

Role of MRI Imaging In Sellar and Parasellar Masses

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Abstract: Now a days, MRI is the examination of choice for sellar and parasellar pathology due to its excellent soft tissue contrast, fine multiplanar capability and almost no ionizing radiation. This permits fair visualization of pathology, bearing close relation to adjoining organs with concrete tissue differentiation. CT, though less employed is of immense use especially for demonstrating calcification, bony destruction and surgically relevant bony anatomy (sphenoid septae and pneumatization). Consequently, when sella gets enlarged as a result of intrasellar tumor, it takes the shape of a round (balloon and extends its tentacles underneath the anterior clinoid processes). Pruning underneath the clinoid processes and intact dorsum sella in these cases makes its appearance and still exists in a closed type of sella, due to characteristic of intrasellar pathology. The cortical line of sella expressed as a lamina dura represents in the form of pencil sharp thin line. Posteriorly the atrophication of lamina dura is initially detected at the junction of base of the dorsum and sellar floor. The empty sella may cause enlargement of size. Angiography is particularly useful for vascular lesions and to depict vascularity of tumors. To demonstrate usefulness of nova gradient 1.5 T philips magnetic resonance imaging (MRI) scan in diagnosis of the sellar tumors and assessment of the normal structures of sella turcica with pathological abnormalities has been in vogue these days.

Keywords: PITUITARY, SELLA, SPHENOID, MACROADENOMA, TUMOR, MAGNETIC RESONANCE IMAGING (MRI)

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I. Introduction

The pituitary gland consists of two anatomically and functionally distinct lobes: the anterior lobe (adenohypophysis) and the posterior lobe (neurohypophysis). Plain radiography is preferred these days for diagnosing sellar and parasellar pathology. Lateral view of the skull being visualised on the sella is an important aspect to search the detailed nature of abnormal spectrum of a particular disorder. The radiographic size of the sella itself may be insensitive indicator of pituitary gland abnormalities provided corroborative changes of erosion and other bony abnormalities are well detected.^{1,2}

Craniopharyngioma: These are benign, locally invasive, hormonally inactive lesions with more slow and localized growth accounting for 2-4 percent of all intracranial lesions. Twenty percent of craniopharyngiomas may be quite intrasellar but 80 percent have their epicenteric position scattered suprasellar cistern. Occasionally, these can be intraventricular or infrasellar. Certainly, there is a bimodal age distribution amongst majority of lesions being expressed at the age group 5-10 years associated with small peak in 6th decade. These are mostly cystic with small solid fraction which frequently calcifies (80% cases). Alternatively, The anterior lobe occupies 75 percent of the volume of the gland and encompasses pars tuberalis, pars intermedia and pars distalis which reveal their existence and derivation from Rathke's pouch. Pars intermedia amidst the adeno and neurohypophysis which is a vestigial component and a usual site for developmental cysts. The anterior lobe of pituitary is isointense to brain on both T1 and T2WI. It is held responsible for secretion of growth hormone (GH), thyroid stimulating hormone (TSH), luteinizing hormone (LH), adrenocorticotropic hormone (ACTH), prolactin (PRL) and melanophore-stimulating hormone (MSH).^{2,3}

II. Material and Methods

The study had been carried out in the Department of Radiodiagnosis, PGIMS, Rohtak for a period of 6 months from December 2018 to May 2019. In this method potential possibility has been explored confirming through cumulative observational study in which we evaluated 20 patients suspected of having pituitary tumor based on laboratory and clinical findings. After taking a brief note of properly informed written consent and complete history, thorough clinical examination was done and these patients were subjected to CT scan.

III. Results

CASE 1: A 18 year old female patient presented with complaints of Progressive diminution of vision in right eye for 2 months with occasional headaches and raised prolactin level.

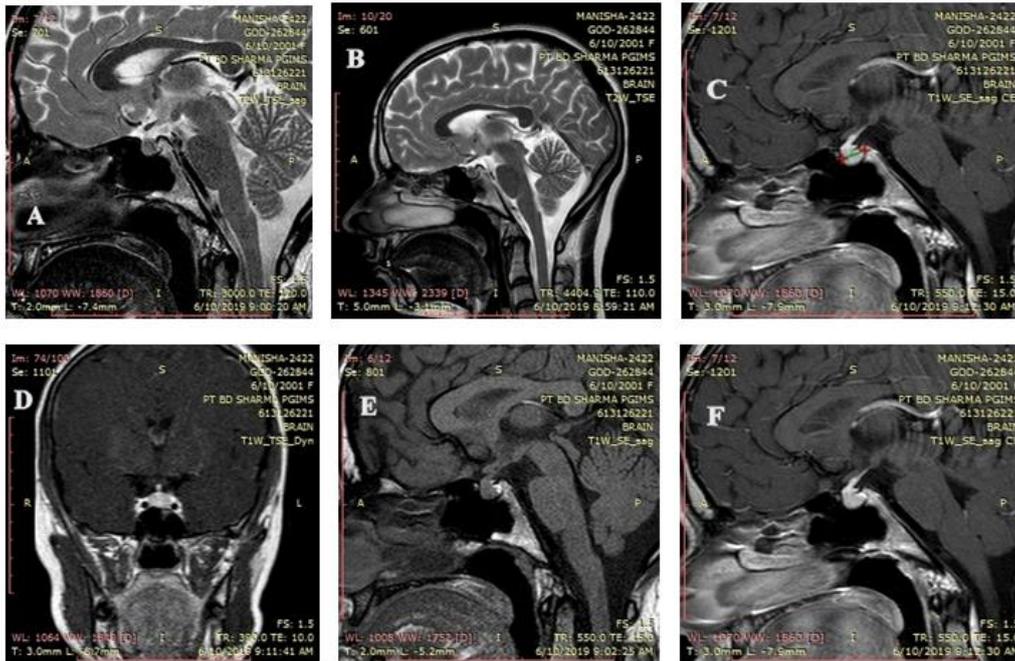


FIGURE 1: Sagittal MRI T2W (figure A & B),T1W (figure E), T1W CE(figure C,F) & Coronal T1W (figure D)MRI images demonstrate bulky pituitary isointense to grey matter and avidly enhancing on contrast images however showing normal signal likely macroadenoma .

CASE 2: A 15 year old female patient presented with chronic headache lasting for 2 years and diminution of vision in both eye. She had also one episode of generalized tonic clonic seizure

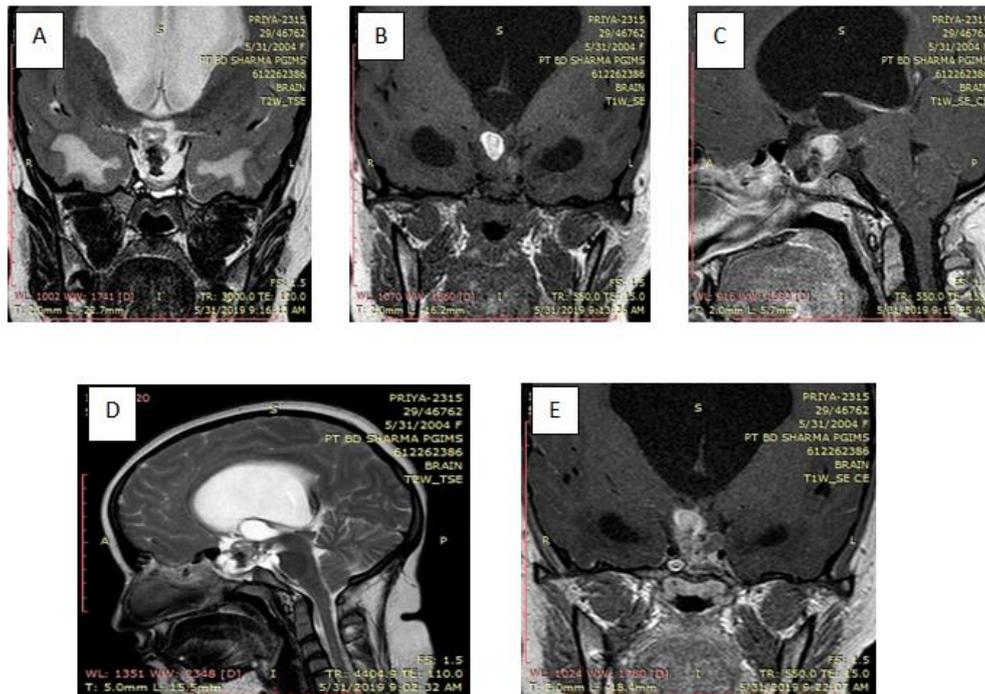


Figure 2: CRANIOPHARYNGIOMA: A,B,C,D,E MRI images demonstrate a large heterogeneous intra and suprasellar mixed solid cystic mass showing high signal on t1 and t2 weighted images with irregular contrast enhancement on t1 contrast images with uplifting of optic chiasma and optic nerve appears displaced laterally.

CASE 3: A 35 year old female patient presented with headache , altered conscious level and sudden loss of vision for one day duration with raised prolactin level.

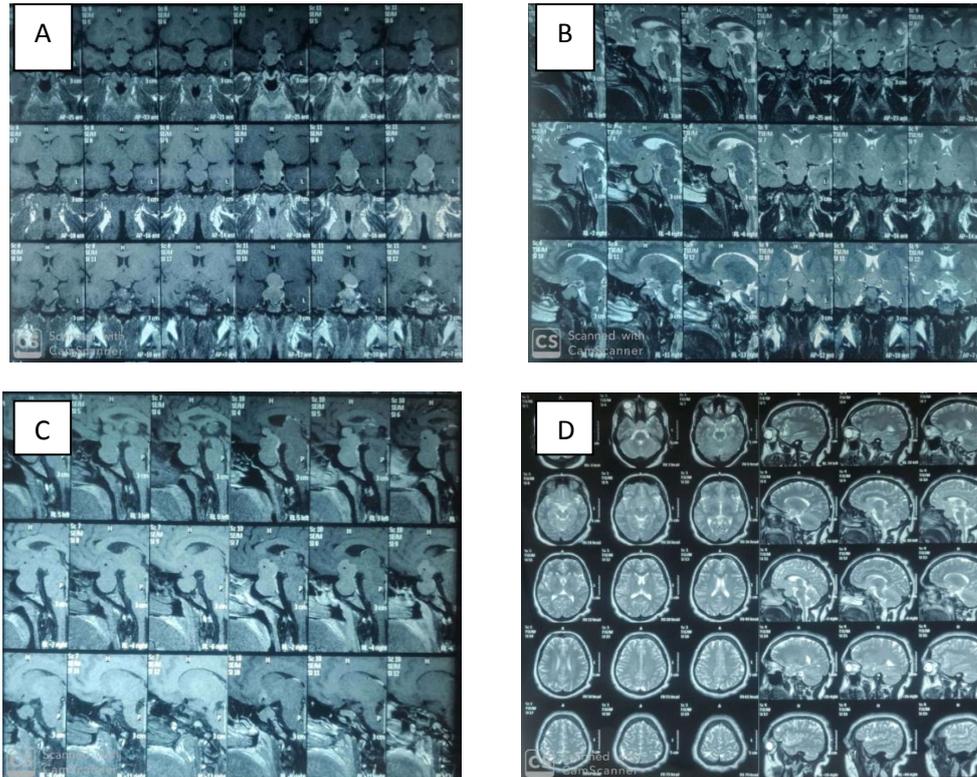
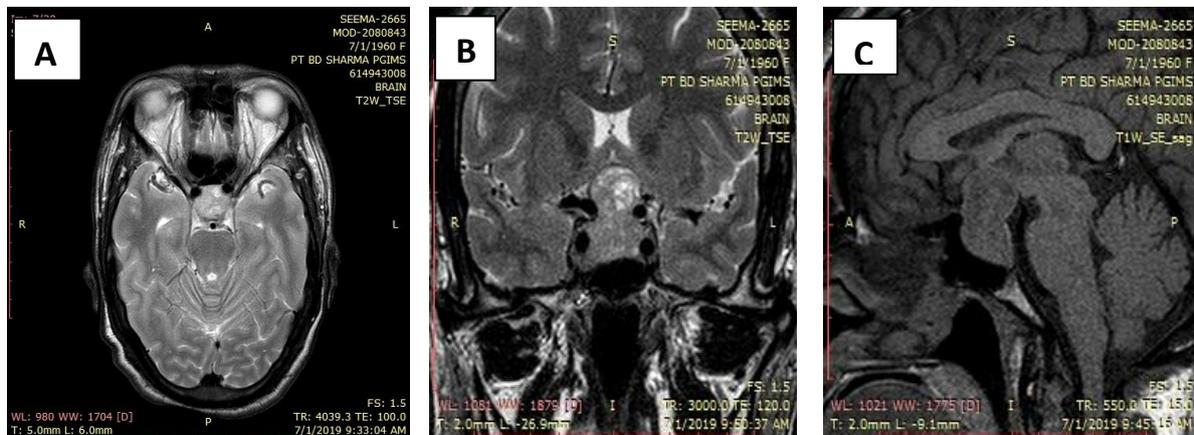
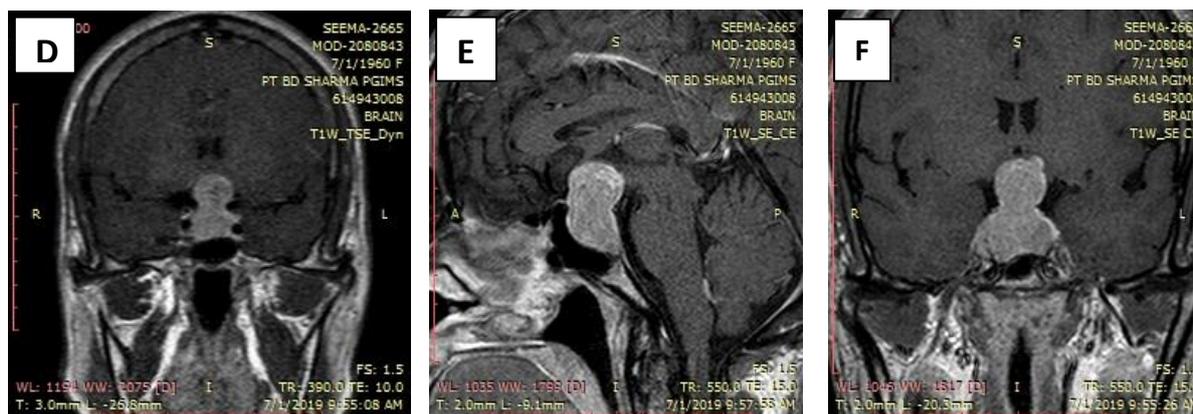


Figure 3: MACROADENOMA: A,B,C,D MRI images demonstrate ‘figure of eight ’, appearance. A large mass involving the pituitary gland and extending into the suprasellar cistern. Infundibulum is also involved with mass effect on third ventricle and hippocampus . Posterior pituitary bright spot compressed and displaced posteriorly. A bulge is seen in floor of sella posteriorly . however cortical continuity is maintained. There is encasement of bilateral ICA (Angle of contact 90 degree and less) with compression of optic chiasm.

CASE 4: A 59 year old female patient presented with headache , diminution of vision in both eye with raised prolactin level and history of acromegaly.





MRI AXIAL & CORONAL T2W images (Figure A & B) images demonstrate a large mass with 'figure of eight' appearance involving the pituitary gland and extending into the suprasellar cistern with few cystic areas within it. Infundibulum is also involved with mass effect on third ventricle and hippocampus. Posterior pituitary bright spot compressed and displaced posteriorly. A bulge is seen in floor of sella posteriorly. however cortical continuity is maintained. There is encasement of bilateral ICA (Angle of contact 90 degree and less) with compression of optic chiasm. On SAGITTAL & CORONAL T1W images (Figure C & D) the mass appears hyperintense & shows avid contrast enhancement on SAGITTAL & CORONAL T1W CE images (Figure E & F).

IV. Discussion and conclusion

Typically, Microadenomas prevailing as hypointense as compared to the normal adenohypophysis on T1WI (80-90%) and hyperintensity is recognised on T2WI. Large intrasellar masses, however, can eliminate the dorsum. Tilt of the pituitary stalk and asymmetrical look of the sellar floor though useful signs can be due to developmental asymmetry of the brain or stalk insertion. Double flooring of sella may also visualized as a result of intrasellar masses or can express as a normal variant. In contrast to an early involvement of tip of the dorsum or its elimination favors a suprasellar mass (open sella from above). On CECT adenomas are being observed as discrete, hypodense regions within the enhancing gland. Petrosal sinus sampling is of immense use to localize adenoma and discriminating Cushing's disease from ectopic ACTH secretion and autonomous adrenal disease when imaging is not successful to mark its appearance on the site of adenoma. Suprasellar calcification is well observed in cases of craniopharyngioma, meningioma, clival chordoma and vascular lesions. In addition, meningioma may reveal hyperostosis of the sphenoid bone. In rare cases, adenomas may reveal calcification on plain radiographs. The signal intensity of adenomas and normal gland can be compared with the grey and white matter of the temporal lobe respectively on T1WI which may apparently appear as quite hyperintense on T1WI as a result of spontaneous hemorrhage. Rarely they may be isointense and can only be viewed on enhanced scans (especially dynamic study) where these express in the form of hypointense mass within the enhancing gland. *Macroadenomas* being bulky are easy to detect. Macroadenomas are generally hyperintense on T2WI. Hyperintense macroadenomas may be quite soft and necrotic but hypointense lesions make their appearance particularly in fibrous form; which is a clear crystal finding and can help surgeon in exploring a relevant abnormality. Frequent enlargement of the sella, erode the sphenoid sinus, overlap and cover the suprasellar cistern and even repositioning of the chiasma. Solid adenomas spread uniformly, while others reveal heterogenous hypodense areas and can be vividly depicted on CECT. With suprasellar extension, the adenomas attains a typical shape of 'figure of eight', appearance.^{3,4}

Craniopharyngioma: Critically, these tumors are viewed as a combination of hypodense (cystic) and hyperdense (calcified) areas on CT. The solid fraction appears isodense/isointense to brain on CT and MRI. CT is of immense use in showing distinct calcification, especially when the tumor is detected as a small solid calcified nodule, which can totally escape on MRI. The adamantinomatous type is more confined in the form of local invasion, encase vessels, cause surrounding gliosis and may regenerate even after surgery. Contrast enhancement of the solid portions of the tumor can be very well observed. Craniopharyngiomas appear as fibroinflammatory adhesions in the budding stage with surrounding tissues and their shape and pattern likely to be reappear after surgery. The cyst fluid contains wet keratin, cholesterol crystals, proteinaceous fluids,

hemorrhages and necrotic debris and particularly labelled as motor oil etc. Such cysts appear as extremely bright masses with unique lusture on both T1 and T2-weighted images. Papillary variety of craniopharyngioma as visualized in adults appear to be solid, often located in third ventricle and devoid of calcification. These can be encapsulated and easily detachable and hence have a lesser tendency to reappear.^{4,5}

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Bibliography

- [1]. Rennert J, Doerfler A. Imaging of sellar and parasellar lesions. *Clin Neurol Neurosurg*. 2007;109:111–124.
- [2]. Eduardo DS, Franco SB, Castro JDV. Magnetic resonance imaging of sellar and juxtaseilar abnormalities: atypical findings of common diseases and typical findings of rare diseases. *Radiol Bras*. 2018;51:45–51.
- [3]. Chakeres DW, Curtin A, Ford G. Magnetic resonance imaging of pituitary and parasellar abnormalities. *Radiology Clinics North America* 1989;27(2):265–281.
- [4]. Peck WW, Dillon WP, Norman D, et al. High-resolution MR imaging of pituitary microadenomas at 1.5T: experience with Cushing disease. *Am J Roentgenol* 1989;152(1):145–151.
- [5]. Lee BC, Deck MD. Sellar and juxtaseilar lesion detection with MR. *Radiology* 1985;157(1):143-7.

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