



Beyond the Dura - Extensive Hyperostotic Response in a Giant Intracranial Meningioma: A Case Report and Review



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Objective

- To report a case of massive cranial hyperostosis as well as to summarize the pertinent neurosurgical literature.

Methods

- Case report and PRISMA-compliant systematic review.

Introduction

- Meningiomas account for approximately 41% of all primary CNS neoplasms in the United States.
- Although local bony changes are frequently observed adjacent to intracranial meningiomas, extensive calvarial hyperostosis is exceedingly rare.
- We report a patient presenting with a 14-year history of pan-cranial hyperostosis from a bilateral parasagittal meningioma, as well as an associated systematic review.

Case Report

- A female in her mid-40s presented with more than 14 years of enlarging pan-calvarial skull deformity involving the bilateral frontal bones.
- MRI revealed an extensive midline enhancing mass arising from the falx and paramedian convexity dura, consistent with meningioma.
- The patient underwent bifrontal craniotomy with en bloc resection of hyperostotic bone and microsurgical removal of a giant bilateral parasagittal meningioma.
- Subtotal resection was performed to preserve critical venous drainage near the superior sagittal sinus.
- Reconstruction included dural grafting and titanium mesh cranioplasty.
- Pathologic analysis confirmed a meningothelial meningioma (WHO Grade II) with a solitary TRAF7 mutation.

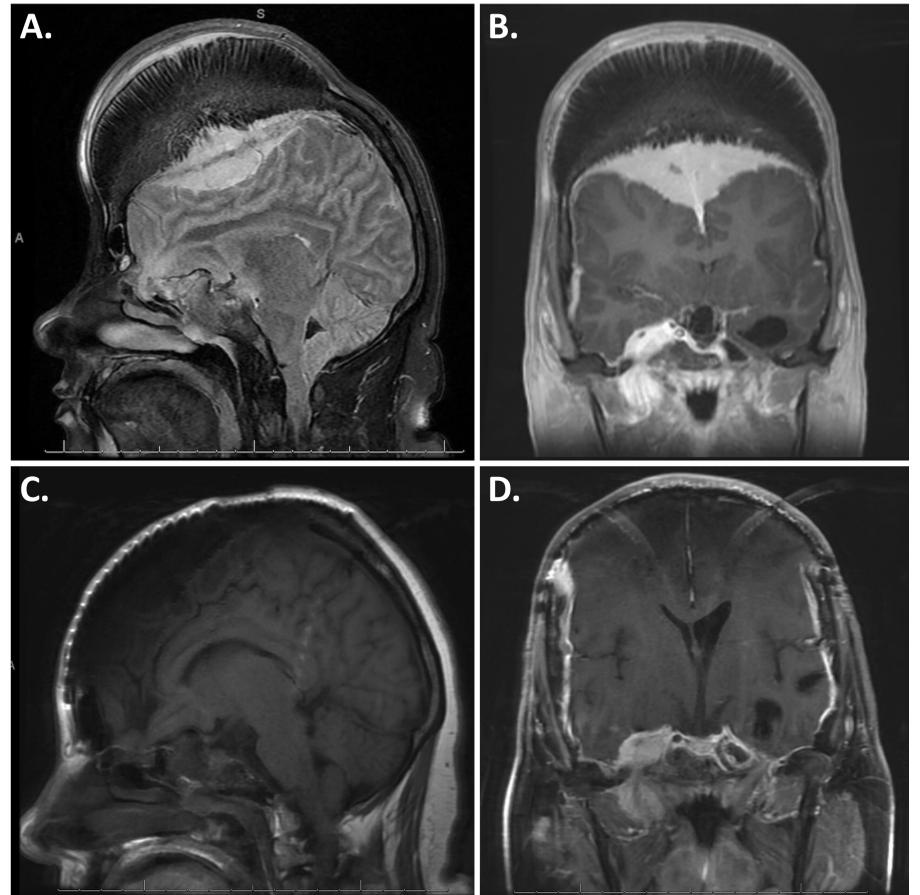


Figure 2. a) Pre-operative sagittal T2 FLAIR FS MRI with/without contrast b) Pre-operative coronal multiplanar reconstruction MRI with/without contrast c) Six-month follow-up sagittal T1 FLAIR MRI with/without contrast d) Six-month follow-up coronal T1 FLAIR MRI with/without contrast

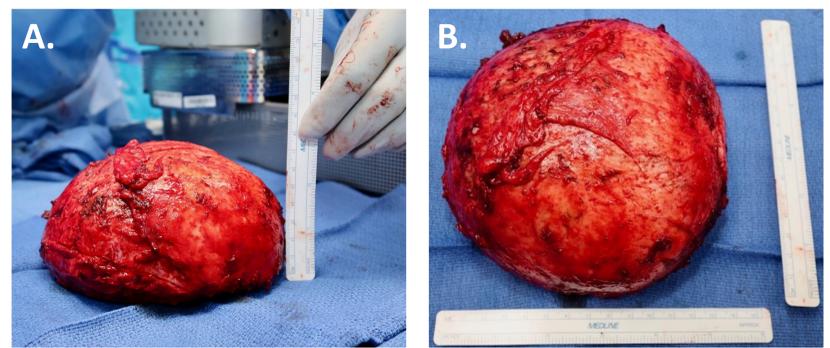


Figure 3. a) Resected calvarial bone flap from en bloc craniotomy, measuring ~ 8 cm in height b) Resected calvarial bone flap from en bloc craniotomy, measuring ~ 14 x 15 cm

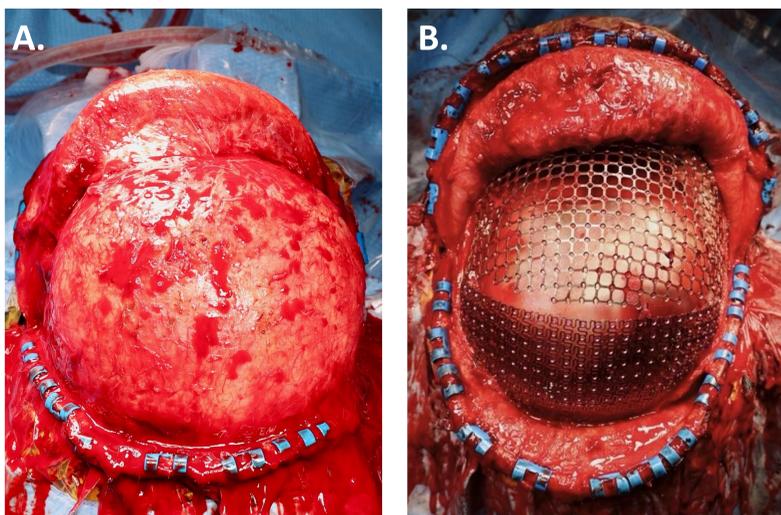


Figure 1. a) Bi-coronal scalp flap exposing hyperostotic calvarium b) Mesh placement following bifrontal craniotomy and subtotal tumor resection

Discussion

- Systematic review indicated a high prevalence of bifrontal bony involvement and meningothelial histology.
- Mutations in TRAF7, a potent regulator of NF- κ B, MAPK, and similar pathways, have been linked to hyperostosis in the calvarium, as well as meningothelial meningioma histopathology.

Conclusion

- The present case report and literature review highlight the potentially profound impact of a TRAF7 mutation in meningioma paracrine hyperostosis, although further study is required to better understand the mechanistic interplay between TRAF7, hyperostosis, and meningioma phenotype.

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