

Pitfalls in Unenhanced MRI: Spotting Small Meningiomas with Subtle Radiologic Signs

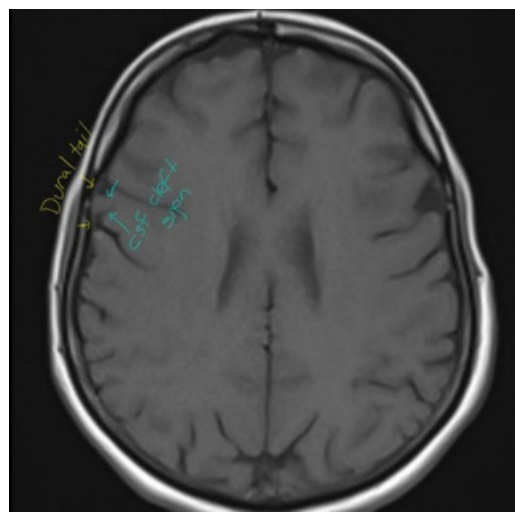
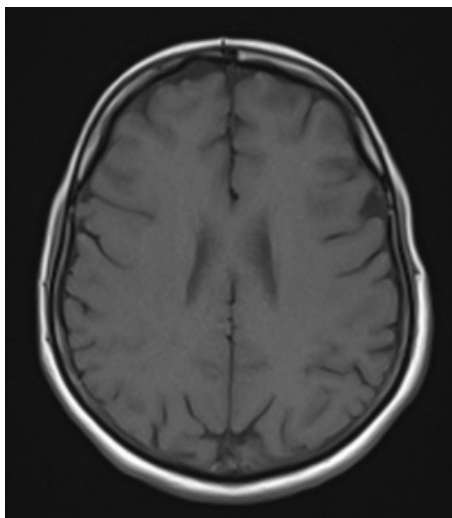
- It is the most common primary brain tumor in adults, originating from the meninges, the membrane layers surrounding the brain and spinal cord. Approximately 80-85% of cases fall into the World Health Organization (WHO) Grade 1 category and are benign (slow-growing). Rather than invading brain tissue, they generally exert pressure by compressing it from the outside.
- In daily radiology practice, small asymptomatic meningiomas are frequently encountered as incidental findings. However, on non-contrast routine brain MRI sequences (particularly T1WI and T2WI), these lesions are prone to being missed due to their small size and isointensity to the adjacent cortex.

Why Are Small Meningiomas Easily Missed on Non-Contrast MRI?

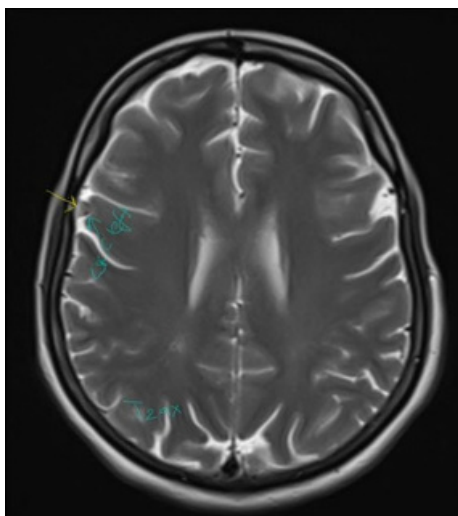
- **Signal Isointensity:** Meningiomas typically display signal intensity similar to normal gray matter, making them blend seamlessly into the adjacent cerebral cortex.
- **Absence of Perilesional Edema: Small,** early-stage meningiomas rarely induce vasogenic edema, lacking the high-signal "alerting" halo on T2/FLAIR sequences.
- **Convexity Blind Spots:** Small extra-axial nodules abutting the inner table of the skull can easily escape detection without noticeable mass effect.

Subtle Clues to Look For:

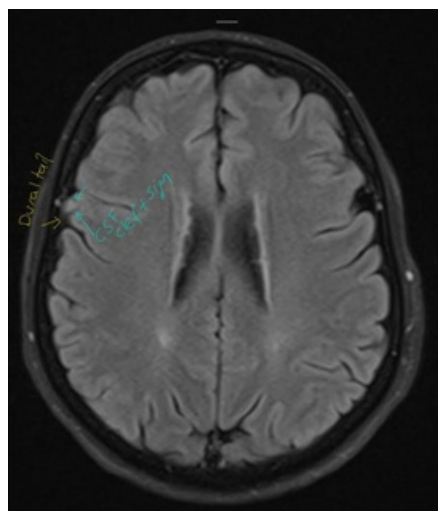
- **CSF Cleft Sign:** A thin, hyperintense fluid rim between the tumor and the cortex on T2WI and FLAIR sequences confirms the extra-axial origin of the mass.
- **Dural Tail Sign:** Even on unenhanced FLAIR images, a subtle dural thickening adjacent to the broad-based dural attachment can be discerned upon meticulous inspection.



Non-contrast T1W ax

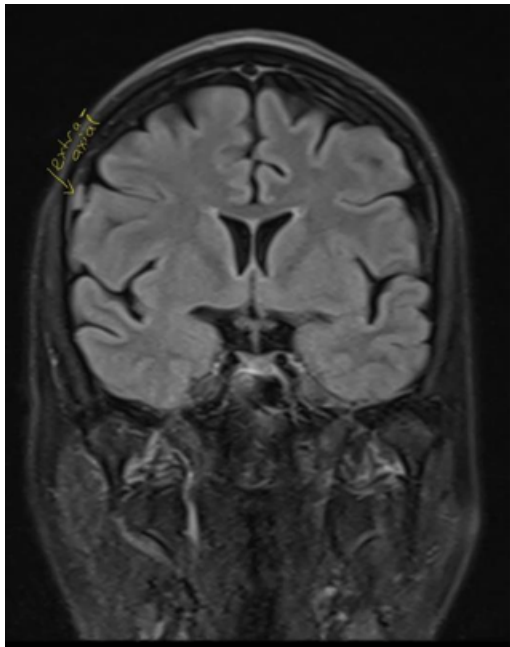


T2W axial

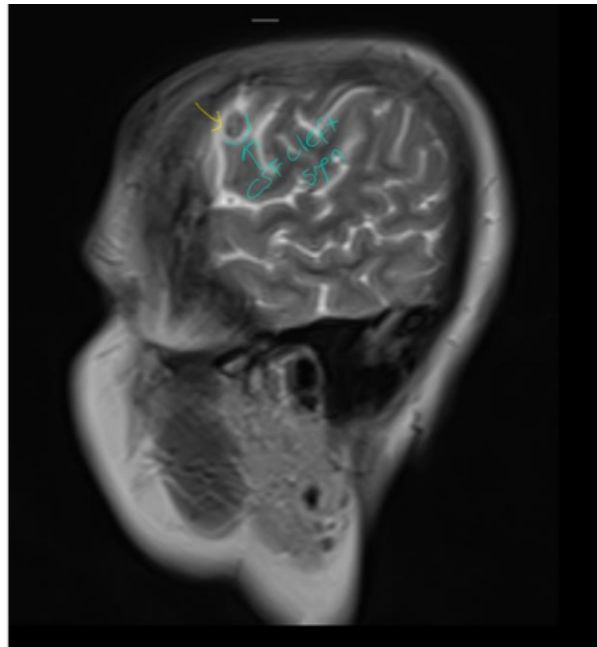


FLAIR axial

- **Cortical Buckling & Sulcal Displacement:** Subtle compression and displacement of the underlying cortex and adjacent sulci indicate an extra-axial mass pushing the parenchyma.



FLAIR coronal



T2W sagittal

Conclusion: Careful evaluation of the convexity dura, subarachnoid CSF spaces, and cortical boundaries on non-contrast MRI enables accurate detection of small meningiomas prior to contrast administration.