

MRI FINDINGS OF MENINGIOMA IN VARIOUS LOCATIONS: A PICTORIAL REVIEW

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Meningioma, one of the most common brain tumor accounts for about one-third of all primary intracranial neoplasms.¹

It can occur virtually at any site within central nervous system.² However, 90% of meningiomas occur in supratentorial location, most common location being parasagittal/convexity. Around 15-20% occur along sphenoid ridge. Other common supratentorial locations are- sellar/parasellar region, olfactory groove. Less common sites in supratentorial region are- ventricles, pineal region. Posterior fossa meningiomas account for around 8-10%. Cerebellopontine angle is the most common infratentorial site. Extradural spaces can also be affected, sites being the optic nerve sheath, paranasal sinuses and nose. Most meningiomas are asymptomatic and diagnosed incidentally.² Usually middle aged and older people are affected. Females are affected more frequently than the males.³

Imaging

Typically meningioma is a round/lobulated well demarcated extraxial dura based mass, which buckles the cortex inward without parenchymal invasion.^{4,5,6}

T1WI: Iso to slightly hypointense compared to cortex. (Fig. 2A, 3A, 6A)

T2WI: Iso to moderately hyperintense compared to cortex (Fig. 1A, 4A, 5A)

Sometimes a CSF-vascular cleft is well delineated

on T2WI. This is seen as a hyperintense rim interposed between the tumor and brain. (Fig. 5A)

FLAIR: Signal intensity of meningioma varies from iso to hyperintense. About half of all typical meningiomas are associated with peritumoral edema,⁷ which is well delineated on FLAIR images.

T*(GRE, SWI): These sequences help to depict intratumoral calcification if any via 'blooming'.

DWI: Mostly meningiomas do not restrict on DWI.

T1 C+ FS: All meningiomas show at least some contrast enhancement.⁸ Over 95% enhance strongly and homogeneously (Fig. 2B, 2C, 3B, 5B, 6B, 6C). However in some cases there may be heterogeneous enhancement (Fig. 4C).

A 'dural tail' is seen in majority of meningiomas. It may be in relatively focal area adjacent to the tumor or there may be extensive dural thickening and enhancement extending far beyond tumor attachment site. Sometimes the 'dural tail' may enhance more intensely and uniformly than the tumor itself (Fig. 4B). Sometimes a sunburst pattern representing the vascular supply of the tumor can be seen radiating to the periphery of the mass. In postcontrast scan these radiating vessels may appear more hyperintense and the centre may be seen as a flow void (Fig. 5B).

MRS: Amino acids peak may be demonstrated. Though alanine is often elevated, glutamate-glutamine and glutathione peak may be more specific.

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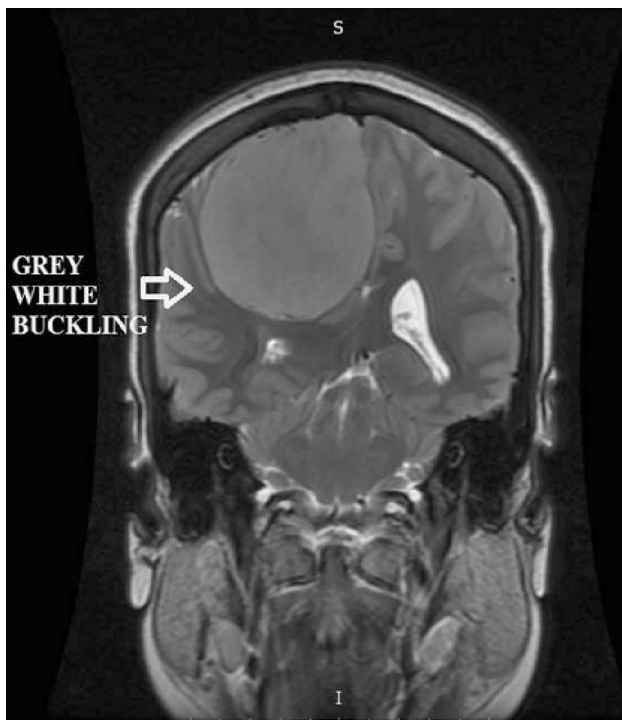


Figure 1A: Coronal T2WI showing a mass, isointense with the cortex. The tumor has flat base towards the dural surface. It buckles the cortex and gray-matter-white-matter interface inward.

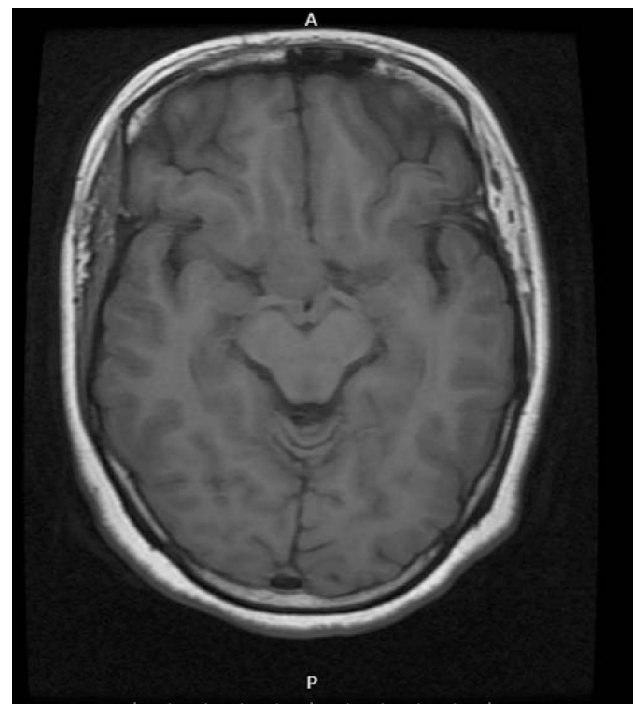


Figure 2A: Axial T1WI demonstrate a well defined suprasellar solid mass, isointense to cortex.

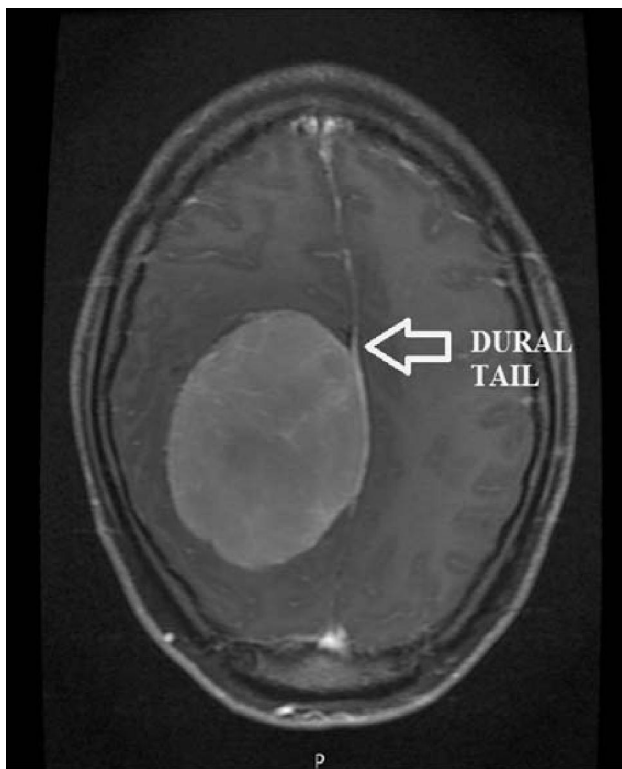


Figure 1B: Axial T1 C+ FS scan of the same patient demonstrate adjacent dural thickening ('dural tail' sign).

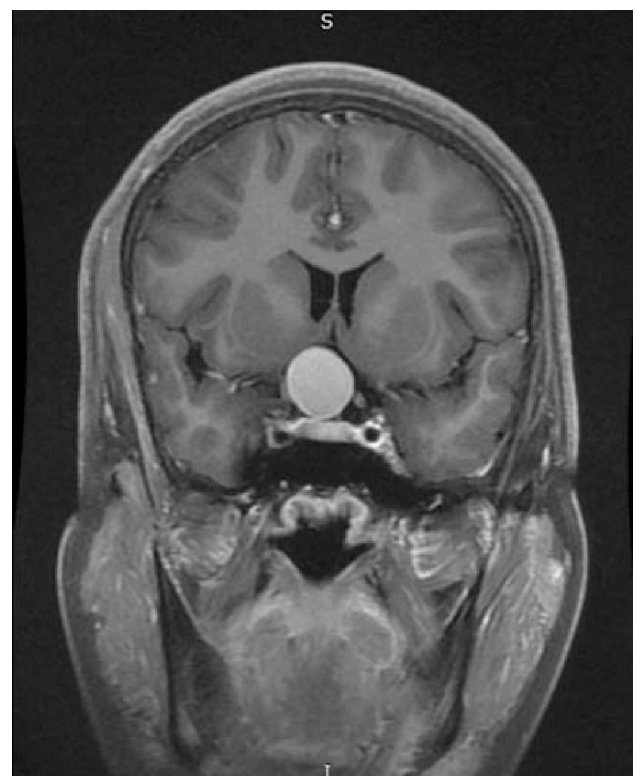


Figure 2B: Coronal T1 C+ FS scan shows depression of diaphragm sella; The mass is pushing down into the sella, rather than arising out of the sella.

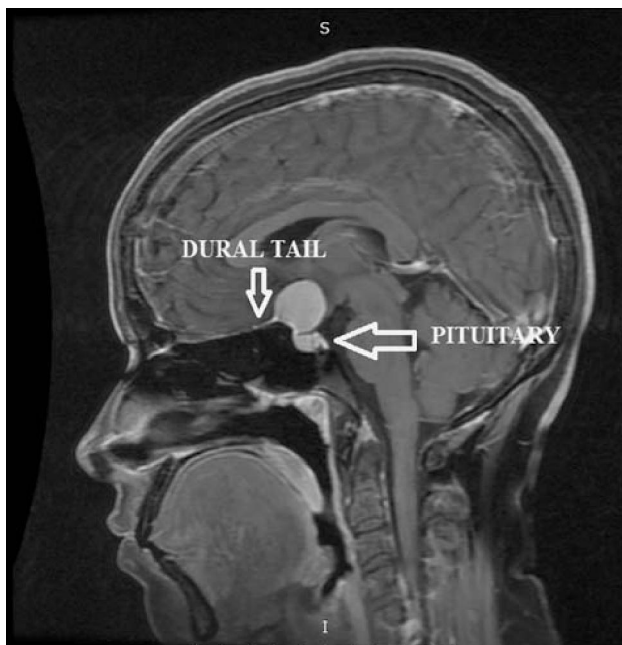


Figure 2C: Sagittal T1 C+ FS scan shows intense homogenous contrast enhancement of the mass. There is a broad dural attachment (dural tail) to the planum sphenoidale. The pituitary gland is separately visualized from the mass.

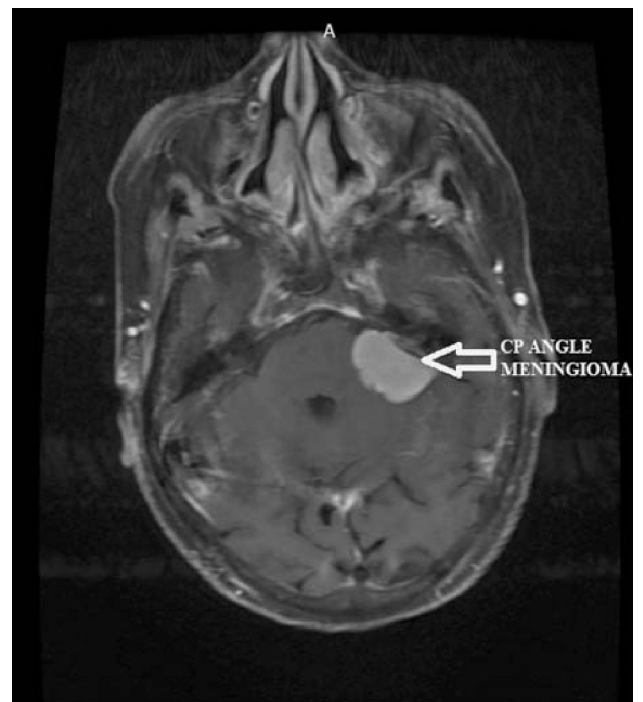


Figure 3B: Axial T1 C+ FS scan of same patient shows intense homogenous contrast enhancement of the mass.

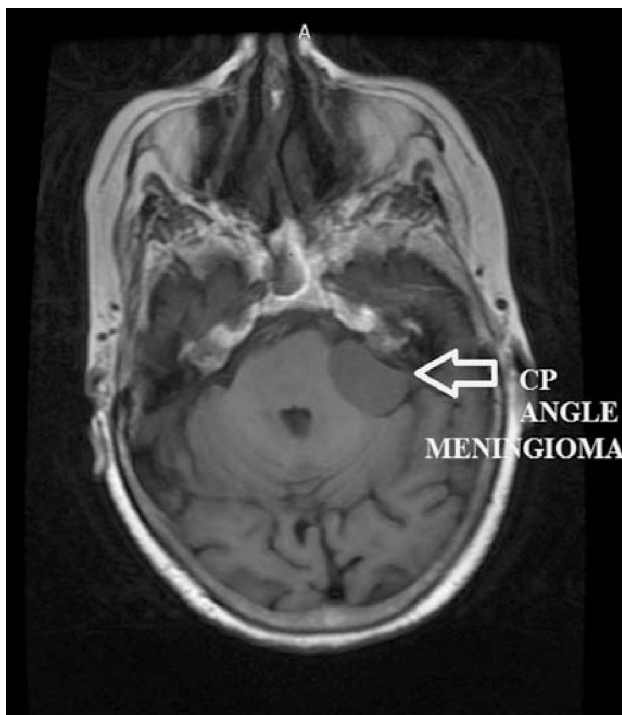


Figure 3A: Axial T1WI shows a well defined oval mass, isointense with cortex in left CP angle.

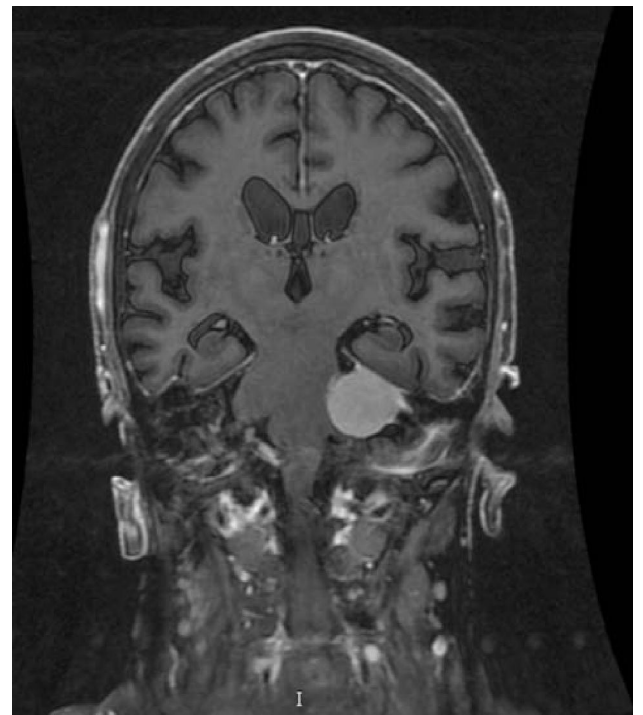


Figure 3C: Coronal T1 C+ FS scan shows the mass is broadbased towards the dura.

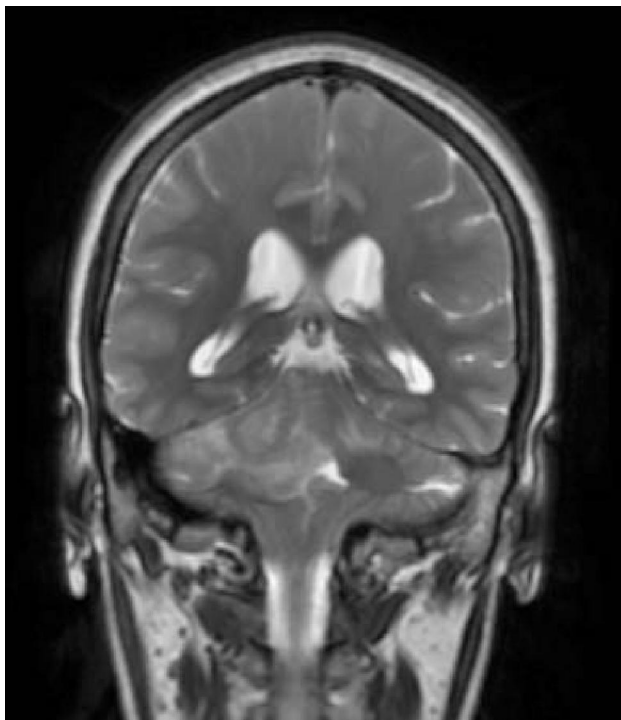


Figure 4A: Coronal T2WI shows a well defined mass in right tentorium. The mass is iso to moderately hyperintense compared to the cortex.

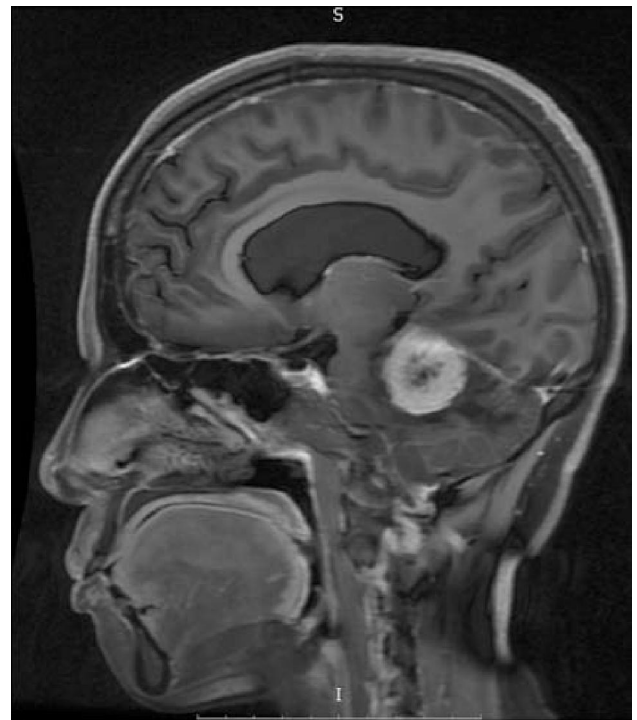


Figure 4C: Sagittal T1 C+ FS scan shows intense enhancement of the mass which is somewhat heterogeneous.

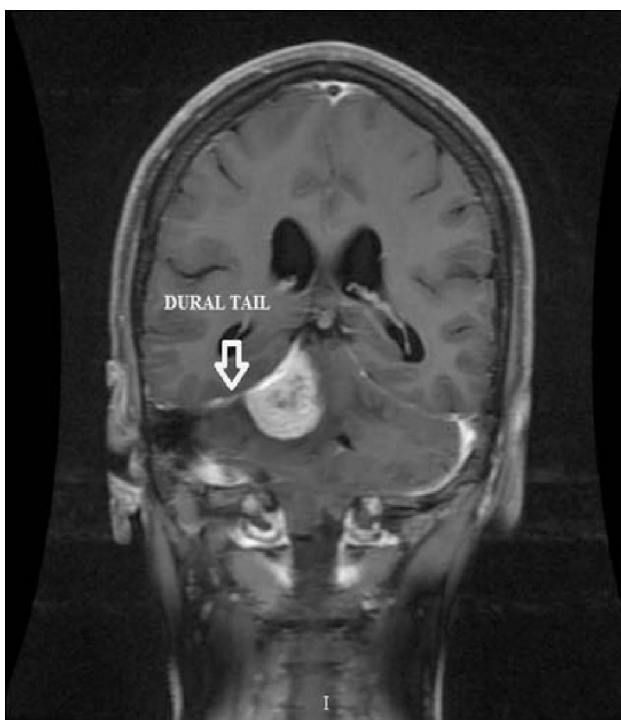


Figure 4B: Coronal T1 C+ FS scan shows the dural tail of the mass. The dural tail is enhancing more intensely and uniformly than the mass itself.

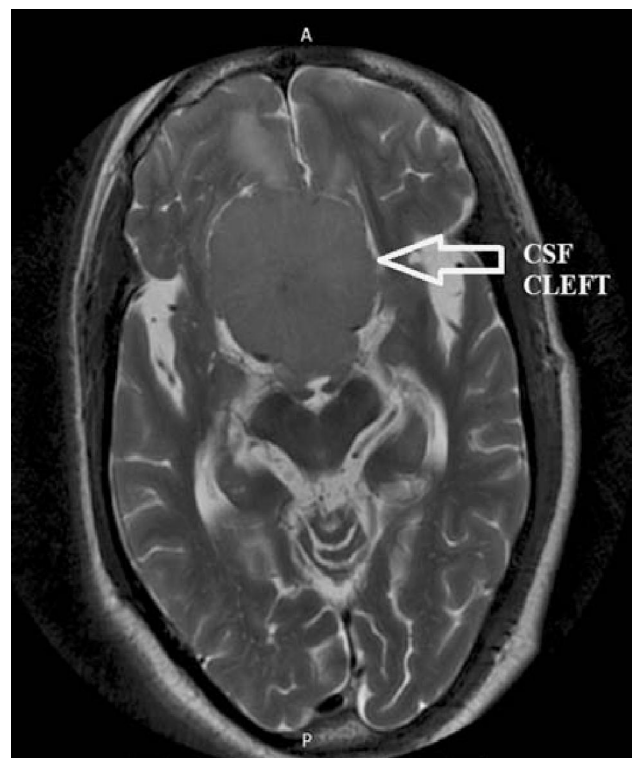


Figure 5A: Axial T2WI shows an iso to slightly hyperintense mass in orbitofrontal cortex. CSF-vascular cleft is clearly depicted here.

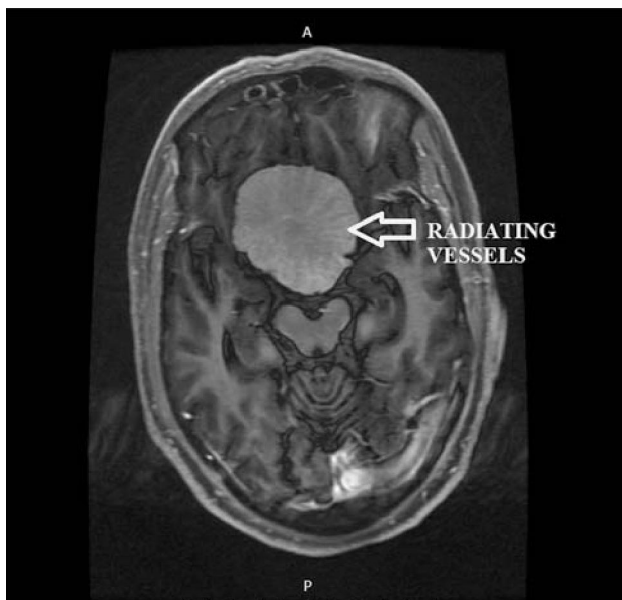


Figure 5B: Axial T1 C+FS scan shows the tumor enhances intensely. The vascular centre of the mass is appearing as flow void. The more hyperintense sunburst of vessels, that supply the tumor, is radiating towards the periphery, from the centre.

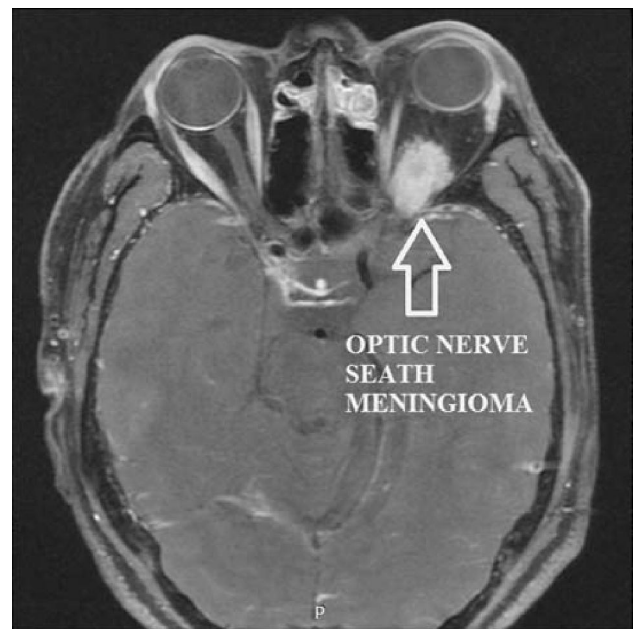


Figure 6B: Axial T1 C+ FS shows intense contrast enhancement.

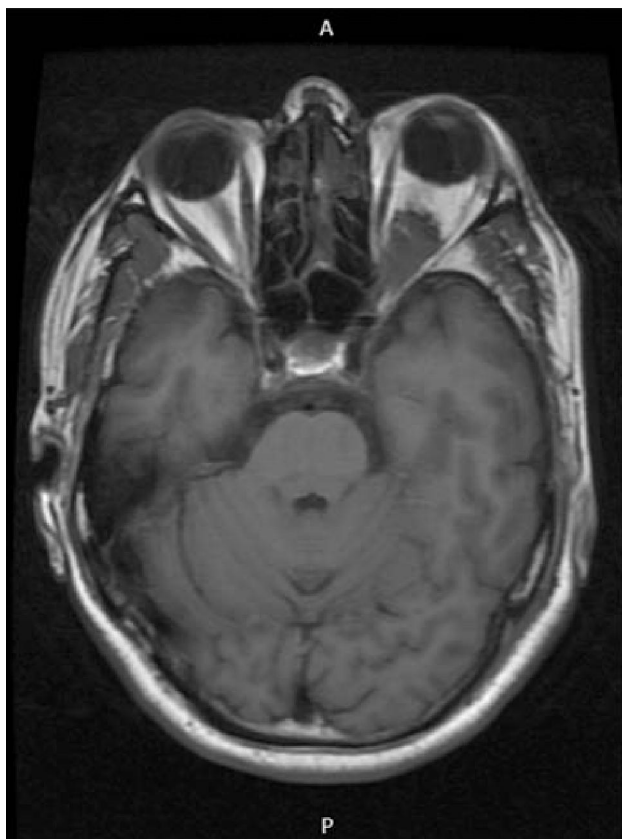


Figure 6A: Axial T1WI shows a hypo to isointense mass compared to the optic nerve, arising from optic nerve sheath in left side.

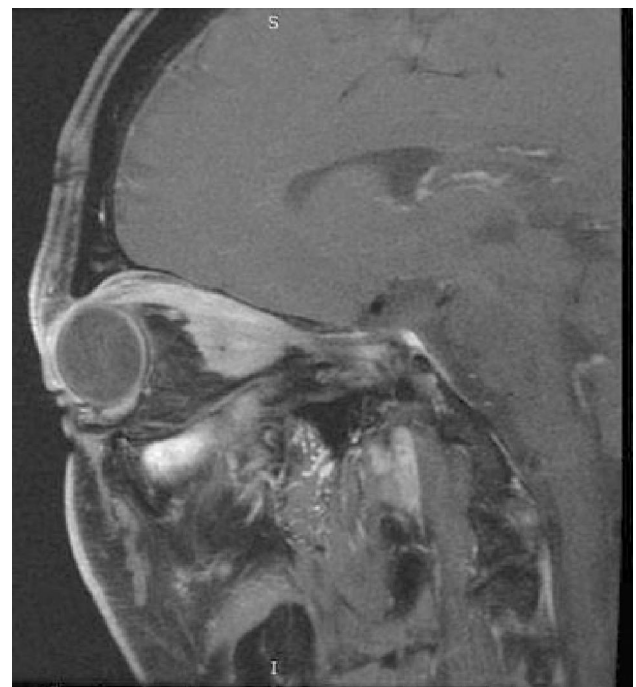



Figure 6C: Sagittal T1 C+ FS shows intense contrast enhancement.

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