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Surgery

BILATERAL FRONTAL HYPEROSTOSIS IN A UNILATERAL SPHENOID WING MENINGIOMA: A RARE PRESENTATION

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ABSTRACT **Background:** Hyperostosis is frequently encountered in sphenoid wing meningiomas and is usually confined to the adjacent skull base. Bilateral symmetrical frontal bone involvement in the setting of a unilateral sphenoid wing lesion is exceptionally uncommon and has rarely been documented. **Case Description:** A 62-year-old woman presented with gradually progressive bifrontal headache. Neurological examination was unremarkable. MRI revealed a right sphenoid wing extra-axial enhancing mass. CT bone window demonstrated marked hyperostosis of the right sphenoid wing along with diffuse bilateral frontal bone thickening and obliteration of the diploic space. The lesion was excised, and histopathology confirmed WHO Grade I meningothelial meningioma with tumor infiltration into the involved bone. **Conclusion:** While hyperostosis is common in sphenoid wing meningiomas, bilateral frontal calvarial involvement associated with a unilateral tumor is exceedingly rare. Awareness of this unusual pattern is important to avoid diagnostic confusion and to appreciate the full extent of osseous involvement.

KEYWORDS : Sphenoid Wing Meningioma; Bilateral Hyperostosis; Frontal Bone; Calvarium

INTRODUCTION

Meningioma represents approximately one-third of primary intracranial tumors, with a higher incidence in women (1). Sphenoid wing meningioma account for 15–20% of intracranial meningiomas (2). Hyperostosis is a well-recognized radiological feature of these tumors and has been reported in 25–49% of cases, particularly in en plaque variants (3,4).

In most surgical series, the bony changes remain localised to the sphenoid wing and contiguous skull base. Extension into the ipsilateral frontal bone may be seen, but widespread calvarial involvement is uncommon (4,5). Bilateral symmetrical frontal hyperostosis in association with a unilateral sphenoid wing meningioma is not described in major cohorts and appears limited to isolated case reports. We present a case illustrating this unusual pattern and discuss its relevance in light of the available literature.

Case Presentation

A 62-year-old female presented with a 10-month history of dull, progressively worsening bifrontal headache. There was no history of seizures, visual impairment, vomiting, or focal neurological symptoms.

On examination, she was alert and oriented. Cranial nerves were intact, visual acuity was preserved, and no motor or sensory deficits were detected.

Radiological Findings

Magnetic resonance imaging demonstrated a well-circumscribed extra-axial mass along the right sphenoid wing measuring approximately 3.8 × 3.5 × 3.2 cm. The lesion was isointense on T1-weighted imaging and enhanced uniformly following contrast administration. A broad dural attachment with a dural tail sign was noted. There was mild compression of the adjacent temporal lobe without significant surrounding edema.

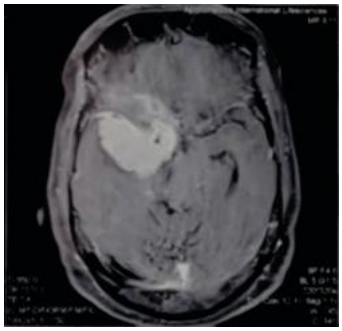

Figure 1: Right Wing Sphenoid Meningioma with Bilateral Frontal Hyperostosis with Prominent Frontal Sinus

Computed tomography with bone windows revealed dense hyperostosis of the right sphenoid wing. In addition, there was diffuse and symmetrical thickening of both frontal bones with near-complete obliteration of the diploic space. The frontal involvement extended across the midline and was disproportionate to the unilateral location of the tumor

Management and Histopathology

The patient underwent right frontotemporal craniotomy with gross total excision of the tumor. The hyperostotic bone was drilled to normal margins.

Histological examination demonstrated meningothelial meningioma (WHO Grade I). Sections obtained from the thickened bone showed tumor cells within Haversian canals, confirming direct osseous involvement.

The postoperative course was uneventful, and the patient reported significant relief from headache.

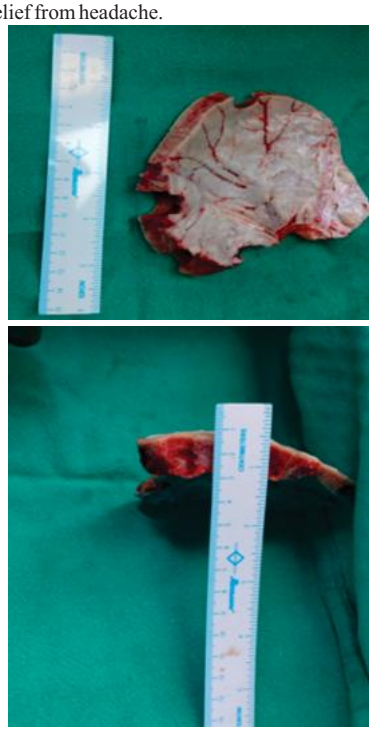

Figure 2a & 2b:Excised Hyperostotic Frontal Bone

DISCUSSION

Hyperostosis is commonly associated with sphenoid wing meningiomas and is observed in roughly one-quarter to one-half of cases (3,4). In large series, however, the bony involvement is typically limited to the sphenoid wing and adjacent structures. Extensive calvarial spread is uncommon, and bilateral symmetrical frontal involvement is particularly rare.

Munjal et al. reported a case of giant bilateral calvarial hyperostosis associated with a small unilateral frontal meningioma, noting the disproportionate extent of bone thickening relative to tumor size (6). Haddad and Al-Mefty described bilateral en plaque sphenoid wing meningiomas with extensive hyperostosis, although in those cases the dural disease itself was bilateral (7). Notably, major surgical series of sphenoid wing meningiomas by Al-Mefty (3) and Bassiouni et al. (4) do not describe bilateral symmetrical frontal hyperostosis as a distinct pattern.

Taken together, the literature suggests that only a handful of comparable cases have been documented. Considering the overall frequency of sphenoid wing meningiomas and the reported rates of hyperostosis, bilateral frontal calvarial involvement in a unilateral lesion likely represents well under 1% of cases.

This distinction is clinically relevant. Diffuse frontal bone thickening may raise suspicion for primary osseous disorders such as Fibrous dysplasia or Paget disease of bone. Awareness that meningioma can, in rare instances, produce bilateral hyperostosis helps prevent misinterpretation and ensures appropriate management.

CONCLUSION

Hyperostosis is a familiar finding in sphenoid wing meningiomas, but it is usually localised. Diffuse bilateral frontal hyperostosis associated with a unilateral sphenoid wing tumor is exceptionally rare, with only a few similar cases reported. Recognition of this unusual presentation broadens the known spectrum of hyperostotic meningiomas and underscores the need for careful radiological assessment of the entire calvarium

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