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Clinical vignette

Optic nerve sheath meningioma detected by somatostatin receptor scintigraphy with [^{99m}Tc]Tc-Tektrotyd

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Abstract

Optic nerve sheath meningiomas are rare and difficult to diagnose accurately due to the high risk of visual loss associated with histologic confirmation. Currently, the primary imaging techniques used for diagnosis are contrast-enhanced computed tomography (CT) and magnetic resonance imaging (MRI). However, these methods may not always provide a definitive diagnosis, necessitating alternative approaches. This case study is one of the few that reports the use of a [^{99m}Tc]Tc-Tektrotyd single-photon emission computed tomography (SPECT/CT) scan for the non-invasive diagnosis of an orbital space-occupying tumor. This radiopharmaceutical can bind with high affinity to somatostatin receptor subtype 2, which is expressed in meningiomas.

KEYwords: optic nerve sheath meningiomas; octreoscan; [^{99m}Tc]Tc-Tektrotyd; SSTR2

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Case report

A 49-year-old female initially consulted for progressive right visual loss over a year. The patient also complained of a dull ache in her right eye but did not experience any other neurological symptoms. An initial magnetic resonance imaging (MRI) revealed a posterior intraconal lesion in the right orbit, measuring 11 × 9 × 11 mm anterior-posterior × transverse × height (AP × T × H) (Fig. 1). The lesion, well-defined with regular contours, exhibited iso T1 signal, intermediate T2 signal, and slight diffusion hypersignal, enhancing moderately and homogeneously after gadolinium injection, initially suggesting a pseudo-inflammatory tumor. However, a neoplastic cause could not be ruled out. An [^{18}F]FDG PET/CT scan was performed to search for a primary tumor, which did not show any hypermetabolic areas from the head to mid-thighs. A follow-up MRI six months later confirmed persistent abnormalities in the right orbit, and a biopsy was considered too risky in this context.

Due to the atypical clinical presentation and inconclusive imaging findings, a [^{99m}Tc]Tc-EDDA/HYNIC-Tyr3-octreotide (Tektrotyd)

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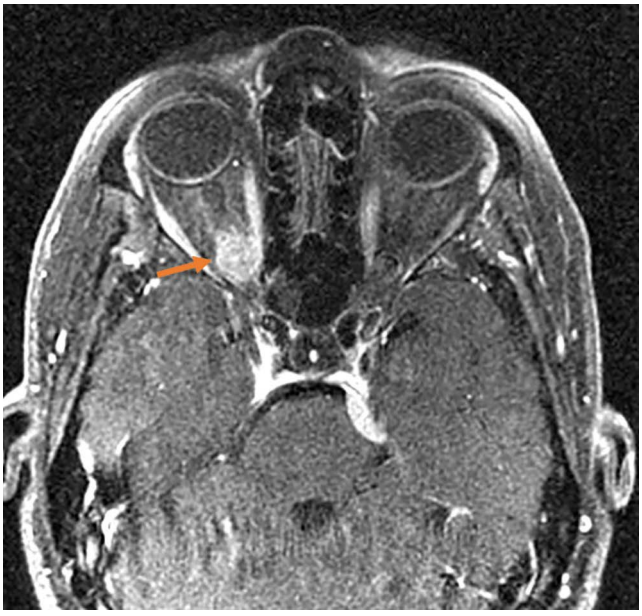

Figure 1. Axial section of a cerebral magnetic resonance imaging with T1 sequence after gadolinium injection revealing a posterior intraconal right orbital lesion process measuring 11 × 9 × 11 mm arriving at the orbital apex, well limited, with regular contours, enhanced moderately and homogeneously after injection of gadolinium (*arrow*)

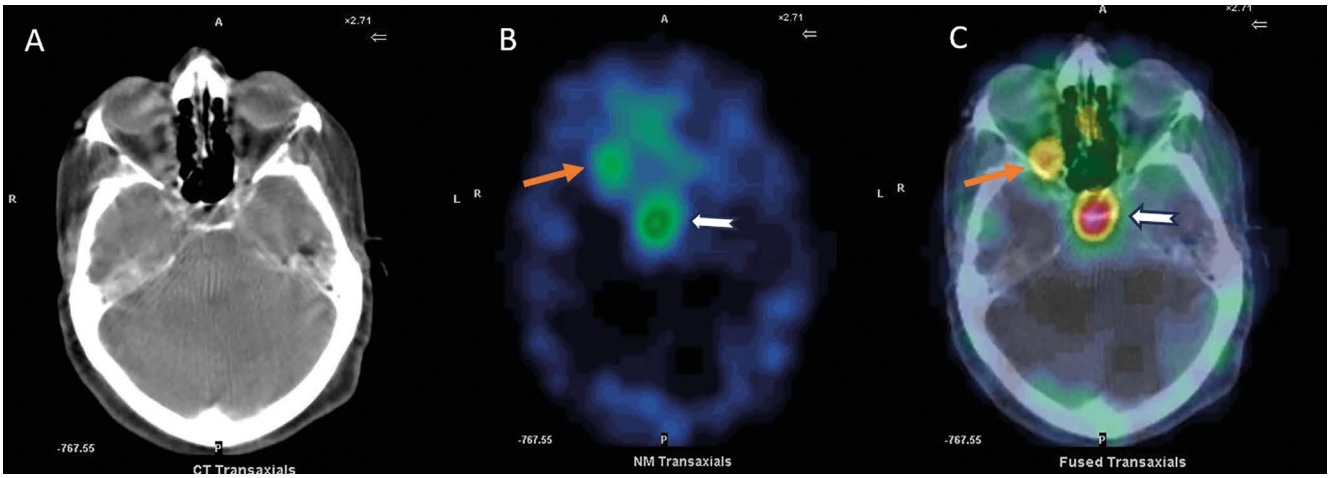

Figure 2. [^{99m}Tc]Tc-Tektrotyd scintigraphy: axial computed tomography image (**A**), axial SPECT image (**B**), axial SPECT/CT image (**C**). [^{99m}Tc]Tc-Tektrotyd scintigraphy corroborated focus of the right orbital with intense uptake, measuring 10 mm (*orange arrow*), corresponding to the lesional process described on brain magnetic resonance imaging. It shows also a physiological uptake of radiotracer in the pituitary (*white arrow*)

somatostatin analog scintigraphy was requested. This scan revealed intense uptake of the radiotracer in the right orbital apex, measuring 10 mm, corresponding to the lesion identified on the brain MRI, and indicated the expression of somatostatin receptors (Fig. 2). The patient then underwent successful hypofractionated stereotactic radiotherapy. After one year, follow-up assessments showed improved visual acuity and stable MRI findings.

Although meningiomas are among the most common intracranial tumors, optic nerve sheath meningiomas (ONSM) are rare, constituting only 1–2% of all meningiomas [1]. Contrast-enhanced computed tomography (CT) and MRI are the primary methods for diagnosing, monitoring, and evaluating treatment response in meningiomas. However, approximately 10% to 15% of these tumors present with atypical MRI appearances that can mimic metastases or malignant gliomas.

Meningioma cells are known to strongly express somatostatin receptor subtype 2 (SSTR2) [2], which distinguishes them from optic gliomas [3]. This property underpins the use of molecular imaging with somatostatin receptor ligands as a promising tool for differentiating between these two conditions. In line with previous studies on ONSM [4, 5], this case demonstrated significant uptake of [^{99m}Tc]Tc-Tektrotyd in the right optic nerve, highlighting the radiotracer's affinity for somatostatin receptors.

While [^{111}In]-labeled pharmaceuticals are commonly used for SPECT imaging, the shorter half-life, and higher energy of emitted gamma rays from [^{99m}Tc] agents have made them increasingly favorable for somatostatin receptor imaging [6]. To our knowledge, this is the first documented case of ONSM evaluated using somatostatin receptor scintigraphy with [^{99m}Tc]Tc-EDDA/HYNIC-Tyr3-octreotide.

Article information and declarations

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None.

Author contributions

Writing the manuscript and reviewing the literature — OA; literature review and correcting the manuscript —MH, SO, YB, JE; manuscript correction before submission — AD.

Conflicts of interest

All authors declare no conflict of interest.

Ethics statement

Informed consent has been obtained from the patient.

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Supplementary material

None.

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