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Incidental detection of medullary thyroid carcinoma by ^{68}Ga -DOTATATE PET/CT in a patient with neuroendocrine tumor liver metastases

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Abstract

^{68}Ga -DOTATATE, a positron-emitting somatostatin analogue, has been approved by the Food and Drug Administration for imaging neuroendocrine tumors (NET). The presence of a second primary malignancy is common in NETs; however, synchronous primary malignancy in the thyroid has rarely been reported. The value of ^{68}Ga -DOTATATE in medullary thyroid cancer is being investigated and is currently recommended for use when treatment with somatostatin analogues is an option. We present a 55-year-old man with abdominal pain associated with well differentiated NET liver metastases and incidental medullary thyroid carcinoma demonstrated on a ^{68}Ga -DOTATATE PET/CT.

Keywords

^{68}Ga -DOTATATE; medullary thyroid cancer; neuroendocrine tumor

NETs are frequently associated with synchronous or metachronous second primary malignancies; more commonly, gastrointestinal and genitourinary second primary tumors including colorectal, small intestinal, renal, bladder, breast, and prostate [1–3]. The presence of a second primary malignancy in the thyroid with NETs has seldom been reported in the literature [4,5]. ^{68}Ga -DOTATATE has high sensitivity and specificity for the detection of midgut NETs [6,7], and is often useful in planning subsequent treatment strategy for patients [8]. Medullary thyroid carcinoma (MTC) that arises from para-follicular C cells in the thyroid gland and constitutes 2% of all primary thyroid cancers is known to express somatostatin receptors [9]. Utilization of ^{68}Ga -DOTATATE imaging prior to somatostatin analogue therapy in MTC is well known [10]. This case is unique in the rare demonstration of unsuspected incidental detection of MTC in a patient with small bowel NET and the application of ^{68}Ga -DOTATATE PET/CT in changing further patient management. The decision to treat the small bowel NET and liver metastases was postponed for this patient,

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Conflict of interest: None

given that MTC is comparatively aggressive in nature. The patient is currently undergoing molecular testing to identify actionable genetic alterations for appropriate treatment planning of metastatic small bowel NET.

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FIGURE 1.

A 55-year-old man presented with abdominal pain and was diagnosed with liver metastases on ultrasound (USG) and computed tomography (CT) and pathology showed well-differentiated NET (synaptophysin-positive, chromogranin-positive, Ki-67: 5–7%) from an unknown primary. As part of further workup, he was referred for a ^{68}Ga -DOTATATE PET/CT scan that was significant for multiple findings. (A) MIP image shows increased physiological uptake in pituitary gland, liver, gall bladder, biliary tract, spleen, kidneys, and urinary bladder. Foci of increased tracer accumulation in abdomen were localized to (A, B, C; *thick arrow*) a soft tissue lesion in the terminal ileum, likely the primary neuroendocrine tumor, SUV 29.1 with (A, D, E; *thin arrow*) associated mesenteric vessel tumor thrombus, SUV 15.5 and (A, F, G; *dashed arrow*) known metastatic liver lesion measuring 4.1 x 3.4 cm, SUV 33.8.

FIGURE 2.

(A) Coronal fused PET/CT image shows additional foci of increased uptake in the neck localizing to (B, C – transaxial fused PET/CT and CT image; *thick white arrows*) asymmetric uptake in the left thyroid lobe SUV 19.8 measuring 2.5 x 1.8 x 3.6 cm; (D, E; *thin white arrows*) lymph nodes involving left cervical level 4 and (F, G; *dashed arrows*) left supraclavicular region. USG neck and fine needle aspiration revealed presence of medullary thyroid cancer. Serum calcitonin levels were detected to be significantly elevated (~1700 pg/ml). Patient underwent total thyroidectomy and left modified radical neck dissection. Surgical pathology showed the presence of loosely clustered and dispersed epithelial cells with irregular nuclei, inconspicuous nucleoli, granular chromatin, and moderate cytoplasm. Immunohistochemical staining was positive for AE1/AE3, calcitonin, TTF1, chromogranin, and negative for thyroglobulin with rare cells staining for synaptophysin and CD56, consistent with medullary thyroid carcinoma in the left thyroid lobe with metastatic neck nodes (pT2N1bMx).