

False-positive ^{111}In -pentetreotide Uptake in Gastritis

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Abstract

^{111}In -pentetreotide [^{111}In -octreoscan] is the most widely used radiolabeled somatostatin analog for evaluating neuroendocrine tumor overexpression of somatostatin receptors. False-positives studies of somatostatin receptor scintigraphy have been reported and often the cause is unexplained but assumed to be due to high number of somatostatin receptors in other pathologies. Causes of false-positives include visualization of the gallbladder, nasal mucosa and pulmonary hilar areas in respiratory infections, thyroid abnormalities, accessory spleens, recent Cerebrovascular accidents (CVA's) and activity at the site of a recent surgical incision. In infection or inflammation the cause of false-positive uptake is probably the result of tracer binding by somatostatin receptors on the inflammatory leukocytes. In this case report, we report, a 44-year-old male patient with false-positive ^{111}In -pentetreotide uptake due to gastritis.

Keywords: ^{111}In -pentetreotide, false positive, gastritis

Introduction

Neuroendocrine tumors (NET) are relatively rare tumors; however the incidence has increased over the last 20 years from approximately 2/100,000-4/100,000 per year. These tumors are derived from the endocrine system and can be found anywhere in the body.^[1] Radiolabeled somatostatin analogs for NET imaging are really a major breakthrough in the detection of these neoplasms. ^{111}In -pentetreotide [^{111}In -octreoscan] is the most widely used radiolabeled somatostatin analog for evaluating NET overexpression of somatostatin receptors. Somatostatin receptor scintigraphy (SRS) is routinely performed for localizing the primary tumor, evaluating disease extension, monitoring treatment effects, determining the receptor status as a predictor of response to octreotide therapy and selecting patients for targeted radionuclide therapy. ^{111}In -diethylenetriaminepentaacetic acid (DTPA) octreoscan, appeared to be a sensitive and specific technique to show *in vivo* the presence of somatostatin receptors on various tumors. This octapeptide, called

pentetreotide, exhibits a biologic half-life of several hours and can be linked through DTPA to ^{111}In , forming the radiotracer ^{111}In -octreoscan. It binds to SSTR₂ and can be used for imaging purposes.^[2] It is a sensitive method for the detection of NET and their metastases.^[3-5] To the best of our knowledge, ^{111}In -DTPA octreotide uptake was never reported in gastritis. This case stresses the need to correlate scan results with the patient's presentation, symptoms and other investigations to avoid false-positive data.

Case Report

This was a case of a 44-year-old male who was admitted in March 2009 with a history of a right axillary swelling associated with pain. The swelling increased progressively in size over a year. U/S guided fine-needle aspiration cytology done on 8th of March, 2009 revealed a suspicious smear suggestive of malignant changes and tissue biopsy was recommended to confirm the diagnosis. Computed tomography (CT) chest was carried out on the 16th of March, 2009 and showed a large partially lobulated soft-tissue mass in the right axillary area measuring 86 × 61 × 57 mm in maximum diameters and showing irregular thick marginal enhancement with surrounding lymph nodes and right supraclavicular involvement. The mass was suspicious of malignancy and hence a needle core biopsy was taken 10 days later. The biopsy [Figure 1], suggested that the mass is most likely metastatic rather than a primary lesion and that

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the degree of neuroendocrine differentiation shown may suggest primary lung or gastrointestinal (GI) origin. CT abdomen and pelvis done on May 2008 showed diffuse mural thickening in the pyloric antrum, descending duodenal flexure and cecum. Bilateral minimal pleural effusion and minimal pelvi-abdominal ascites was also reported.

On the 11th of June, 2009, patient was referred to our nuclear medicine department to do a ¹¹¹Indium-pentetreotide scan. Patient was injected with a dose of 148 MBq of ¹¹¹In-pentetreotide containing 10 µg somatostatin analog. The dose was administered immediately after the specific radiochemical purity had been checked by chromatography. Scintigraphic planar images were acquired using a double-head camera with a medium-resolution parallel-hole collimator, a 256 × 256 word matrix, and a preset time of 10-15 min. Acquisition was performed using both ¹¹¹In photo peaks (171 and 245 keV). Whole body images were obtained at 4 h after injection [Figure 2a]. Additional delayed static images of the abdomen were obtained in the anterior and posterior views at 24 h after injection [Figure 2b]. Single-photon emission computed tomography (SPECT) was performed 24 h after injection [Figure 2c]. The SPECT acquisition parameters were a double-indium-peak acquisition, 64 projections over a 360° rotation, 40-60 s/step and a 64 × 64 matrix. Tomographic slices were obtained using iterative reconstruction (2 iterations, 8 subsets) with hanning post-filter reconstruction. The scan images revealed a large focal area of increased tracer uptake at the right axilla. Diffuse increased tracer uptake seen at the left upper abdomen in the region of the stomach was also noted. While the lesion in the right axilla was reported as most likely to be metastatic, the lesion described in the stomach was suggested as a possible primary site. Patient did an endoscopy in 15th of June, 2009 and five biopsies were taken from suspicious areas in the gastric antrum and gastric body. The biopsies revealed chronic active *Helicobacter pylori* associated gastritis [Figure 3].

Discussion

Although uncommon, false-positives studies of SRS have been reported and often the cause is unexplained but assumed to be a high number of somatostatin receptors in other pathology. Hence, the term “false-positive” is a misnomer because somatostatin receptor-positive lesions are present that are not related to the pathology for which the investigation is performed; examples include the visualization of the gallbladder, nasal and pulmonary hilar areas in respiratory infections, thyroid abnormalities, accessory spleens, recent CVAs, activity at the site of a recent surgical incision and so forth.^[6] Bilateral diffuse lung uptake of In-111 pentetreotide was also observed

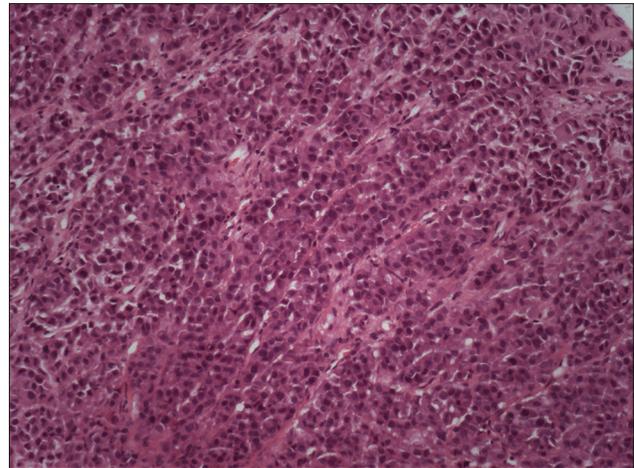


Figure 1: Core biopsy of right axilla suggested that the mass is most likely metastatic rather than a primary lesion with a degree of neuroendocrine differentiation suggesting primary lung or gastrointestinal origin

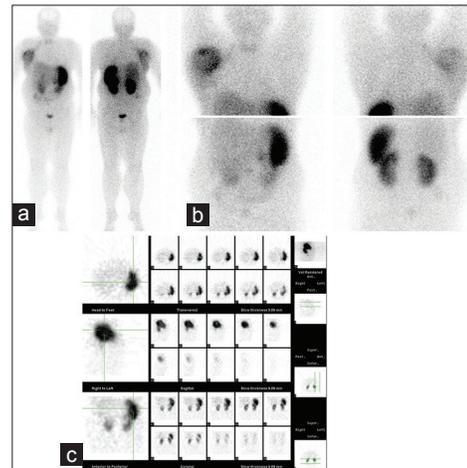


Figure 2: ¹¹¹In-pentetreotide whole body imaging (a), spot views (b) and single-photon emission computed tomography (c) revealed a large focal area of increased tracer uptake at the right axilla. Diffuse increased tracer uptake seen at the left upper abdomen in the region of the stomach was also noted

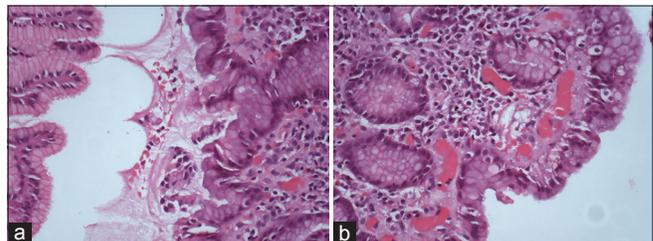


Figure 3: (a and b) Biopsies revealed chronic active *Helicobacter pylori* associated gastritis

during a whole-body scan performed in a 68-year-old woman with Cushing’s syndrome and suspected ectopic adrenocorticotrophic hormone secretion.^[7] Yenson *et al.* in their study have reported a case of an 18-year-old woman which underwent an ¹¹¹In octreotide scan for evaluation

of a possible insulinoma.^[8] Scan showed mildly increased radiopharmaceutical uptake involving the right lung base. On closer inquiry, the patient reported a productive cough for 5 days before the octreotide scan. Her chest radiograph showed increased airspace opacification in the right lower lobe, corresponding to the uptake seen on the octreotide scan. Patient was diagnosed with community-acquired pneumonia.^[8] Uptake seen in inflammatory conditions is probably the result of tracer binding by somatostatin receptors on the inflammatory leukocytes

Conclusions

¹¹¹Indium-pentetreotide scintigraphy improves tumor detection, has a major clinical significance and should be performed systematically for staging and to help in therapeutic decision in patients with NET. However, note should be made of false positive causes of uptake in this tracer for better interpretation of the scan.

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