Type 1 G-NETs, endoscopic resection and follow-up is an acceptable treatment option.[12] In view of nonmetastatic Grade 1 gastric carcinoid in our patient, he is planned for endoscopic removal of gastric polyp and has shown good response to ATT for lymph node TB which was incidentally detected on ^{68}Ga-DOTANOC PET/CT.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Burkitt MD, Pritchard DM. Review article: Pathogenesis and management of gastric carcinoid tumours. Aliment Pharmacol Ther 2006;24:1305-20.
2. Gladdy RA, Strong VE, Coit D, Allen PJ, Gerdes H, Shia J, *et al*. Defining surgical indications for Type I gastric carcinoid tumor. Ann Surg Oncol 2009;16:3154-60.
3. Kowalski J, Henze M, Schuhmacher J, Mäcke HR, Hofmann M, Haberkorn U. Evaluation of positron emission tomography imaging using [68Ga]-DOTA-D Phe (1)-Tyr (3)-Octreotide in comparison to [111In]-DTPAOC SPECT. First results in patients with neuroendocrine tumors. Mol Imaging Biol 2003;5:42-8.
4. James DG. A clinicopathological classification of granulomatous disorders. Postgrad Med J 2000;76:457-65.
5. van Hagen PM, Krenning EP, Kwekkeboom DJ, Reubi JC, Anker-Lugtenburg PJ, Löwenberg B, *et al*. Somatostatin and the immune and haematopoetic system; A review. Eur J Clin Invest 1994;24:91-9.
6. Vanhagen PM, Krenning EP, Reubi JC, Kwekkeboom DJ, Bakker WH, Mulder AH, *et al*. Somatostatin analogue scintigraphy in granulomatous diseases. Eur J Nucl Med 1994;21:497-502.
7. Aubry MC. Necrotizing granulomatous inflammation: what does it mean if your special stains are negative? Mod Pathol 2012;25 Suppl 1:S31-8.
8. Pritchard J, Foley P, Wong H. Langerhans and Langhans: what's misleading in a name? Lancet 2003;362:922.
9. Bezabih M, Mariam DW, Selassie SG. Fine needle aspiration cytology of suspected tuberculous lymphadenitis. Cytopathology 2002;13:284-90.
10. TB Statistics India; 2012. Available from: http://www.tbfacts.org/tb-statistics-india.html 2014. [Last accessed on 2020 Mar 01].
11. Rajwanshi A, Bhambhani S, Das DK. Fine needle aspiration cytology. Diagnosis of tuberculosis. Diagn Cytopathol 1987;3:6-13.
12. Sato Y, Hashimoto S, Mizuno K, Takeuchi M, Terai S. Management of gastric and duodenal neuroendocrine tumors. World J Gastroenterol 2016;22:6817-28.