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Large Pineal Meningioma Causing Vision Loss in a Teenager: A Case Report

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1. Abstract

Tumors of the pineal region are rare, particularly meningiomas, and often present with neurological deficits due to their deep midline location. We report an 18-year-old female who presented with headache, visual impairment, gait disturbance, and drowsiness. Neuroimaging revealed a large pineal mass causing obstructive hydrocephalus. Histopathological examination confirmed a World Health Organization (WHO) grade I meningioma. The patient underwent ventriculostomy followed by tumor embolization and surgical resection. Postoperatively, visual recovery was limited to partial peripheral improvement. This case highlights the diagnostic challenges, management considerations, and potential for irreversible visual deficits associated with pineal region tumors.

2. Keywords: Pineal tumor, meningioma, hydrocephalus, vision loss

3. Introduction

The pineal gland is a small neuroendocrine structure located in the midline, between the superior colliculi at the posterior aspect of the third ventricle. Although anatomically small, lesions in this region can have significant clinical consequences due to proximity to critical neural and cerebrospinal fluid (CSF) pathways.

Pineal region tumors are uncommon and account for a small percentage of intracranial neoplasms. The majority are germ cell tumors, while meningiomas in this location are rare, especially in younger patients. Because of their central position, these tumors often cause symptoms by obstructing CSF flow, leading to hydrocephalus, or by compressing adjacent visual, auditory, and motor pathways.

Early diagnosis is essential, as prolonged compression of neural structures may result in permanent deficits despite appropriate treatment.

4.Case Report

An 18-year-old female presented with progressive headache, visual disturbances, difficulty in walking, and increasing drowsiness over a short duration.

4.1. Clinical Findings

Neurological examination suggested raised intracranial pressure and possible involvement of visual pathways. The patient exhibited impaired vision along with signs of gait instability.

4.2. Imaging

Magnetic resonance imaging (MRI) of the brain revealed a large, well-defined mass in the pineal region. The lesion caused compression of adjacent midbrain structures and obstruction of CSF flow, resulting in hydrocephalus.

4.3. Initial Management

An urgent ventriculostomy was performed to relieve intracranial pressure. A biopsy could not be obtained during this procedure due to technical limitations.

4.4. Diagnosis

The patient subsequently underwent stereotactic biopsy. Histopathological analysis demonstrated a fibrous meningioma, classified as WHO grade I.

4.5. Definitive Treatment

Preoperative embolization was carried out to reduce tumor vascularity. This was followed by craniotomy and surgical excision of the mass.

4.6. Outcome

Following surgery, the patient's neurological status stabilized. However, visual improvement was limited, with only partial recovery of peripheral vision. No significant restoration of central vision was noted.

5. Discussion

Pineal region tumors are rare and encompass a wide spectrum of pathologies, with germ cell tumors being the most common. Meningiomas in this region are unusual and particularly rare in adolescents.

5.1. Clinical Presentation

Symptoms are primarily due to:

- Obstructive hydrocephalus, causing headache, nausea, and

ANNALS OF MEDICAL AND CLINICAL CASES

drowsiness
- Compression of adjacent neural pathways, leading to visual disturbances, gait abnormalities, and other neurological deficits

Visual impairment is a recognized feature, as visual pathways run close to the pineal region. Compression or displacement of these structures can result in partial or complete vision loss.

5.2. Diagnosis

MRI is the imaging modality of choice, providing detailed information about tumor size, location, and its relationship to surrounding structures. However, definitive diagnosis requires histopathological confirmation.

5.3. Management

Treatment depends on tumor type:

- Germ cell tumors are often treated with radiotherapy and chemotherapy
- Meningiomas and other non-germinomatous tumors are primarily managed surgically

Preoperative embolization may be useful in reducing intraoperative bleeding in vascular tumors.

5.4. Prognosis

The outcome depends on:

- Tumor size and duration of symptoms
- Degree of neural compression
- Completeness of surgical resection

Visual deficits, particularly when longstanding, may be irreversible despite successful tumor removal. This emphasizes the importance of early diagnosis and timely intervention.

6. Conclusion

Pineal meningiomas are rare tumors that can present with significant neurological impairment in young patients. This case demonstrates the importance of considering pineal region pathology in patients with hydrocephalus and visual symptoms. Early diagnosis and prompt surgical management are crucial, although recovery of vision may be limited if neural structures have sustained prolonged compression.

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