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A CASE REPORT: THE ROLE OF GALLIUM-68 DOTATATE PET SCAN IN NEUROENDOCRINE TUMORS

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ABSTRACT

Aims: Neuroendocrine tumors are rare neoplasms which express high quantity of somatostatin receptors. Gallium-68 DOTATATE PET scan is used to detect these tumors. In this case presentation, it is aimed to show the role of Ga-68 DOTATATE PET scan in detecting neuroendocrine tumors.

Case Report: Sixty-four-year-old female consulted Trakya University Hospital Department of Nuclear Medicine with a diagnosis of neuroendocrine tumors in her various visceral organs. Galium-68 DOTATATE PET scan was used to detect the lesions and afterwards peptide receptor radionuclide therapy with Lutetium (Lu)-177 DOTATATE was given to the patient.

Conclusion: Galium-68 DOTATATE PET scan plays a major role in detecting neuroendocrine tumors with high accuracy.

Keywords: Galium, neuroendocrine tumors, lutetium, somatostatin receptor

INTRODUCTION

Neuroendocrine tumors (NETs) are rare neoplasms which arise mostly from endocrine cells in various parts of the body such as gastrointestinal tract and pancreas or endocrine glands such as pituitary (1-3). Their clinical behavior is highly variable. Well-differentiated NETs grow slowly, however they can metastasize extensively (2). In addition, they can secrete hormones which may cause clinical symptoms (2). A characteristic feature of NET cells is the expression of numerous receptors in high quantities such as somatostatin receptors (1).

Imagining of these tumors may be difficult sometimes because of the small lesion size, adjustable anatomical location, and low metabolic rate. Thus functional imagining is crucial in managing of NETs (1). Somatostatin receptor scintigraphy (SRS) is used for imaging of NETs and to detect their metastatic lesions (1). With PET, somatostatin analogues labeled with positron emitting isotopes such as Gallium (Ga)-68 in order to image somatostatin receptor expressing tumors such as NETs. It has been found out that Ga-68 DOTATATE PET scan improved the spatial resolution and detectability (3).

CASE REPORT

Sixty-four-year-old female consulted Trakya University Hospital Department of Nuclear Medicine in June, 2016. It was confirmed that the patient had a history of NET. In 2009, she had a mass in her spleen. After the biopsy, she was diagnosed with well-differentiated NET. After that, a mass was detected also in her pancreas. Therefore she had a splenectomy and partial (distal) pancreatectomy in 2012.

In 2012, she had her first scintigraphy in a different health center. It was seen that somatostatin receptors were high in quantity which is a sign of NET. After that she was accepted to Trakya University Balkan Oncology Hospital and started to take a treatment for NET. In 2013, it was seen with computer tomography that the

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tumor had progression and metastasizes to her liver. After that, she had a target treatment again. In June 2016, the patient consulted to Trakya University Hospital Department of Nuclear Medicine after she was diagnosed with a tumor progression in her liver and had a Ga-68 DOTATATE PET scan in order to image NET which is a somatostatin receptor expressing tumor. It was detected that there are several masses in patient's visceral organs (Figures 1, 2a, 2b, 2c).

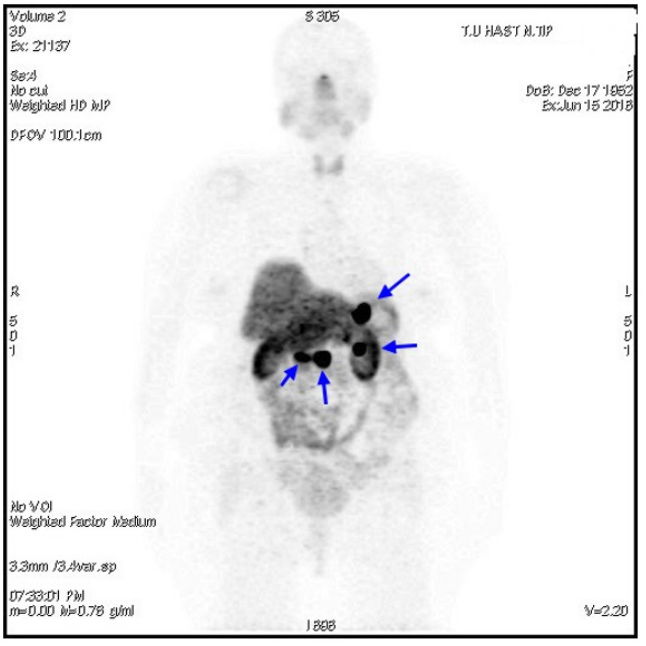

Figure 1: The centers that show the presence of high quantity somatostatin receptors (Maximum Intensity Projection)

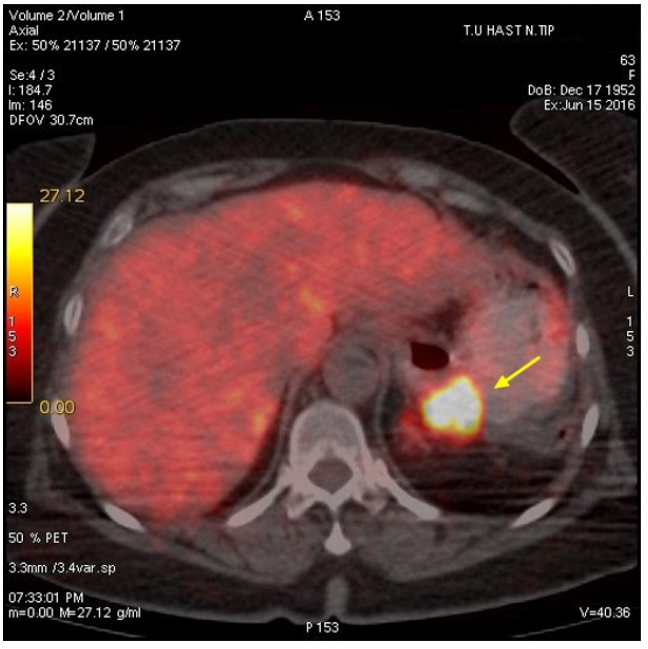

Figure 2a: The lesion of stomach wall (Transaxial PET CT Fusion)

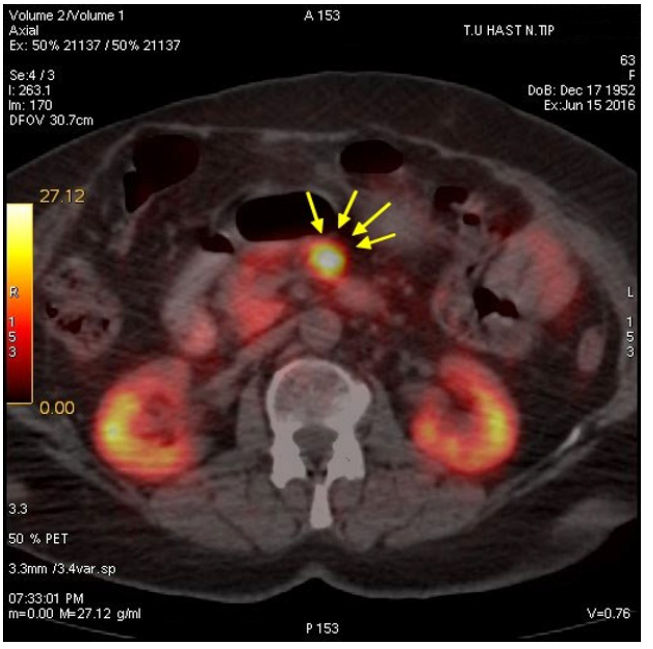

Figure 2b: The lesion of pancreas (Transaxial PET CT Fusion)

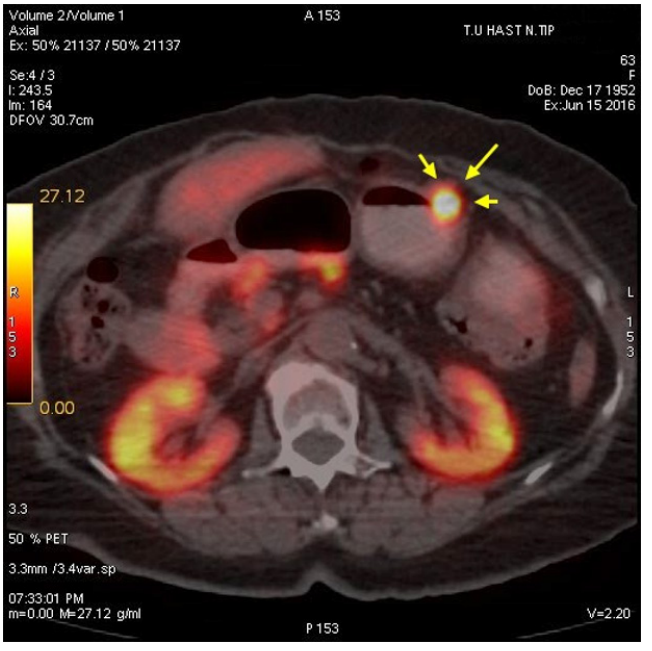

Figure 2c: The involvement of the lymph node which is adjacent to the stomach wall (Transaxial PET CT Fusion)

After the imagining with Ga-68 DOTATATE PET scan, the patient started to take peptide receptor radionuclide therapy with Lutetium (Lu)-177 DOTATATE.

DISCUSSION

NETs are rare tumors which are in the group of somatostatin receptor expressing tumors (3). They are located in the endocrine cells of several organs and metastasize widely. Their characteristic feature is the expression of somatostatin receptors in high quantities. Ga-68 DOTATATE PET scan is a proper imagining technique for these kinds of tumors. DOTATATE is a peptide which can bind to somatostatin receptors (2). It was given with Ga-68 which is a radioactive substance to the patient. NETs can be detected with high accuracy by using Ga-68 DOTATATE PET scan (2). In addition, it is used in detecting the primary center of the lesion, deciding the definitive diagnosis, determining the stage of the cancer, deciding the operation, evaluating the treatment options, and detecting the metastasis in the follow-up period (3). Therefore it plays a major role in clinical practice of NETs and other somatostatin-avid malignancies.

After testing the suitability of the patient to the treatment, peptide receptor radionuclide therapy with Lu-177 DOTATATE could be applied to the patients. Lu-177 is a radioactive substance and it destroys the tumor cells. After the treatment, the current state of the cancer is controlled with Ga-68 DOTATE PET scan.

In conclusion, Ga-68 DOTATATE PET scan is an efficient technique to detect NETs and peptide receptor radionuclide therapy with Lu-177 DOTATATE is used for somatostatin receptor expressing tumors such as NETs.

Ethics Committee Approval: N/A
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Conflict of Interest: The authors declared no conflict of interest.
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