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Suprasellar Meningioma Presenting with Visual Decline: A Comprehensive Radiological Evaluation of Chiasmal and Vascular Compromise

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ABSTRACT

Background: Suprasellar meningiomas, encompassing those arising from the tuberculum sellae and planum sphenoidale, are critical skull base neoplasms that present formidable diagnostic challenges. Their presentation often mimics other sellar and suprasellar masses, notably pituitary macroadenomas. Precise radiological evaluation is paramount to establish the diagnosis through specific imaging biomarkers and to assess the critical involvement of the optic apparatus and parasellar vasculature. Case Presentation: A 59-year-old female presented with a progressive decrease in bilateral visual acuity. Dedicated magnetic resonance imaging (MRI) revealed a large extra-axial suprasellar mass. Sagittal contrast-enhanced T1-weighted imaging demonstrated avid, homogeneous enhancement with a prominent dural tail, causing severe superior elevation of the optic chiasm and inferior displacement of the normal pituitary gland into a non-expanded sella turcica (Figure 1). Furthermore, coronal T2-weighted sequences demonstrated lateral tumor extension with focal encasement and a marked reduction in the luminal caliber of the left internal carotid artery (Figure 2). Conclusion: This case underscores the indispensable role of targeted MRI in the differential diagnosis of suprasellar masses. Identifying key radiological features—such as sellar integrity, chiasmal compression, and arterial luminal narrowing—is fundamental for distinguishing meningiomas from macroadenomas and determining surgical resectability.

KEYWORDS :

Suprasellar meningioma; Magnetic resonance imaging (MRI); Optic chiasm compression; Internal carotid artery encasement; Pituitary macroadenoma; Differential diagnosis.

MAIN ARTICLE

INTRODUCTION

Meningiomas of the tuberculum sellae and planum sphenoidale account for approximately 5% to 10% of all intracranial meningiomas [1]. Arising from the arachnoid cap cells in the suprasellar cistern, these extra-axial lesions pose immediate threats to the optic chiasm, the pituitary stalk, and the supraclinoid internal carotid arteries (ICA) [1, 2].

Patients typically present with insidious, progressive visual decline resulting from direct mechanical compression or microvascular ischemia of the anterior visual pathways [2]. From a neuroradiological standpoint, a suprasellar mass introduces a broad and complex differential diagnosis. The primary clinical and radiological challenge lies in distinguishing a suprasellar meningioma from a primary pituitary macroadenoma with suprasellar extension, as the surgical approach and perioperative management differ drastically.

While these entities are distinct, the literature also documents rare, confounding instances of coexisting pituitary adenomas and intracranial meningiomas, rendering the precise mapping of sellar and suprasellar architecture absolutely crucial [3, 4]. We present a targeted neuroradiological analysis of a 59-year-old female with a massive suprasellar meningioma, highlighting the critical imaging biomarkers visible on essential MRI sequences required for accurate differential diagnosis and preoperative staging.

CASE PRESENTATION

A 59-year-old female patient presented to the ophthalmology clinic reporting a progressive, painless decrease in bilateral visual acuity evolving over several months. A comprehensive neuro-ophthalmological evaluation confirmed bilateral visual field deficits, prompting an urgent brain MRI assessment.

Sagittal contrast-enhanced T1-weighted imaging revealed a solid, well-circumscribed mass centered within the suprasellar cistern. The mass exhibited avid and homogeneous enhancement. A prominent "dural tail" sign was clearly visible, extending anteriorly along the planum sphenoidale. Crucially, this sequence demonstrated an intact, non-expanded sella turcica. The normal pituitary gland was visualized entirely separate from the mass, being significantly compressed and displaced downward into the sellar floor. Superiorly, the tumor caused severe structural elevation and flattening of the optic chiasm (Figure 1).

Assessment of the parasellar vascular structures yielded critical preoperative findings. Coronal T2-weighted sequences revealed partial encasement of the left supraclinoid ICA by the lateral margin of the meningioma. This encasement was associated with a measurable reduction in the luminal caliber of the left ICA compared to the unaffected contralateral ICA flow void, indicating a highly constrictive desmoplastic tumor reaction (Figure 2).

DISCUSSION

Radiological Differential Diagnosis of Suprasellar Masses The precise radiological differentiation of suprasellar pathologies relies on meticulously evaluating the epicenter of the mass, the integrity of the sella turcica, and the tumor's interaction with adjacent vessels. The provided sequences highlight the core discriminatory features:

- **Pituitary Macroadenoma vs. Meningioma:** This is the primary differential diagnosis. Macroadenomas originate within the sella and expand upward, characteristically resulting in the "ballooning" or gross enlargement of the sella turcica. In contrast, our patient's sagittal imaging (**Figure 1**) confirms a tuberculum sellae meningioma: the sella turcica remains normal in size, and the pituitary gland is compressed inferiorly rather than being the source of the tumor [1]. The presence of a prominent dural tail further secures the meningothelial origin. Furthermore, while macroadenomas frequently invade the cavernous sinus and completely surround the ICA, they characteristically *do not* narrow the arterial lumen [1]. The luminal stenosis visible on the T2 sequence (**Figure 2**) is a hallmark of meningiomas, not adenomas.

Coexisting Lesions and Diagnostic Pitfalls While distinguishing between a meningioma and an adenoma is standard practice, neuroradiologists must be aware of synchronous lesions. Amirjamshidi et al. [3] and Furtado et al. [4] have highlighted rare cases of coexisting pituitary adenomas and suprasellar meningiomas. These reports emphasize that identifying a suprasellar meningioma does not absolve the radiologist from thoroughly examining the sellar contents. In our patient, the distinct visualization of the compressed, otherwise anatomically normal pituitary gland beneath the enhancing mass (**Figure 1**) effectively ruled out a synchronous adenoma.

Vascular Encasement and Surgical Implications The interaction between the tumor and the adjacent vasculature dictates surgical resectability. Unlike pituitary adenomas, meningiomas

often induce a profound desmoplastic reaction. Consequently, when a meningioma encases an artery, it frequently constricts it [2].

The coronal T2-weighted imaging in our patient (**Figure 2**) was pivotal. It demonstrated not only the encasement of the left ICA but a distinct reduction in its luminal caliber. This finding is a major surgical red flag. Attempting to aggressively dissect a constricting meningioma from a narrowed ICA carries an exorbitant risk of arterial rupture, severe vasospasm, and devastating ischemic stroke. Identifying this specific radiological sign alerts the surgical team and often alters the strategy from an attempted gross total resection to a subtotal maximal safe resection followed by adjuvant stereotactic radiosurgery [1, 2].

CONCLUSION

This case illustrates the targeted neuroradiological analysis required for evaluating suprasellar masses. A 59-year-old female presenting with visual decline harbored an avidly enhancing mass with a dural tail, severe chiasmal compression, and inferior pituitary displacement. Crucially, the differentiation from a pituitary macroadenoma was established by the normal sellar dimensions and the identifiable, separate pituitary gland. Furthermore, the identification of left ICA luminal reduction highlights the indispensable role of the radiologist in mapping deep vascular involvement, directly dictating safe surgical management.

FIGURES :

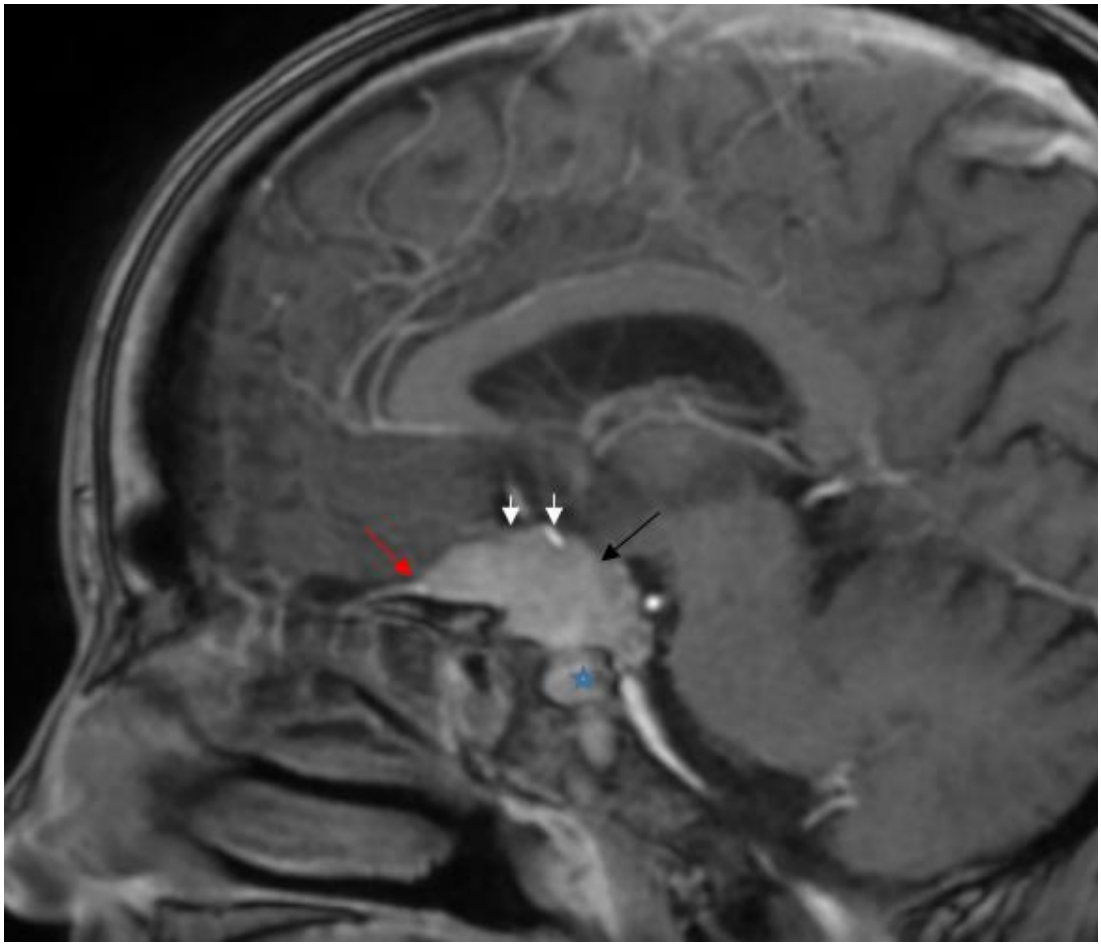

Figure 1: *Sagittal contrast-enhanced T1-weighted MRI demonstrating a homogeneously enhancing extra-axial suprasellar mass (Black arrow).. Note the prominent dural tail sign extending anteriorly along the planum sphenoidale, (Red Arrow) the severe downward compression of the normal pituitary gland into a non-expanded sella turcica (Blue star), and the structural compression of the optic chiasm draped over the superior dome of the tumor(White arrows).*

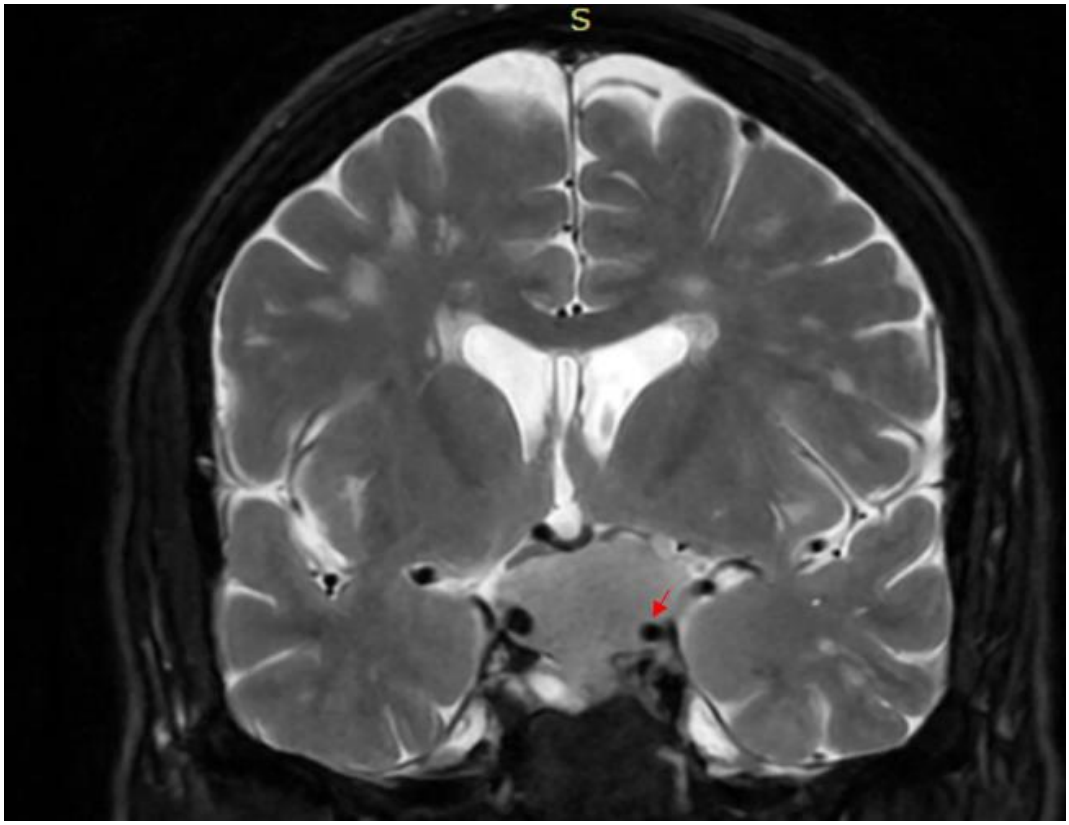

Figure 2: *Coronal T2-weighted MRI showcasing the critical vascular relationship. The image demonstrates lateral extension of the tumor with encasement and a distinct reduction in the caliber of the left internal carotid artery (ICA) flow void, (Red arrow) compared to the normal contralateral right ICA.*

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