Optic Chiasma Compression by Meningioma: A Case Report

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Abstract: Meningiomas of the tuberculum sellae and suprasellar region are rare, accounting for approximately 5–10% of intracranial meningiomas. Their proximity to the optic chiasma often leads to progressive visual impairment, posing both diagnostic and surgical challenges. Early identification and intervention are crucial for preserving visual function. We report the case of a 59-year-old female who presented with gradual, painless, progressive diminution of vision in the right eye over ten years and decreased brightness in the left eye for four months. Ophthalmological examination revealed total optic atrophy in the right eye and temporal pallor in the left optic disc, with a temporal field defect. MRI brain demonstrated a well-defined suprasellar mass (1.6 × 2.1 × 1.8 cm) compressing and splaying the optic chiasma. Endocrine evaluation was regular. The patient underwent right frontotemporal (pterional) craniotomy with gross total tumor excision. Histopathology confirmed a WHO Grade I transitional meningioma. Postoperatively, there was partial improvement in left eye visual brightness, while the right eye remained non-functional. Follow-up MRI at three months showed complete tumor excision with no recurrence. This case highlights the insidious onset and chronic visual deterioration characteristic of optic chiasma compression by a tuberculum sellae meningioma. Optic chiasma compression by meningioma demands high clinical suspicion, prompt neuroimaging, and timely surgical decompression to optimise visual outcomes. Delayed presentation, as in this case, often results in irreversible optic neuropathy despite complete resection.

Keywords: *Meningioma, vision loss, optic chiasma, optic atrophy, recurrence*

I. Introduction

Meningiomas are common, typically benign intracranial tumors that arise from the arachnoid cap cells of the meninges. Anterior skull base meningiomas comprise ~40% of all intracranial meningiomas, of which Suprasellar/parasellar meningiomas occur in 5-10% of all intracranial meningiomas.1-3 These tumors, like all other meningiomas, are found more commonly in females (3:1) and their most common presentation is in the fourth or fifth decade of life.1,2

Meningiomas located at the tuberculum sellae, planum sphenoidale, and suprasellar region are particularly significant due to their proximity to critical neurovascular structures, including the optic chiasma, optic nerves, and pituitary stalk. Compression of the optic apparatus by a meningioma often leads to progressive, insidious visual deterioration. Early recognition and timely intervention are crucial to prevent irreversible visual loss. Suprasellar meningiomas are a frequent cause of gradual bitemporal hemianopia, which can mimic pituitary adenomas; however, they can be differentiated by specific clinical, radiological, and surgical features. Over the years, the treatment of suprasellar meningioma has remained challenging due to the proximity of vital neurovasculature. Over time, various approaches have been employed for the resection of these tumors, ranging from microsurgical excision to endonasal endoscopic approaches, with proponents of each claiming safer and better results.

This case report describes a 59-year-old female presented with gradual, painless, progressive diminution of vision, of right eye for 10 years with decreased brightness in left eye for 4 months, examination of fundus revealed total optic atrophy in the right and partial optic atrophy in left eye secondary to optic chiasma compression by a tuberculum sellae meningioma, emphasising diagnostic challenges, neuroimaging findings, surgical management, and postoperative outcomes. The discussion reviews current understanding and management strategies for this condition.

Case History

A 59-year-old woman presented to the Ophthalmology outpatient department of Chirayu Medical College and Hospital, Bhopal, with complaints of gradual, painless, and progressive diminution of vision in her right eye for 10 years, and blurred vision. She also reported blurring of vision with decreased brightness in her left eye for 4 months. She had intermittent frontal headaches in the morning and vertigo for the last 5 years. There was no history of diplopia, seizures, vomiting, or limb weakness. She had been a known case of hypertension for 20 years, and she was taking medicine regularly. She had no history of prior radiation exposure or hormonal abnormalities.

Systemic and neurological examination revealed no motor or sensory deficits. The cranial nerve examination was otherwise regular, and there was no evidence of endocrine dysfunction, such as galactorrhea, menstrual irregularity, or changes in body habitus.

On ophthalmological examination- Best corrected vision of right eye: Hand movement present, Projection of light was accurate in all four quadrants, and best corrected vision of left eye was 6/9. The pupil of the right eye did not exhibit a direct light reaction and showed a RAPD grade 3 on consensual light presentation. (Figure 1) A pupillary reflex of the left eye was normal.

Fundus examination showed primary optic atrophy in the right eye and temporal pallor of the optic disc in the left eye. (Figure 2) Intraocular pressure was normal in both eyes (right eye -14 mmHg, left eye -12 mmHg). Visual field testing showed no record in the right eye and a temporal half-field defect in the left eye. (Figure 3)

Based on the above findings, an Intraorbital/Intracranial space-occupying lesion is suspected, and an MRI of the brain and orbit is ordered. The MRI brain scan showed a well-defined mass lesion in the suprasellar region, measuring 1.6×2.1×1.8 cm, which compressed and splayed the optic chiasm against the basifrontal lobe. (Figure 4) Baseline hormonal assays (TSH, prolactin, cortisol, growth hormone, and gonadotropins) were within normal limits, ruling out a functional pituitary tumor. The patient was referred to a neurosurgeon. The patient was operated on through a right frontotemporal pterional craniotomy, and the tumour was resected. Histopathological examination of the resected mass revealed a transitional meningioma (WHO grade 1). (Figure 5) The patient came in for follow-up after 2 months in a stable condition. Right eye visual acuity was hand movement PL+PR, inaccurate in the inferior and temporal quadrants. The best corrected vision in the left eye was 6/9. Temporal field defect was still present in the left eye. Follow-up MRI at 3 months confirmed complete tumor excision with no residual enhancement. The patient was maintained on routine follow-up every six months with clinical and imaging surveillance.

II. Discussion

The present case exemplifies the course of a suprasellar meningioma, characterised by a 10-year history of slow, progressive visual loss in the right eye and 4 months of blurred vision with decreased brightness in the left eye. Visual field testing showed a temporal half-field defect in the left eye, preserved endocrine function, and MRI findings of a well-defined mass lesion in the suprasellar region, compressing and splaying of the optic chiasm against the basifrontal lobe. In our case, marked visual loss was presented in one eye, accompanied by optic atrophy. Consequently, visual recovery was not observed in the right eye. In the left eye, contrast sensitivity improved, but the field defect and visual acuity remained unchanged after surgery.

Goel et al. (2018) analysed 72 patients with tuberculum sellae meningiomas and found that over 80% presented with visual deficits as the initial symptom. The mean duration before diagnosis was 9 months, shorter than our case. Following microsurgical excision via the pterional approach, 67%

experienced visual improvement. The study highlighted that early intervention correlated strongly with visual recovery.[4]

Bassiouni et al. (2009) reported a series of 41 patients with suprasellar meningiomas. Bitemporal hemianopia was the most frequent presentation (73%), and visual improvement occurred in 70% postoperatively. Patients operated within six months of symptom onset had significantly better outcomes than those with chronic deficits, underscoring the importance of early diagnosis and decompression.[5] Oya et al. (2011) compared 35 cases of tuberculum sellae meningiomas treated via microsurgical pterional and endonasal endoscopic approaches. Both routes achieved equivalent tumor control, but the endonasal approach reduced brain retraction and hospital stay. Nonetheless, patients with severe preoperative optic atrophy showed limited recovery, confirming that chronic compression causes irreversible damage.[6]

Visual impairment in these tumors arises from both mechanical compression and vascular compromise of the optic nerves. Chronic distortion leads to retrograde degeneration of retinal ganglion cells, manifesting as optic pallor on fundoscopy. The pterional craniotomy, used in this case, offers excellent visualisation of the optic apparatus and internal carotid arteries. Key principles include early optic nerve decompression, preservation of the perforating vessels, and avoidance of traction. For smaller, midline lesions, the endonasal endoscopic route may provide direct access with minimal invasiveness. Predictors of postoperative visual recovery includes shorter duration of preoperative symptoms, absence of complete optic atrophy, adequate microsurgical decompression, and avoidance of vascular injury to the optic nerves and chiasma. Regular MRI follow-up every 6–12 months is advised, along with annual visual field testing to detect early recurrence.

Collectively, these studies and our experience affirm that early microsurgical excision remains the standard of care for optic chiasma compression by meningioma. Delay in diagnosis and surgery correlates with poorer visual outcomes due to irreversible optic neuropathy.

III. Conclusion

In conclusion, compression of the optic chiasma by meningioma poses diagnostic and therapeutic challenges, necessitating a multidisciplinary approach for optimal management. Early recognition of symptoms, prompt neuroimaging, and timely surgical intervention are crucial in preserving visual function and improving patient outcomes.

Acknowledgement

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Figure 1: Figure showing RAPD grade 3 on consensually light presentation

Figure 2: Figure showing optic atrophy in right eye and temporal pallor of optic disc in left eye

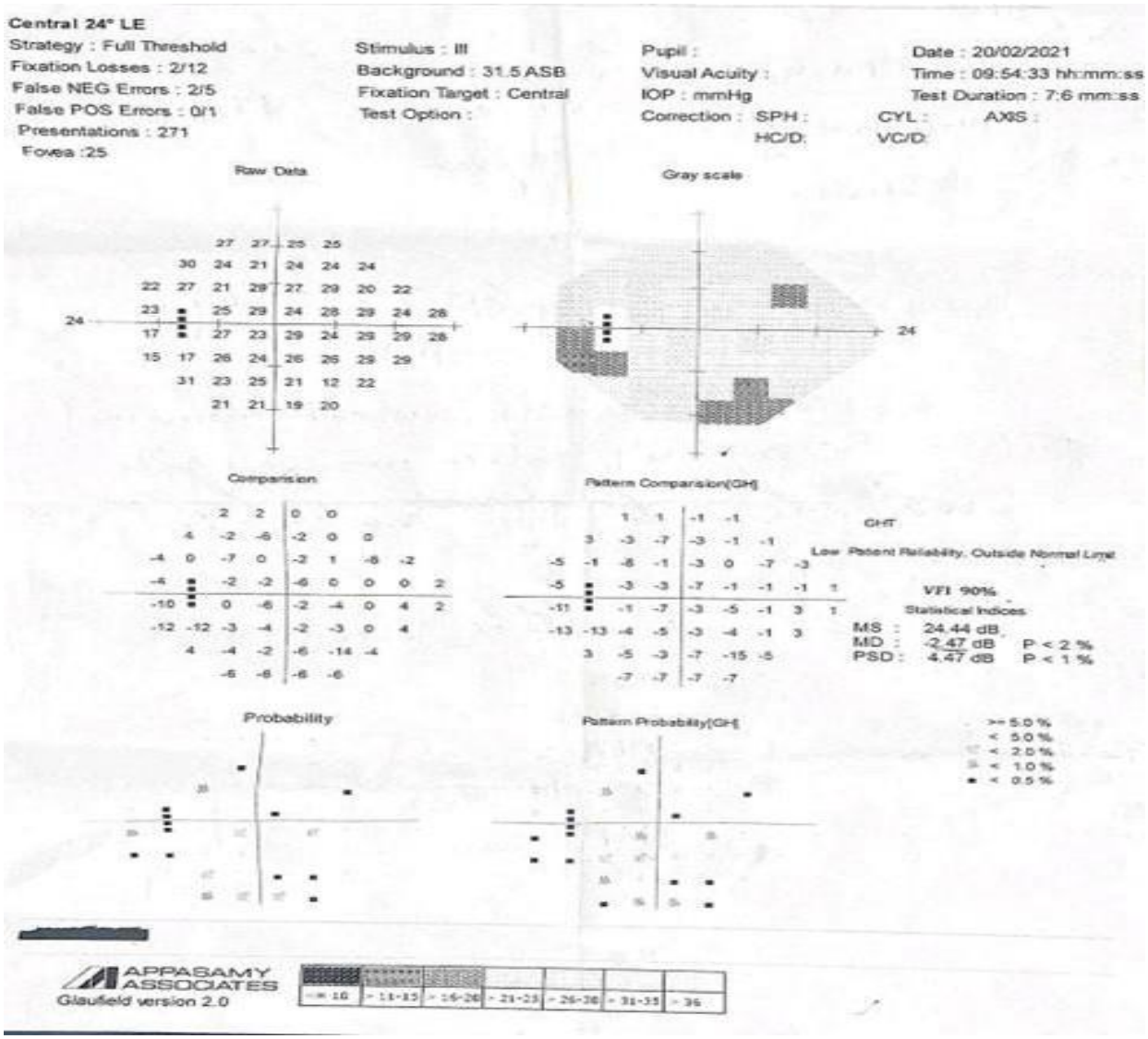

Figure 3: Visual filed testing of the patient

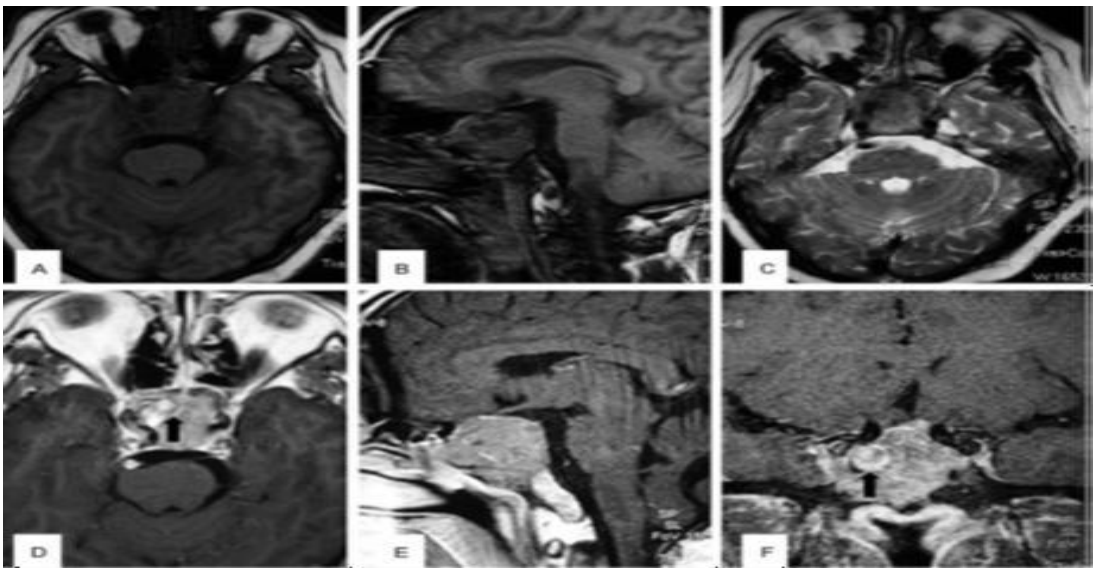

Figure 4: MRI brain showing suprasellar mass

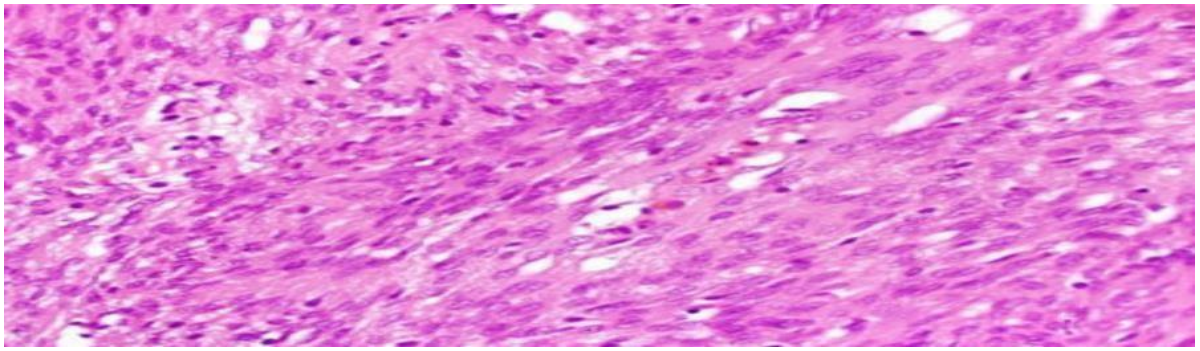

Figure 5: Histopathology slide showing meningioma