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Radiotherapy

Detection of Optic Nerve Sheath Meningioma Using Computed Tomography Somatostatin Receptor Scintigraphy: A Case Report

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Abstract **Case Report**

Optic nerve sheath meningiomas (ONSM) pose diagnostic challenges due to their rarity and imaging overlap with other optic pathway lesions. This case study presents a patient initially exhibiting decreased visual acuity, where conventional MRI failed to conclusively diagnose the underlying pathology. Employing Tektrotyd-Tc99m tomography, a novel imaging modality utilizing somatostatin analog radiotracers, enabled precise localization and characterization of the ONSM. This study underscores the importance of leveraging advanced imaging techniques in the comprehensive management of optic nerve sheath meningiomas.

Keywords: Meningioma- Computed Tomography Somatostatin Receptor Scintigraphy- Radiotherapy.

INTRODUCTION

Meningiomas, a common type of intracranial tumor, include optic nerve sheath meningiomas (ONSM), a specific subset accounting for 1–2% of all meningiomas [1]. Traditional imaging techniques struggle to differentiate meningiomas from other optic pathway tumors. OCTREO/CT with somatostatin analog radiotracers, like Tektrotyd-Tc99m, emerge as highly effective methods for meningioma detection [2].

This case highlights an ONSM diagnosis achieved through Tektrotyd-Tc99m tomography in a patient initially presenting with a decrease in visual acuity and whose MRI was inconclusive and revealed an orbital lesion process suggestive of either an inflammatory pseudo tumor, a neoplastic origin or meningioma. The report discusses the clinical presentation, imaging findings, and the role of Tektrotyd-Tc99m scintigraphy in confirming the diagnosis, emphasizing its significance in the management of optic nerve sheath meningiomas.

CASE REPORT

A 51-year-old woman presented with right visual loss. An MRI scan revealed Posterior intraconical right orbital lesion process measuring 11x9x11mm (APxTxH) (Image 1), arriving at the orbital apex, well limited, with regular contours, in iso T1 signal, intermediate T2 signal, with discret diffusion hypersignal, enhanced moderately and homogeneously after injection of gadolinium evoking a pseudo-inflammatory tumor first, however a neoplastic origin cannot be eliminated. A 18 FDG PET CT looking for a primary did not reveal any hypermetabolic focus from the head to mid-thighs. A follow-up MRI after six months confirmed persistent abnormalities in the right orbital. Given this atypical clinical presentation with inconclusive morphological imaging, a complementary study has been requested with Tektrotyd-Tc99m Somatostatin analogue scintigraphy. This examination revealed a focus of the right orbital apex moderately hyperfixing the radiotracer, measuring 10 mm, corresponding to the lesional process described on brain MRI, and expressing somatostatin receptors (Image 2). The patient underwent successful hypofractionated stereotaxic radiotherapy. After one year, the follow-up showed improved visual acuity, and stable MRI findings.

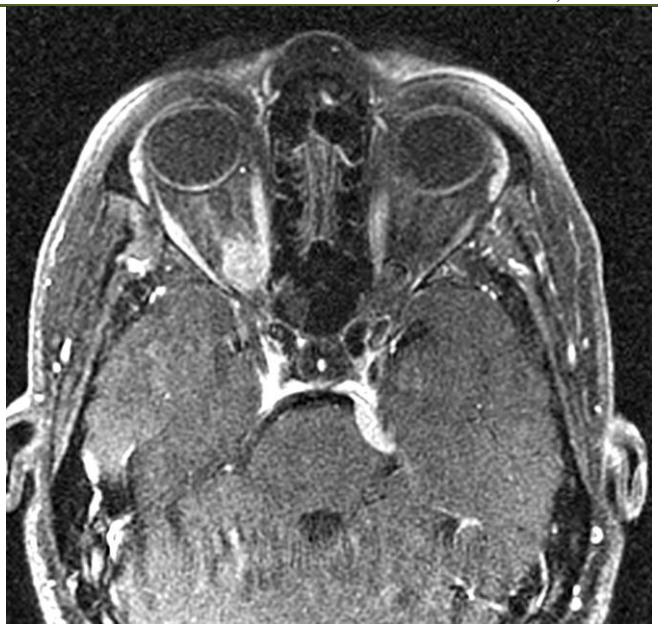

Image 1: Axial section of a cerebral MRI with T1 sequence after gadolinium injection revealing a Posterior intraconical right orbital lesion process measuring 11x9x11mm (APxTxH) arriving at the orbital apex, well limited, with regular contours, enhanced moderately and homogeneously after injection of gadolinium

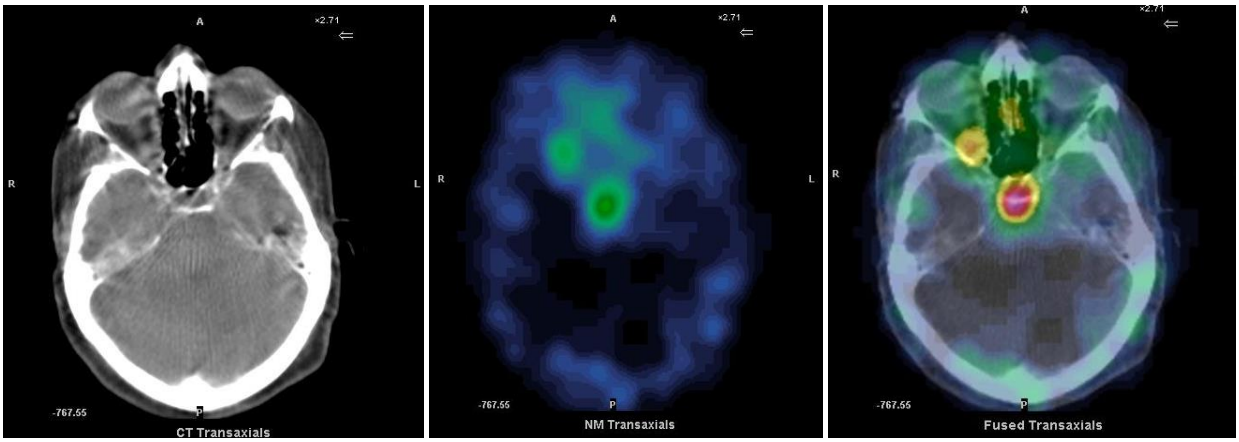

Image 2: Somatostatin analogue scintigraphy with Tektrotyd-Tc99m corroborated focus of the right orbital apex moderately hyperfixing the radiotracer, measuring 10 mm, corresponding to the lesional process described on brain MRI

DISCUSSION

Optic nerve sheath meningiomas (ONSM), comprising 2% of orbital lesions, stand as the second most prevalent optic nerve tumors, surpassed only by optic nerve gliomas [3]. Clinical presenting is painless unilateral vision impairment [4]. Diagnostic challenges arise due to the associated risk of visual loss with histologic confirmation, necessitating a less invasive and specific diagnostic approach for personalized treatment decisions.

Brain imaging with contrast-enhanced CT or MRI is the most common method of diagnosing, monitoring, and evaluating response to treatment. However, approximately 10% to 15% of meningiomas have an atypical MRI appearance mimicking metastases or malignant gliomas

Meningiomas typically demonstrate robust somatostatin receptor expression with rare instances of receptor-negative cases, which allows for the use of octreotide brain scintigraphy to help delineate extent of disease and to pathologically define an extra-axial lesion and distinguishing ONSMs from other orbital lesions [5]. Octreotide imaging with radiolabeled indium or, more recently, gallium may be particularly useful in distinguishing residual tumor from postoperative scarring in subtotally resected/recurrent tumors or as in our case make the diagnosis of a meningioma when the lesion is inaccessible or the biopsy is morbid.

This case, consistent with previous ONSM studies [6], revealed significant Tektrotyd-Tc99m scintigraphy uptake in the right optic nerve, showcasing the radiotracer's affinity for somatostatin receptor. Early and noninvasive diagnosis using such imaging

techniques is crucial, especially for small tumors, allowing prompt and optimal treatment. Surgical options for ONSMs involving the orbit are limited, emphasizing the importance of early diagnosis for effective surgical or radiotherapy approaches, potentially preserving vision.

In this case, tailored treatment guided by multimodal imaging prevented permanent visual damage or intracranial growth.

CONCLUSION

This case report highlights the successful detection of an optic nerve sheath meningioma through the utilization of computed tomography somatostatin receptor scintigraphy. Optic nerve sheath meningiomas are infrequent and challenging to diagnose accurately. The case underscores the efficacy of Tektrotyd-Tc99m scintigraphy as a valuable diagnostic tool, contributing to the early and precise identification of this rare pathology.

Competing interests: We (authors) declare that we have no conflict of interest.

Authors' Contribution: Mouhcine Hommadi, Omar Ait Sahel, Khalid hadadi, Maroua Benlemlih, Elamin Marnouch, Abdelhak Maghouss, Amine Bazzine, Noha zaghba, Issam Lalya, Khalid Andaloussi Saghir, Mohammed Elmarjany, Abderrahim Doudouh and Hassan Sifat designed and coordinated research and drafted the manuscript. All authors read and approved the final manuscript.

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