



"MAGNETIC RESONANCE IMAGING OF SELLAR, PARASELLAR AND SUPRASELLAR TUMORS: A RELIABLE DIAGNOSTIC TOOL".

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ABSTRACT:

BACKGROUND:

The sellar and parasellar region is complex anatomical area. Advanced multiplanar neuroimaging techniques are essential for its visualization. Tumors occurring in this region are approximately 18-20% amongst all intracranial tumors.

This location lies at a crossroads where several neoplastic, inflammatory, infectious, and circulatory illnesses might manifest.

MRI is the great diagnostic tool not only for detecting and characterizing masses but also evaluating pressure effects.

MATERIAL AND METHODS:

Present study is a prospective cross-sectional study on 49 patients. Cases of all age groups, suspected of sellar, parasellar and suprasellar masses, clinically and on other imaging modalities were included. Patients with absolute MRI contraindication were excluded. All patients underwent pre and post contrast MRI brain on 1.5 Tesla, 16 channel, HDXT, Version 23.0 GE machine. Data analysis was analyzed in a statistical software EPI INFO version 7. Sensitivity,

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Specificity, Positive predictive value, Negative predictive value, and Diagnostic accuracy were calculated using this software. P value less than 0.05 was statistically significant.

RESULTS:

Majority of patients(43%),were in the age group of 21- 40, followed by 31% in of 41-60 age group, 14.29% were over 60 years and 4% were children.

The diagnosis on MRI was,Macroadenoma in 22(45%), Meningioma in 9(18%), Craniopharyngioma in 8 (16%), Glioma in 7(14%), Epidermoid in 2(4%) and Germinoma in 1(2%).In pituitary adenoma sensitivity of MRI was 95%, specificity 96% and accuracy 95%.In Craniopharyngioma, sensitivity was 88%, specificity 97% and accuracy 95%.In Meningioma sensitivity was 90%, specificity100% and accuracy 98%. In Epidermoid, sensitivity was 100%, specificity98% and accuracy 98%.

CONCLUSION:

MRI is the best imaging modality to diagnose and characterize sellar, parasellar and suprasellar tumors. The tumors exhibited unique MRI features on different sequences and contrast study to differentiate tumors from one another in majority of cases.

KEYWORDS: sellartumors, pituitary macroadenoma, craniopharyngioma, cavernous sinus tumor invasion,Magnetic Resonance Imaging.

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INTRODUCTION:

The sellar and parasellar region is complex anatomical area. Advanced multiplanar neuroimaging techniques are essential for its visualization.¹Tumors occurring in this region are approximately 18-20% amongst all intracranial tumors.¹

Pituitary origin macroadenomas and microadenomas, cystic lesions, germ cell tumors, sellar and parasellar region glioma neoplasm, lymphomas, meningiomas, and metastatic tumors are examples of neoplastic lesions that can be benign or malignant. These lesions can manifest with a variety of symptoms depending on which anatomical landmarks are affected.²

The various clinical presentations occur due to hormonal dysfunction or pressure effects with clinical features like headache or ocular symptoms.³

This location lies at a crossroads where several neoplastic, inflammatory, infectious, and circulatory illnesses might manifest.⁴

Intrasellar tumors include microadenoma, macroadenoma, craniopharyngioma, meningioma, hyperplasia, cyst. Suprasellartumorin children include craniopharyngioma, hypothalamic glioma, germinoma, arachnoid cyst, tuber cinereum hamartoma.⁵

Adults can develop macroadenoma, meningioma, aneurysm, metastasis, and

epidermoid/dermoid as suprasellar masses. Meningioma, schwannoma, lymphoma, chordoma, osteocartilaginous tumors, nasopharyngeal cancers, plasmacytoma, cavernous sinus thrombosis, cavernous sinus hemangioma, aneurysm, and carotico-cavernous fistula are other examples of parasellar masses.⁶

MRI is the great diagnostic tool not only for detecting and characterizing masses but also evaluating pressure effects.⁷Significant clinical benefits can be achieved with advanced imaging which will help to minimize the differential diagnosis but arrive at a precise diagnosis.

Present study was undertaken to evaluate diagnostic accuracy of MRI in sellar, suprasellar and parasellar tumors which is anatomically highly complex area.

MATERIAL AND METHODS:

Study Design

Present study is a prospective cross-sectional study on 49 patients for the period of 2 years from January 2021 to December 2022, referred to Department of Radiodiagnosis of a tertiary health care centre for MRI brain, fulfilling all inclusion criteria. A convenient sampling technique was used for selection of cases. The study was started after institutional ethics committee approval. (IEC/76/2020).



Inclusion Criteria:

- Cases of all age groups, suspected of sellar, parasellar and suprasellar masses, clinically and on other imaging modalities.

Exclusion Criteria:

- Previously diagnosed cases with sellar, parasellar and suprasellar masses.
- Patients with absolute MRI contraindication.

MRI Protocol:

- All patients underwent pre and post contrast MRI brain on 1.5 Tesla, 16 channel, HDXT, Version 23.0 GE machine.

- Axial T1WI, Coronal T1WI Axial T2WI, Coronal T2WI, Sagittal T2WI, Axial Short Tau inversion recovery (STIR), Axial Diffusion weighted Imaging
- Contrast axial T1WI, coronal T1WI, and sagittal T2WI.
- Standard settings as per required field of view (FOV).

Statistical Analysis :

Data analysis was coded and analyzed in a statistical software EPI INFO version 7. Sensitivity, Specificity, Positive predictive value, Negative predictive value, and Diagnostic accuracy were calculated using this software. P value less than 0.05 indicated statistical significance.

RESULTS:

Table1: Age distribution

Age	Total Patients	Percentage
0-20	6	12.24%
21-40	21	42.86%
41-60	15	30.61%
>60	7	14.29%
Total	49	100%

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Table 2: Gender Distribution of patients.

Gender	Total Patients	Percentage
Male	26	53%
Female	23	47%
Total	49	100.00



Table 3: Distribution of patients according to presenting complaints.

Symptoms	Total Patients	Percentage
Asymptomatic	11	22.45%
Headache	38	77.55%
Visual defect	32	65.31%
Endocrine disturbance	10	20.41%
Seizure attack	12	24.49%
Cranial nerve palsy	8	16.33%
CSF rhinorrhoea	3	6.12%

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Some patients had more than on symptoms as presenting complaint.

Table 4: Patients' distribution according to MRI diagnosis.

Diagnosis	Total Patients	Percentage
Macroadenoma	22	44.90
Craniopharyngioma	8	16.33
Meningioma	9	18.37
Epidermoid	2	4.08
Germinoma	1	2.04
Glioma	7	14.29
Total	49	100

Table 5:Patients distribution of according to MRI characteristic features (Pre-contrast)

signal	Macroadenoma	Craniopharyngioma	Meningioma	Epidermoid	Germinoma	Gliomas
T1 Isointense	19	2	9	0	1	7



T1 Hypointense	3	6	0	2	0	0
T1 Hyperintense	0	0	0	0	0	0
T2 Isointense	0	0	7	0	1	0
T2 Hypointense	0	1	2	0	0	0
T2 Hyperintense	22	7	0	2	0	7
DWI RESTRICTION	0	0	9	2	1	7
STIR	ISOINTENSE	HYPERINTENSE	HYPERINTENSE	HYPERINTENSE	HYPOINTENSE	HYPERINTENSE

Table 6: Distribution of patients according to post contrast enhancement on MRI

Enhancement	Macroadenoma	Craniopharyngioma	Meningioma	Epidermoid	Germinoma	Glioma
Mild	14	0	0	0	0	0
Moderate	2	1	2	0	1	0
Intense	0	1	7	0	0	6
Heterogeneous	4	4	0	0	0	1
Rim enhancement	2	2	0	0	0	0
No enhancement	0	0	0	2	0	0
Total	22	8	9	2	1	7

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Table 7: MRI diagnosis versus histopathological diagnosis accuracy.

Histopathological diagnosis	MRI results		
	Sensitivity	Specificity	Accuracy
Pituitary adenoma	95.45%	96.30%	95.92%
Craniopharyngioma	87.50%	97.56%	95.92%



Meningioma	90.00%	100.00%	97.96%
Epidermoid cysts	100.00%	97.92%	97.96%
Germinoma	100.00%	100.00%	100.00%
Glioma	100.00%	97.67%	97.96%

DISCUSSION :

Our study is prospective cross-sectional study on 49 patients with sellar, parasellar and suprasellar tumors. 6 patients (12.2%) were below 20 years of age ,21 patients (42.8%) were in the age group of 21-40, 15 patients (30.6%) were in the age group of 41-60 years, and 7 patients (14.2%) were above 60 years of age.

Karthikeyan V et al.in their study of 65 patients observed similar age distribution amongst all patients.In their study also,majority of patients were in the age group of 21-40 years. Also in their study, 60% were males and 40% females. In our present study, 51% were males and 49% females.²⁷

In our study, MRI diagnosis, was noted in the following descending Macroadenoma In 22(44.9%), Meningioma in 9(18.3%), Craniopharyngioma in 8(16.3%), Glioma in 7(14.3%), Epidermoid in 2 (4.1%) and Germinoma in 1(2%).

Hui et al. reported the findings of 50 cases, having diagnosis of sellar and suprasellar involvement in 74% patients, parasellar involvement in 22% patients and a sellar involvement in 4%. Craniopharyngioma, Pituitary macroadenoma, and meningioma were predominant tumors comprising 32%, 42% and 18% respectively.²⁸

Thus, the findings in our study are in concordance with the findings of above studies. 38 cases in our study had solid consistency on MRI, out of which 19 were Macroadenoma, 9 were Meningioma,7 cases were Glioma, 2 cases were Epidermoid, and 1 case was Germinoma. 2 cases had cystic consistency on MRI, both were epidermoid. 9 cases had mixed consistency on MRI, of which 6 cases were Craniopharyngioma and 3 cases were macroadenoma.

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Chaudhary et al.reported the findings of the 51 cases and found that 68.75% cases diagnosed with craniopharyngioma had mixed solid cystic consistency, whereas 85% diagnosed with macroadenoma and all meningioma cases had solid consistency Thus the findings in our study are in concordance with findings of above study.²⁹

33 cases in our study had homogenous enhancement, 16 of them were macroadenoma, followed by 9 cases with meningioma, 6 cases with glioma, and 1 case each of Germinoma and craniopharyngioma. 10 cases had heterogenous post contrast enhancement, of which 5 cases were Craniopharyngioma, 4 cases were macroadenoma, and 1 case was Glioma.Rim enhancement was seen in 2 cases of macroadenoma and 2 cases of Craniopharyngioma. Heterogenous enhancement in craniopharyngioma was due to its solid and cystic component as compared to Meningioma. Homogenous enhancement in meningioma and macroadenoma were the significant differences in contrast enhancement found by study done by Suman Chaudhary et al. Thus, the findings in our study are in accordance with the findings of study by Chaudhary et al.²⁹

In our study, in Meningioma, the MRI sensitivity was 90%, specificity100% and accuracy 98% in correlation with Histopathological examination.

In diagnosis of epidermoid,MRI sensitivity was 100%, specificity 98% and accuracy 98%; in the case of Germinoma sensitivity for MRI was 100%, specificity 100% and accuracy 100%. In Glioma sensitivity for MRI was 100%, specificity 97% and accuracy 98%. in Craniopharyngioma, sensitivity for MRI was 88%, specificity 97% and accuracy 94%. In

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meningioma sensitivity for MRI was 100%, specificity was 100% and accuracy was 100%. Suman Chaudhary et al. in their study found that, in case of pituitary adenoma sensitivity of MRI was 100%, specificity was 100% and accuracy was 100%. In Craniopharyngioma sensitivity of MRI was 75%, specificity 100% and accuracy of MRI was 75%. In Meningioma, sensitivity of MRI was 100%, specificity 100% and accuracy 100%.²⁹

LIMITATION:

Study was conducted on patient with limited sample size 49 patients and higher sample size may optimize external validation.

CONCLUSION:

MRI is the best imaging modality to diagnose and characterize sellar, parasellar

and suprasellar tumors. The most prevalent tumor in our study was pituitary macroadenoma followed by craniopharyngioma, meningioma, and glioma.

The tumors exhibited unique MRI features on different sequences and contrast study to differentiate tumors from one another in majority of cases.

On MRI we can predict best available management to patient to reduce mortality and morbidity.

Conflict of Interest:

None.

FUNDING RECEIVED:

This research received no specific grant from any funding agency in the public, commercial or not for profit sectors.

1.PITUITARY MACROADENOMA

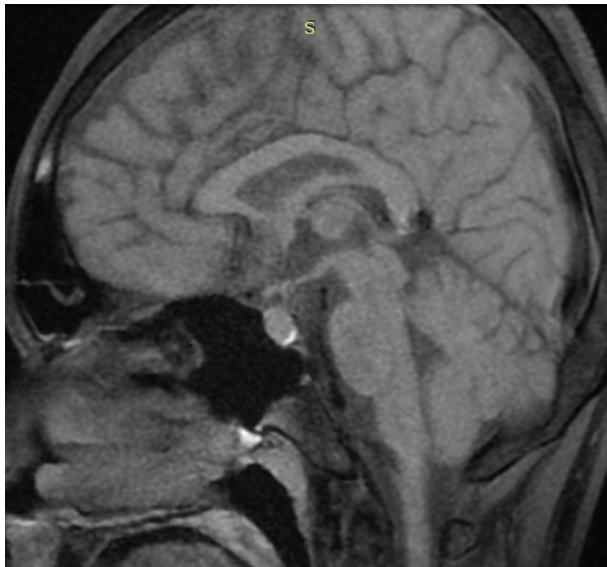


FIG. 1A- SAGITAL T1WI-PITUITARY MACROADENOMA ISOINTENSE ON T1WI.

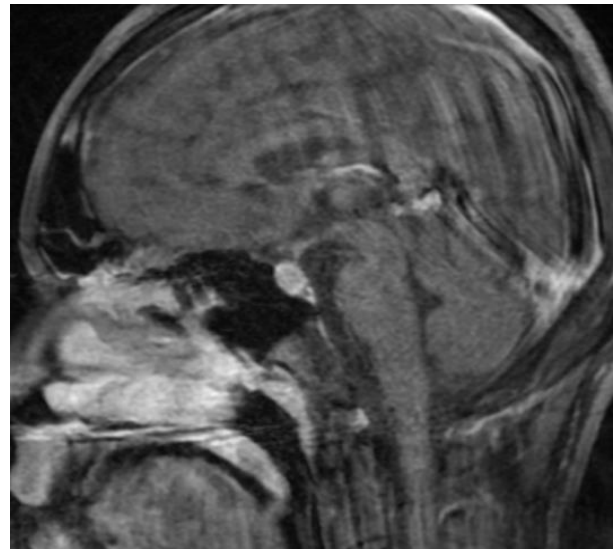


FIGURE 1B. T1WI POST CONTRAST IMAGE WITH MODERATE ENHANCEMENT

2.GLIOMA

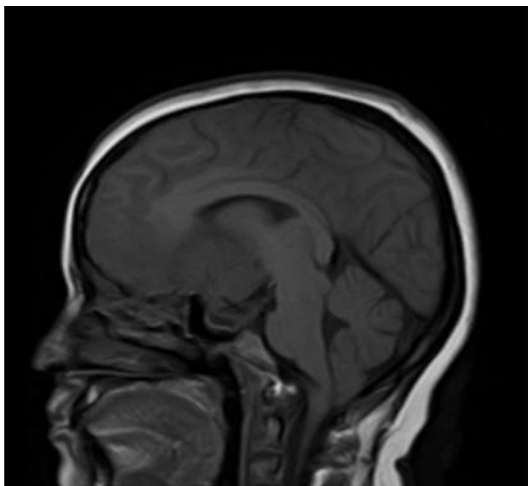


FIG. 2A. SAGITAL T1W IMAGE SHOWING ISOINTENSE LESION

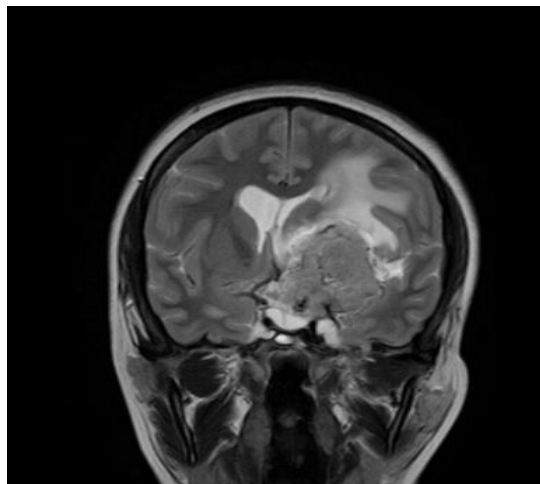


FIG. 3B. CORONAL T2W IMAGE SHOWING HYPERINTENSITY

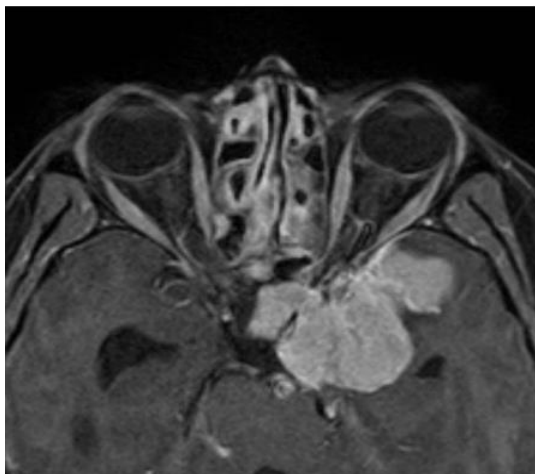


FIG. 3C. CORONAL T1WPOST CONTRAST IMAGE SHOWING MODERATE TO INTENSE ENHANCEMENT.

3.MENINGIOMA

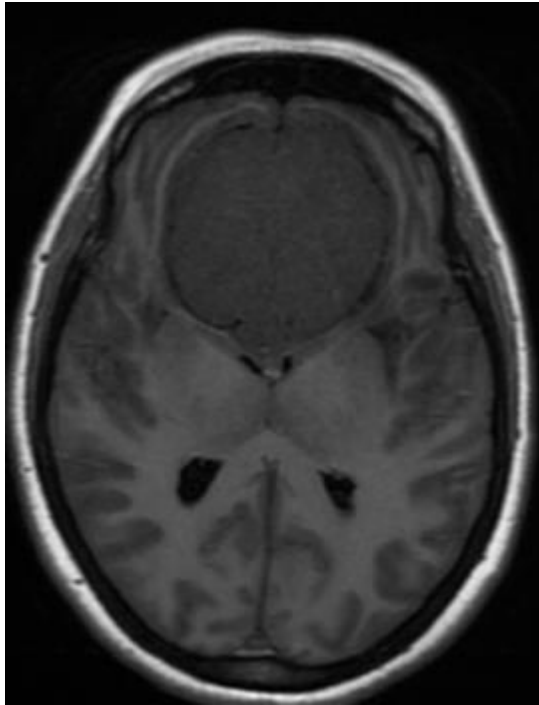


FIG.3A. AXIAL T1W IMAGESHOWING ISOINTENSE LESION

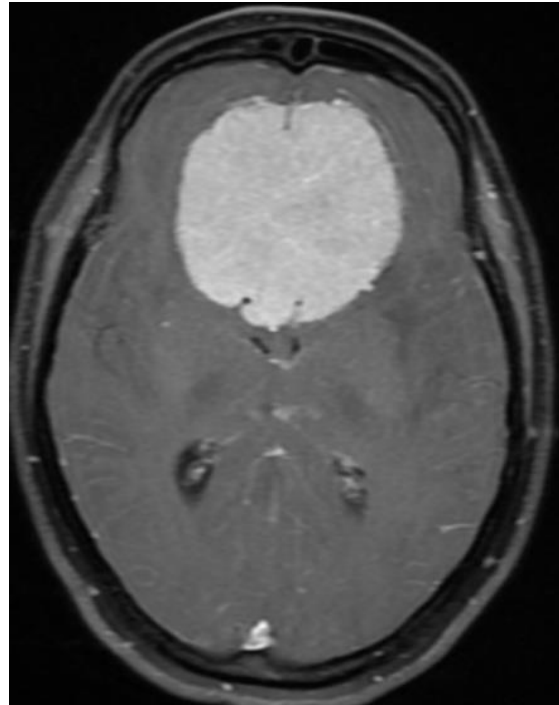


FIG.4B. POST CONTRAST AXIAL T1W IMAGEWITH INTENSEENHANCEMENT

4.CRANIOPHARYNGIOMA

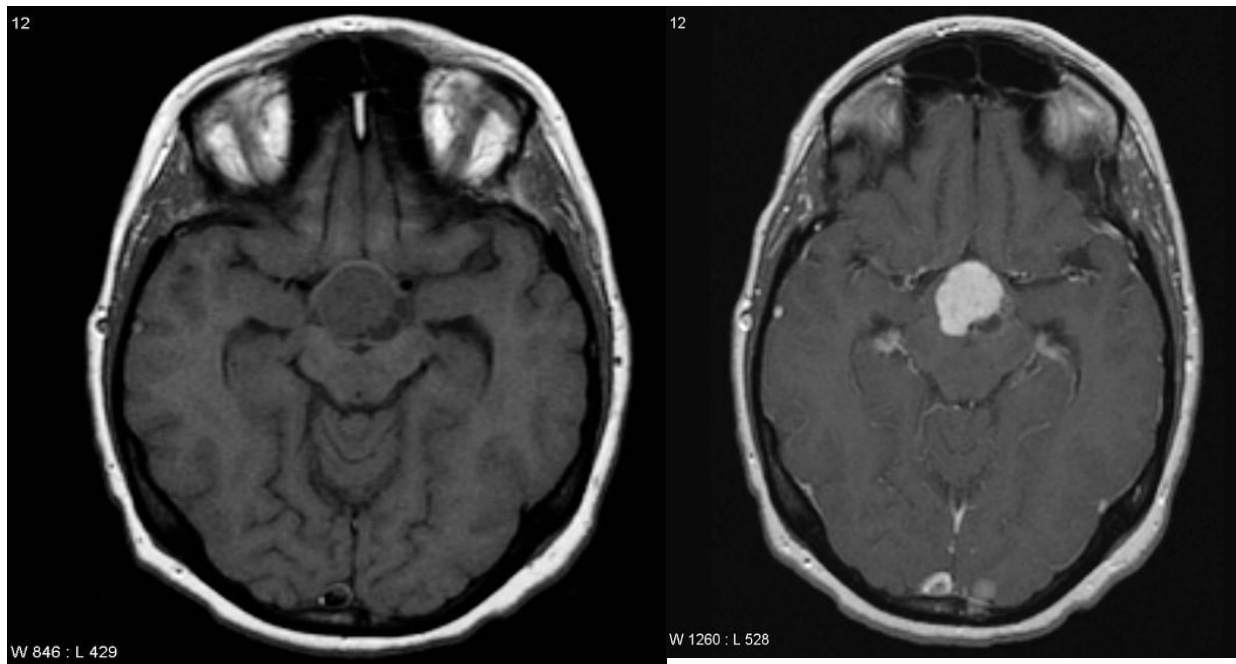


FIG 4A- AXIAL T1W IMAGE SHOWING ISOINTENSE LESION

FIG 4B- POST CONTRAST AXIAL T1W IMAGE SHOWING INTENSE ENHANCEMENT

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