

Incidental detection of brain stem meningioma by Ga-68 DOTATATE PET/CT in a patient with neuroendocrine tumor

Zehra Pınar Koç^{1*}, Pınar Pelin Özcan¹, Emel Sezer² and Anıl Özgür³

¹Department of Nuclear Medicine, Mersin University, Turkey

²Department of Oncology, Mersin University, Turkey

³Department of Radiology, Mersin University, Turkey

Abstract

A female patient who was diagnosed as pancreatic neuroendocrine tumor and the primary tumor was surgically removed. The Ga-68 DOTATATE PET/CT imaging which was performed for tumor staging revealed significant uptake in the brain stem. Additional FDG PET/CT showed no increased uptake at the site of the lesion. MR could not exclude the diagnosis of metastasis. However follow up imaging showed no change in the tumor size thus diagnosed as meningioma as a Ga-68 DOTATATE accumulating lesion.

Introduction

Neuroendocrine tumors usually accumulate Ga-68 DOTATATE PET/CT in a significant amount depending on the several factors related to the receptor status of the tumor. In recent years Ga-68 DOTATATE imaging is the important part of staging algorithm in neuroendocrine tumors. As a whole body imaging modality unexpected sites of metastasis as well as frequent sites could be demonstrated [1]. In a previous case series including 4210 patients; 6 patients were found to have brain metastasis [1].

Several benign lesions of the brain also demonstrate significant amount of Ga-68 DOTATATE due to the presence of somatostatin receptors. In a previous analysis including optic pathway tumors Ga-68 DOTATATE PET/CT imaging identified 8 of the 10 meningiomas successfully and influenced therapy decision in various tumors [2]. Meningiomas are benign tumors which is common in adult women and usually do not require treatment [3]. There was previous report of cases about incidental detection of meningiomas in the literature [4]. This is the first report of a case presented as incidentally detected meningioma by Ga-68 DOTATATE imaging.

Case report

62 years old female patient presented with primary pancreas carcinoma was operated. Due to the pathology of neuroendocrine tumor primary staging with Ga-68 DOTATATE and F-18 FDG PET/CT was performed. Ga-68 DOTATATE images showed atypical brain stem uptake as a focus (Figure 1a). F-18 FDG PET/CT did not show increased activity in the lesion (Figure 1b). Further MR imaging showed the lesion but could not verify or exclude metastasis of neuroendocrine tumor at first imaging. However, second follow up imaging showed no change in tumor size thus diagnosis of benign tumor with high probability of meningioma was decided (Figure 2).

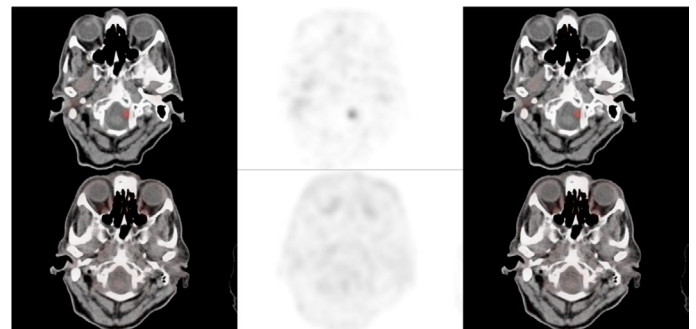


Figure 1. Ga-68 DOTATATE CT, PET and fusion PET/CT respectively images of the patients in axial projection demonstrates the increased activity in in left lateral brain stem region (A: upper line) however F-18 FDG PET/CT images do not show FDG uptake at the lesion site (B)

Discussion

Meningiomas usually accumulate Ga-68 DOTATATE due to presence of SSTR 2 and affinity of the agent to the receptor. However, there are exceptional cases that do not show increased activity on Ga-68 DOTATATE [5]. Previous reports demonstrated higher sensitivity for the detection of meningiomas with Ga-68 DOTATATE PET/CT compared to MR especially in special cases in the problematic localizations [5]. Furthermore Y-90 DOTATOC treatment has been implicated in this

*Correspondence to: Zehra Pınar Koç, Department of Nuclear Medicine, Mersin University, Turkey, Tel: 903242410000-22524; Fax:903242410098; E-mail: zehrapinarkoc@gmail.com

Key words: meningioma, Ga-68, DOTATATE, FDG, PET.

Received: November 26, 2019; **Accepted:** December 09, 2019; **Published:** December 12, 2019

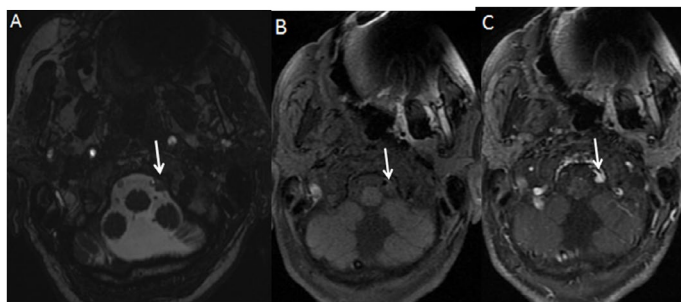


Figure 2. Axial Fiesta (A) and T1-weighted (B) images at foramen magnum level show a lesion (arrow) adjacent to the left hypoglossal canal and vertebral artery. Axial contrast-enhanced T1-weighted image (C) demonstrates homogeneously enhancing lesion (arrow) with dural tail

group of patients with successful results [6]. Meningiomas are usually benign tumors and do not require treatment. However if the patient is symptomatic or radiological progression occurs there are treatment options. These 'nonbenign meningiomas' might be evaluated by means of Ga-68 DOTATATE PET/CT as a pretreatment imaging method [7]. This imaging modality has prognostic value in the preoperative imaging of this neoplasm which can predict risk of recurrence according to a previous study [7]. Another study compared the value of intra arterial versus intravenous methods of Ga-68 DOTA imaging in patients with inoperable meningioma and achieved significantly increased accumulation [8].

A single previous case report including incidental detection of meningioma in the medulla spinalis by Ga-68 DOTATATE in a patient with neuroendocrine tumor has been presented [9]. However this is

the report of first case with a single focus of meningioma mimicking metastasis of a known neuroendocrine tumor. It is important to be aware of potential pitfalls in Ga-68 DOTATATE imaging in order to provide true management of the patients with neuroendocrine tumors.

References

1. Carreras C, Kulkarni HR, Baum RP (2013) Rare metastases detected by (68)Ga-somatostatin receptor PET/CT in patients with neuroendocrine tumors. *Recent Results Cancer Res* 194:379-384.
2. Klingenstein A, Haug AR, Miller C, Hintschich C (2015) Ga-68-DOTA-TATE PET/CT for discrimination of tumors of the optic pathway. *Orbit* 34(1):16-22.
3. Wilhelm H (2013) Meningioma of the anterior visual pathways: Epidemiology and clinical symptoms. *Ophthalmologie* 110:403-407
4. Vernooij MW, Ikram MA, Tanghe HL (2007) Incidental findings on brain MRI in the general population. *N Engl J Med* 357:1821-1828.
5. Afshar-Oromieh A, Giesel FL, Linhart HG, Haberkorn U, Haufe S, Combs SE, et al. (2012) Detection of cranial meningiomas: Comparison of ⁶⁸Ga-DOTATOC PET/CT and contrast-enhanced MRI. *Eur J Nucl Med Mol Imaging* 39(9):1409-1415.
6. Bartolomei M, Bodei L, De Cicco C, Grana CM, Cremonesi M, Botteri E, et al. (2009) Peptide receptor radionuclide therapy with (90)Y-DOTATOC in recurrent meningioma. *Eur J Nucl Med Mol Imaging* 36(9):1407-1416.
7. Pelak MJ, d'Amico A (2019) The prognostic value of pretreatment Gallium-68 DOTATATE positron emission tomography/computed tomography in irradiated non-benign meningioma. *Indian J Nucl Med* 34(4):278-283.
8. Verburg FA, Wiessmann M, Neuloh G, Mottaghy FM, Brockmann MA (2019) Intraindividual comparison of selective intraarterial versus systemic intravenous ⁶⁸Ga-DOTATATE PET/CT in patients with inoperable meningioma. *Nuklearmedizin* 58(1):23-27.
9. Klinaki I, Al-Nahhas A, Soneji N, Win Z (2013) ⁶⁸Ga DOTATATE PET/CT uptake in spinal lesions and MRI correlation on a patient with neuroendocrine tumor: potential pitfalls. *Clin Nucl Med* 38(12):e449-53.