

Magnetic Resonance Imaging Findings of Brain Tumour with Histopathological Association According to WHO 2021 Classification

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Abstract

Introduction: Magnetic Resonance Imaging (MRI) is the gold standard for evaluating brain tumours. However, correlation between MRI findings and histopathological diagnosis, particularly under the WHO CNS 5th edition classification, requires further assessment.

Materials and Methods: This prospective observational study was conducted from April 2024 to September 2025 in the Department of Radiodiagnosis, SRMSIMS, Bareilly. Fifty patients with clinically or radiologically suspected brain tumours underwent MRI followed by histopathological examination after surgery. MRI protocol included T1, T2, FLAIR, DWI/ADC, perfusion imaging, and MR spectroscopy. Histopathological diagnosis was categorized according to the WHO CNS 5th edition classification. Statistical analysis was performed using the chi-square test with $p < 0.05$ considered significant.

Results: The mean age of patients was 38.5 ± 17.6 years with slight female predominance. Headache with vomiting was the most common presenting complaint. Most tumours were supratentorial and larger than 5 cm. MRI commonly showed T1 hypo-/isointensity, T2/FLAIR hyperintensity, diffusion restriction, haemorrhage, ventricular effacement, and midline shift. Meningioma was the most common tumour on both MRI and histopathology. MRI demonstrated an overall diagnostic accuracy of 94% with strong concordance with histopathology ($p < 0.001$), especially for supratentorial tumours. Minor overlap was observed between pilocytic astrocytoma and hemangioblastoma in infratentorial lesions.

Conclusion: MRI shows high diagnostic accuracy and strong concordance with histopathology in brain tumour evaluation. However, molecular biomarkers remain essential for comprehensive WHO 2021 classification and optimal management.

Keywords: Brain tumor, WHO 2021, histopathology, MRI, supratentorial, infratentorial.

INTRODUCTION

Background

The brain, composed of gray matter, white matter, and cerebrospinal fluid, regulates vital neurological functions.¹ Brain and central nervous system (CNS) tumours arise from uncontrolled cellular proliferation and account for ~2% of all cancers in India (5–10/100,000), with astrocytomas being the most common.³ Accurate classification is essential for management. The WHO CNS 5th edition classification integrates histology with molecular profiling, including biomarkers such as IDH mutation and 1p/19q codeletion, to refine tumour classification and grading.^{4–7}

MRI is central to tumour evaluation. Conventional sequences (T1, T2, FLAIR, contrast-enhanced) provide structural detail,

while advanced techniques—diffusion-weighted imaging, perfusion imaging, and MR spectroscopy—offer insights into tumour cellularity, vascularity, and metabolism.^{8–10} ADC values correlate with cellularity, perfusion reflects vascularity, and MRS provides metabolic information.⁵ Advances in molecular diagnostics, including methylome profiling and next-generation sequencing, have further enhanced tumour characterization.^{11,12}

Need of the Study

Brain tumours carry high morbidity and mortality, necessitating early diagnosis and accurate characterization. While MRI is crucial, definitive diagnosis requires histopathological and molecular correlation.

Statement of the Problem

Despite high sensitivity, MRI is limited by inter-observer variability. Integrated imaging, histopathology, and molecular analysis are essential to improve diagnostic accuracy, tumour grading, and patient outcomes

Aims and Objectives

- To evaluate the spectrum of MRI findings in patients with brain tumours.
- To correlate MRI findings with histopathological examination.

MATERIALS AND METHODS-

Study Design and Setting

This hospital-based prospective observational study was conducted in the Department of Radiodiagnosis at Shri Ram Murti Smarak Institute of Medical Sciences (SRMS-IMS), Bareilly, Uttar Pradesh, over a period of 18 months from April 2024 to September 2025. Patients were referred from the Departments of Neurosurgery, Neurology, Radiation Oncology, and other allied specialties for evaluation of suspected intracranial tumours. The study was designed to assess the diagnostic utility of MRI and its correlation with histopathological findings.

Study Population

The study included patients with clinically or radiologically suspected brain tumours who subsequently underwent MRI evaluation followed by surgical intervention and histopathological examination. Written informed consent was obtained from all participants prior to inclusion in the study.

Sample Selection

Inclusion Criteria

- Patients with clinically or radiologically suspected brain tumors (such as glioma, oligodendroglioma, lymphoma, metastatic tumors, etc.) who underwent MRI imaging followed by postoperative histopathological assessment.
- Patients who provided written informed consent for participation in the study.

Exclusion Criteria

- Patients not giving consent.
- Patients with metallic implants and non-MR compatible devices.
- Patients reluctant to undergo investigations.
- Patients with any history of adverse reaction with contrast or deranged renal function test.

Sample Size and Sampling Technique

Purposive sampling was employed to include eligible patients meeting the study criteria. The sample size was calculated using G*Power software (version 3.1.9.2) based on Z-tests for comparing two proportions, with a error probability set at 0.01 and power at 99%. The estimated sample size was 42 (21 per group). Considering a 20% attrition rate, the final sample size was increased to 50 patients to ensure adequate statistical power.

Imaging Protocol

All enrolled patients underwent Magnetic Resonance Imaging (MRI) of the brain using 1.5 Tesla and 3 Tesla scanners according to the institutional brain tumour imaging protocol. Imaging was performed on Siemens Magnetom Skyra (3T) and Magnetom Semptra (1.5T) systems. The MRI protocol included T1-weighted, T2-weighted, and T2-FLAIR sequences, along with diffusion-weighted imaging (DWI) and apparent diffusion coefficient (ADC) maps. Susceptibility-weighted imaging (SWI) was performed for detection of hemorrhage and calcification. Advanced imaging techniques, including dynamic contrast-enhanced (DCE) perfusion MRI and magnetic resonance spectroscopy (MRS), were used for further lesion characterization and tumour grading. A gadolinium-based contrast agent (gadopentetate dimeglumine) was administered intravenously at a dose of 0.1 mmol/kg for all contrast-enhanced sequences.¹³

Postoperative tumour specimens obtained through surgical excision or biopsy were subjected to histopathological examination using routine staining, special stains, and immunohistochemistry as required. Tumours were classified according to the World Health Organization Classification of Tumours of the Central Nervous System, Fifth Edition (WHO CNS5, 2021).¹

Data were collected using a structured proforma that included patient demographics, clinical presentation, MRI findings, histopathological results, and final diagnosis. Information was recorded in both written and electronic formats to ensure accuracy. MRI findings were subsequently correlated with histopathological results to assess diagnostic accuracy and to evaluate the spectrum of imaging features in brain tumours.

RESULTS

Demographic and Clinical Profile

Most participants were aged 30–39 years (20%), followed by 40–49 years (18%). The 20–29 and 50–59 year groups each accounted for 14%, while 16% were >60 years. Younger patients were less represented (10–19 years: 12%; <10 years: 6%). The mean age was 38.5 ± 17.6 years (range: 6–66). Females constituted 52% and males 48%.

Clinical Presentation and History

Headache with vomiting was the most common symptom (70%), followed by neurological deficits (40%). Seizures (26%), vertigo/dizziness (24%), and loss of consciousness (24%) were less frequent. Most patients (92%) had no prior malignancy; 8% had known primary cancers (cervix, breast, synovial sarcoma), all presenting with brain metastases on MRI.

Imaging Characteristics

Half of the lesions measured >5 cm, with 38% measuring 3–5 cm and 10% <3 cm. Lesions were predominantly supratentorial (64%), followed by infratentorial (28%), with 8% showing multicompartmental involvement. Intra-axial (52%) and extra-axial (48%) lesions were nearly equally distributed. Most lesions were solid (64%), while 22% were solid–cystic and 14% purely cystic. Ventricular effacement was observed in 64% of cases, while midline shift was present in 34%, indicating significant

mass effect in a substantial proportion of patients.

Table 1 shows distribution of T1, T2, and FLAIR signals. On T1-weighted imaging, the overwhelming majority of lesions (94%) were hypo-isointense, with only 6% showing hyperintensity. On T2-weighted sequences, hyperintensity was predominant (84%), consistent with increased water content in most tumors, while 16% showed hypo-isointensity. On FLAIR sequences, two-thirds of lesions (66%) were hyperintense, reflecting parenchymal edema or non-suppressed tumor signal, whereas 34% were hypointense.

Table 2 (A–C) show the distribution of diffusion restriction, hemorrhagic components, and post-contrast enhancement in these lesions. (A) Diffusion restriction was present in 64% of cases, indicating a high proportion of lesions with restricted water diffusion, commonly associated with hypercellular or aggressive lesions, while the remaining 36% showed no diffusion restriction. (B) Hemorrhagic components were identified in 56% of cases, suggesting that intralesional hemorrhage or hemorrhagic necrosis was relatively common in this cohort. (C) Post-contrast enhancement patterns revealed that heterogeneous enhancement was the most frequent pattern (50%), followed by homogeneous enhancement (36%), while 14% of lesions demonstrated no post-contrast enhancement.

Table 3 and figure 1 show MRI-based provisional diagnoses. Meningioma was the most common (36%, n=18), followed by high-grade gliomas (18%, n=9) and pilocytic astrocytoma (10%, n=5). Craniopharyngioma and metastasis each accounted for 8% (n=4), while arachnoid cysts and vestibular schwannomas were seen in 4% (n=2) each. Other diagnoses, including low-grade glioma, epidermoid cyst, hemangioblastoma, medulloblastoma, and pituitary macroadenoma, were each observed in 2% (n=1).

Table 4 and Figure 2 show the distribution of CNS WHO grades. Grade I tumors were most common (42%), followed by Grade IV (10%), while Grades II and III each accounted for 6%. A significant proportion (36%) were categorized as NOS due to insufficient histopathological or ancillary data.

Table 5 and Figure 3 show the distribution of integrated diagnoses. Meningioma was the most common (36%), followed by astrocytomas (10%), and craniopharyngiomas and metastases (8% each). Hemangioblastomas and pilocytic astrocytomas accounted for 6% each, while arachnoid cyst, glioblastoma multiforme, low-grade glioma, and vestibular schwannoma each comprised 4%. Oligodendroglioma, ependymoma, medulloblastoma, and pituitary macroadenoma were least frequent (2% each). Overall, the cohort showed

Table 1: MRI Signal Characteristics on T1, T2 and FLAIR Sequences (n = 50)

MRI Sequence	Signal Pattern	Frequency (n)	Percent (%)
T1-weighted	Hypo-isointense	47	94
	Hyperintense	3	6
T2-weighted	Hypo-isointense	8	16
	Hyperintense	42	84
FLAIR	Hypointense	17	34
	Hyperintense	33	66

Table 2 (A–C): Diffusion Restriction, Hemorrhagic Component and Post-Contrast enhancement (n = 50)

MRI Feature	Category	Frequency (n)	Percent (%)
A. Diffusion restriction	Present	32	64
	Absent	18	36
	Total	50	100
B. Hemorrhagic component	Present	28	56
	Absent	22	44
	Total	50	100
C. Post-contrast enhancement	No enhancement	7	14
	Homogeneous	18	36
	Heterogeneous	25	50
Total		50	100

Table 3: MRI Based Provisional Diagnosis Distribution (n = 50)

MRI Diagnosis	Frequency (n)	Percent (%)
Meningioma	18	36
High-grade glioma	9	18
Pilocytic astrocytoma	5	10
Craniopharyngioma	4	8
Metastasis	4	8
Arachnoid cyst	2	4
Vestibular schwannoma	2	4
Low-grade glioma	1	2
Epidermoid cyst	1	2
Ependymoma	1	2
Hemangioblastoma	1	2
Medulloblastoma	1	2
Pituitary macroadenoma	1	2
Total	50	100

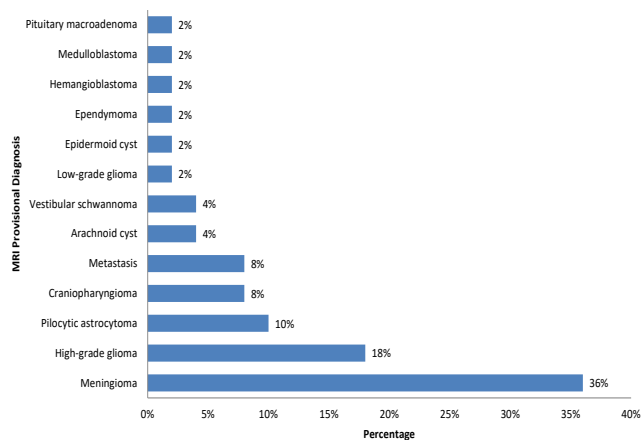
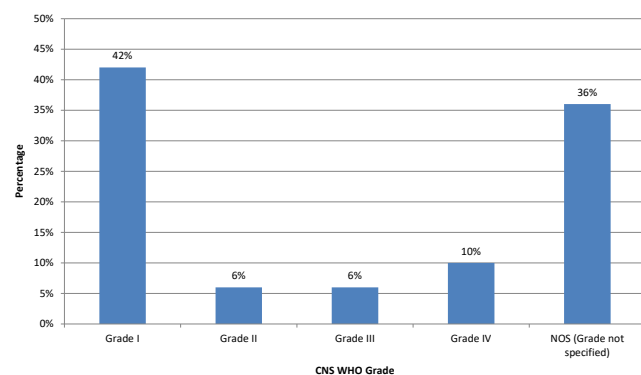


Figure 1: MRI Based Provisional Diagnosis Distribution

Table 4: Histopathology Based CNS WHO Grade Distribution (n = 50)

CNS WHO Grade	Frequency (n)	Percent (%)
Grade I	21	42
Grade II	3	6
Grade III	3	6
Grade IV	5	10
NOS (Grade not specified)	18	36
Total	50	100

**Figure 2:** Histopathology Based CNS WHO Grade Distribution

a heterogeneous mix of tumors, with extra-axial lesions, particularly meningiomas, predominating.

Table 6 and Figure 4 demonstrate a statistically significant association between MRI findings and final integrated diagnosis in 33 patients ($p < 0.001$). Meningioma was the most common (55%, $n=18$), with 100% MRI accuracy. High-grade gliomas accounted for 27% ($n=9$), with 8 correctly identified and 1 overlapping. Low-grade gliomas were less frequent (6%, $n=2$), while craniopharyngioma (12%, $n=4$) and pituitary macroadenoma (3%, $n=1$) showed complete concordance.

Table 5: Integrated Diagnosis Distribution based on HPE (n = 50)

Integrated Diagnosis	Frequency (n)	Percent (%)
Meningioma	18	36
Anaplastic Astrocytoma	5	10
Craniopharyngioma	4	8
Metastasis	4	8
Pilocytic astrocytoma	3	6
Hemangioblastoma	3	6
Arachnoid cyst	2	4
Glioblastoma Multiforme	2	4
Low Grade Glioma	2	4
Vestibular schwannoma	2	4
Ependymoma	1	2
Epidermoid cyst	1	2
Medulloblastoma	1	2
Oligodendroglioma	1	2
Pituitary macroadenoma	1	2
Total	50	100

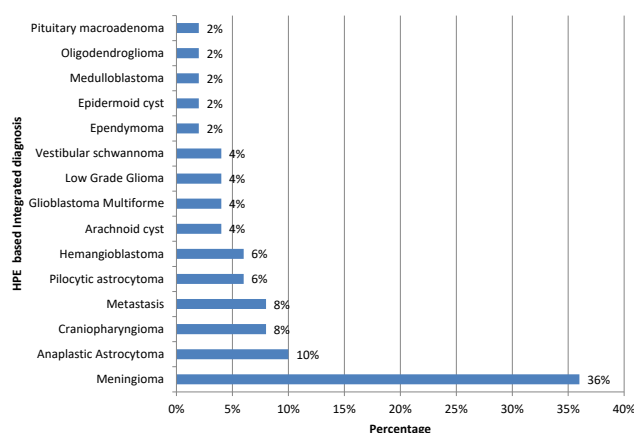
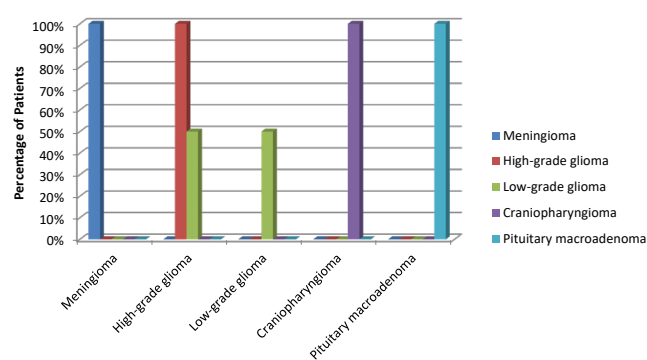
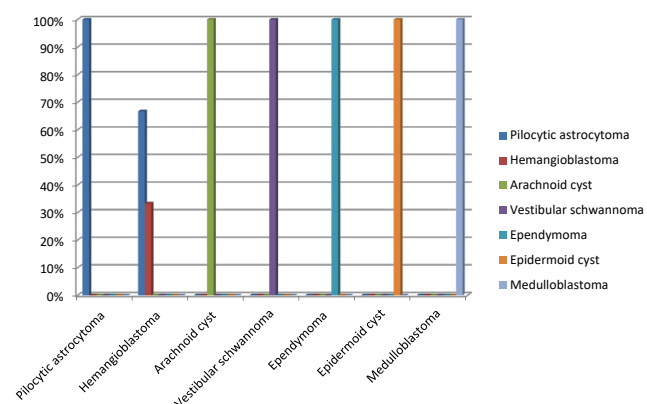
**Figure 3:** Integrated Diagnosis Distribution Based on HPE**Figure 4:** Association between MRI Diagnosis and Integrated Diagnosis in Supratentorial Brain Tumors**Figure 5:** Association between MRI diagnosis and integrated diagnosis in infratentorial Brain Tumors.

Table 7 and Figure 5 show a statistically significant association between MRI and integrated diagnosis in 13 infratentorial tumors ($p < 0.001$), with near-perfect concordance. Pilocytic astrocytoma was most common (38%, $n=5$), with 60% correctly identified and 40% reclassified as hemangioblastoma (23%, $n=3$). Arachnoid cyst (15%, $n=2$), vestibular schwannoma (15%, $n=2$), ependymoma (8%, $n=1$), epidermoid cyst (8%, $n=1$), and medulloblastoma (8%, $n=1$) all showed 100% MRI accuracy.

Table 6: Association between MRI Diagnosis and Integrated Diagnosis in Supratentorial Brain Tumors

MRI Diagnosis	Integrated Diagnosis					p- Value
	Meningioma	High-grade glioma	Low-grade glioma	Craniopharyngioma	Pituitary macroadenoma	
Meningioma (n=18)	18 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	<0.001
High-grade glioma (n=9)	0 (0%)	8 (100%)	1 (50%)	0 (0%)	0 (0%)	
Low-grade glioma (n=1)	0 (0%)	0 (0%)	1 (50%)	0 (0%)	0 (0%)	
Craniopharyngioma (n=4)	0 (0%)	0 (0%)	0 (0%)	4 (100%)	0 (0%)	
Pituitary macroadenoma (n=1)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	
Total (n=33)	18 (100%)	8 (100%)	2 (100%)	4(100%)	1(100%)	

Representative Cases

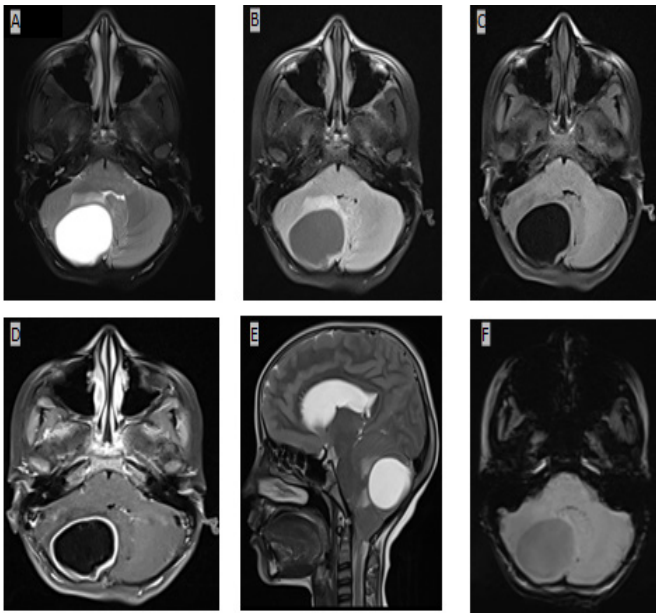


Figure 6: CEMRI brain Findings (Figure A–F: T2, FLAIR, T1, T1 post-contrast,T2sagittal,SWI sections) demonstrates a large, well demarcated, intraaxial infratentorial cystic space occupying lesion with smooth margins, involving the postero-medial and inferior aspects of the right cerebellar hemisphere. The lesion shows mild perifocal edema and demonstrates vivid, smooth, uniform enhancement of the cyst wall on post-contrast T1 images. No mural nodule, internal hemorrhage, or calcifications are seen on SWI... MRI findings suggestive of a low-grade neoplastic etiology (low grade astrocytoma).

DISCUSSION

The present study included 50 patients with histologically confirmed brain tumours, with a mean age of 38.5 ± 17.6 years (range: 6–66), showing a predominance in the 30–49-year age group. This is consistent with previous Indian studies reporting peak incidence in the fourth decade.¹⁸ Although brain tumours have traditionally shown male predominance, recent trends suggest a narrowing gender gap; our study demonstrated near-equal sex distribution (52% females vs 48% males), similar to recent epidemiological observations, though some studies still report higher incidence in males, particularly for malignant tumours.^{19,20} Headache with vomiting was the most common

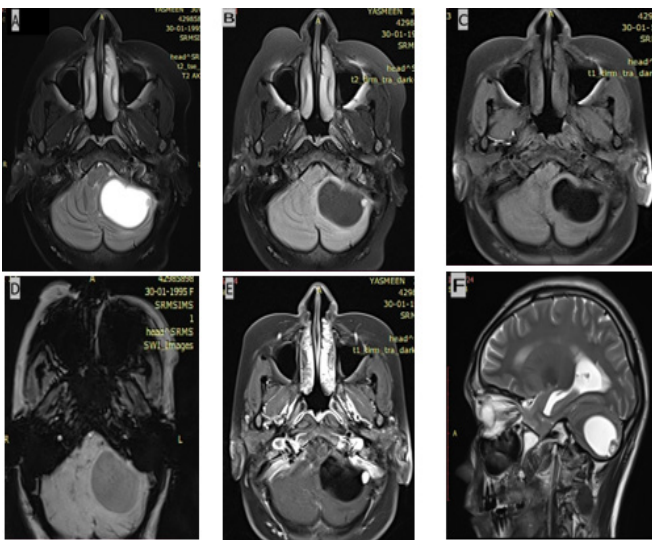
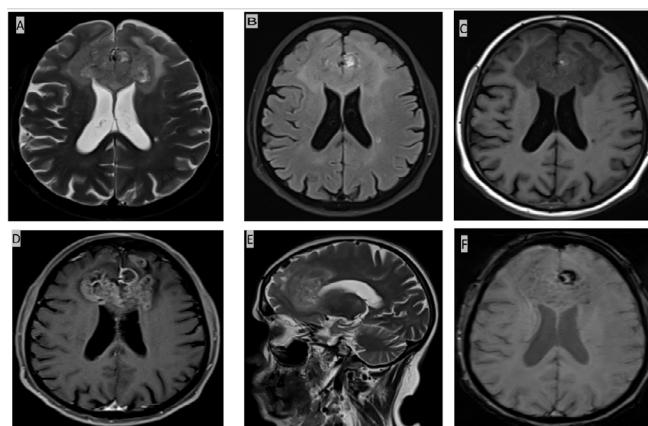
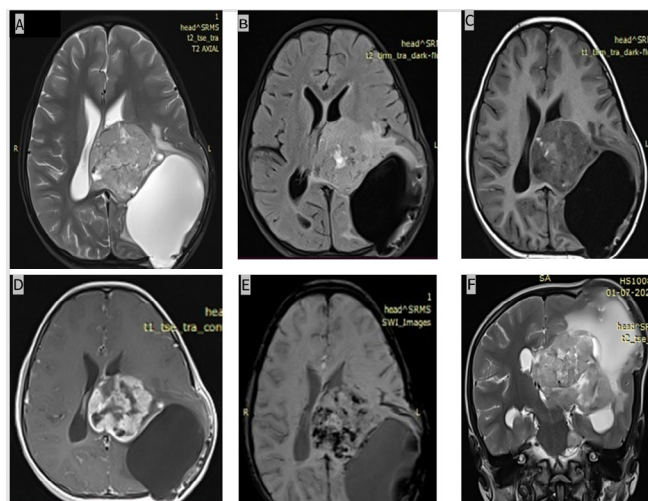


Figure 7: CEMRI brain Findings (Figure A–F: T2, FLAIR, T1, T1 post-contrast, SWI, T2 coronal) demonstrates a well defined solid-cystic lesion in inferior aspect of left cerebellar hemisphere. An eccentric T1/T2 isointense mural nodule is present along the inferolateral aspect of the cyst which shows intense homogenous post contrast enhancement. No obvious hemorrhage or calcification is noted on SWI.... MRI findings suggestive of neoplastic etiology.

presenting symptom (70%), indicating raised intracranial pressure, consistent with earlier reports.²¹ Other symptoms such as neurological deficits, seizures, vertigo, and loss of consciousness reflected tumour heterogeneity. Most patients (92%) had no prior malignancy. A large proportion of tumours were >5 cm, suggesting delayed presentation, as previously described.¹⁸ Lesions were predominantly supratentorial, with near-equal intra-axial and extra-axial distribution, in agreement with prior studies.^{22,23} MRI findings showed a predominance of solid lesions with significant mass effect, including ventricular effacement and midline shift. Signal characteristics were typical (T1 hypointense, T2/FLAIR hyperintense), especially in gliomas.²⁴ Diffusion restriction correlated with tumour cellularity, and hemorrhagic components were common in aggressive tumours.²⁵ Meningioma was the most common tumour (36%), followed by astrocytomas, consistent with previous reports.²⁶

Table 7: Association between MRI diagnosis and integrated diagnosis in infratentorial Brain Tumors

MRI Diagnosis	Pilocytic astrocytoma (n=3)	Hemangioblastoma (n=3)	Arachnoid cyst (n=2)	Vestibular schwannoma (n=2)	Ependymoma (n=1)	Epidermoid cyst (n=1)	Medulloblastoma (n=1)	p-value
Pilocytic astrocytoma (n=5)	3 (100%)	2 (66.7%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	<0.001
Hemangioblastoma (n=1)	0 (0%)	1 (33.3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
Arachnoid cyst (n=2)	0 (0%)	0 (0%)	2 (100%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
Vestibular schwannoma (n=2)	0 (0%)	0 (0%)	0 (0%)	2 (100%)	0 (0%)	0 (0%)	0 (0%)	
Ependymoma (n=1)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	0 (0%)	
Epidermoid cyst (n=1)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	0 (0%)	
Medulloblastoma (n=1)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (100%)	
Total (n=13)	3 (100%)	3 (100%)	2 (100%)	2 (100%)	1 (100%)	1 (100%)	1 (100%)	

**Figure 8:** CEMRI brain Findings (Figure A–F: T2, FLAIR, T1, T1 post-contrast, T2 sagittal, SWI) demonstrates an anterior midline intra axial spaceoccupying lesion involving the bilateral medial frontal lobes and the genu of the corpus callosum. The lesion demonstrates shaggy / irregular rim enhancement on post-contrast imaging. An intrinsic hemorrhagic focus is noted in left paramidline component on SWI which is associated with perifocal vasogenic edema and causing minimal mass effect... MRI findings suggestive of butterfly glioma.**Figure 9:** CEMRI brain Findings (Figure A–F: T2, FLAIR, T1, T1 post-contrast, SWI, T2 coronal): A large intra-axial lesion is seen, showing heterogeneous and avid post-contrast enhancement. The lesion produces significant mass effect with gross dilatation of the left lateral ventricle, particularly a trapped occipital horn. Associated perilesional edema may be present and no definite calcification or hemorrhage is noted on SWI... MRI findings suggestive of high grade glioma.

WHO Grade I tumours predominated (42%); however, 36% were classified as NOS due to lack of molecular profiling as per WHO CNS5 guidelines.¹¹ A significant correlation between MRI diagnosis and histopathology ($p < 0.001$) was observed, demonstrating high diagnostic accuracy, with minor overlap in select infratentorial tumours.²³ Overall, MRI remains a reliable, non-invasive modality for preoperative tumour evaluation, though integrated diagnosis with molecular profiling

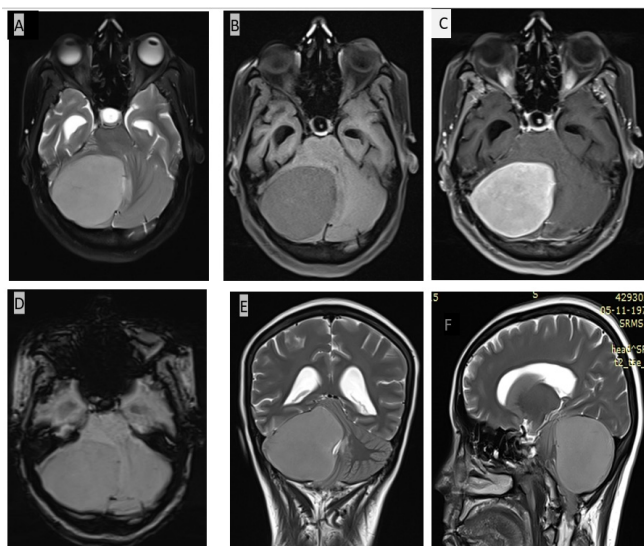


Figure 10: CEMRI brain findings (Figure A-F: T2, FLAIR, T1 post-contrast, SWI, T2 coronal and T2 sagittal sections) demonstrates an extra axial, large, well demarcated, solid, vividly enhancing mass lesion in right cerebellopontine (CP) angle cistern extending into right cerebellar region. The lesion causes mass effect over the right cerebellum, right CP angle cistern, midbrain and fourth ventricle, with resulting mild dilatation of bilateral lateral and third ventricles, suggestive of early obstructive hydrocephalus.... MRI findings suggestive of meningioma.

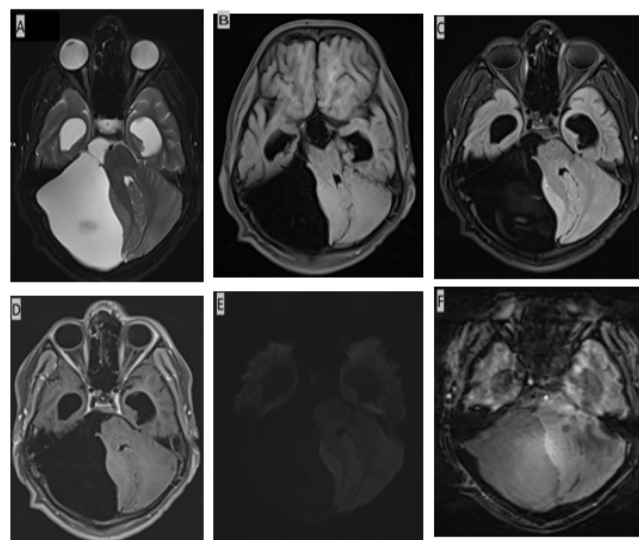


Figure 12: CEMRI brain Findings (Figure A-F: T2, FLAIR, T1, T1 Post contrast, DWI and ADC) shows a large, well-circumscribed, extra-axial fluid signal intensity cystic lesion in the right infratentorial fossa. The lesion follows CSF signal intensity on all sequences which shows no diffusion restriction and no post-contrast enhancement. It causes mass effect on the right cerebellum and brainstem, with stretching and encasement of the right cranial nerves. No significant surrounding edema is noted...MRI findings suggestive of arachnoid cyst.

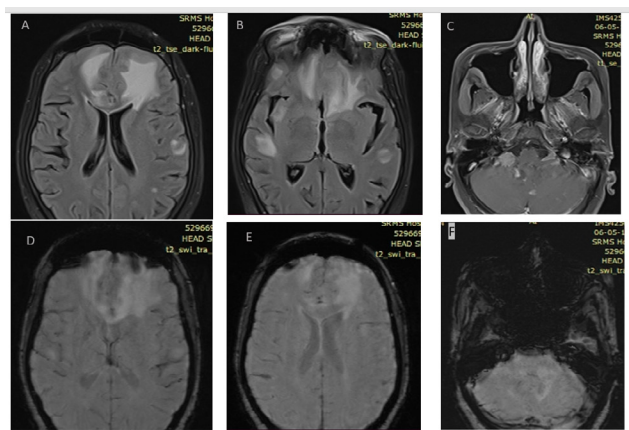


Figure 11: CEMRI brain Findings (Figure A-C FLAIR images, D-F SWI images): demonstrates multiple scattered, round, altered signal intensity enhancing lesions involving the bilateral cerebellar hemispheres and the genu of the corpus callosum. Some of these lesions demonstrate perilesional edema, with associated surrounding edema in the bilateral frontal regions as described.... MRI Findings suggestive of intracranial metastasis.

is essential. MRI demonstrates high diagnostic accuracy and strong histopathological correlation in brain tumour evaluation, particularly when combined with advanced imaging techniques. Integration of molecular biomarkers with imaging and histopathology is essential for comprehensive diagnosis and optimal management as per WHO CNS 2021 classification.

Conclusion

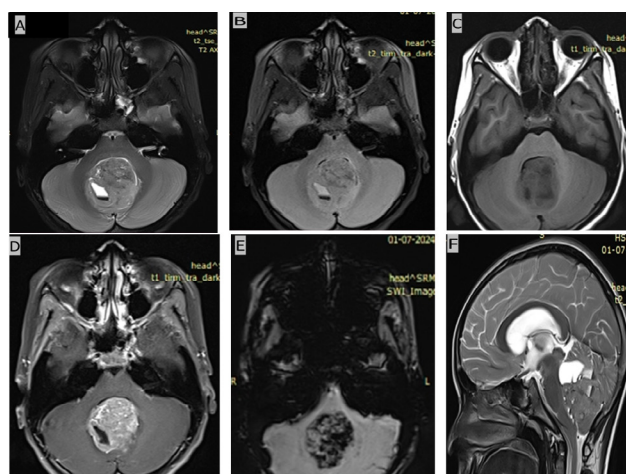


Figure 13: CEMRI brain Findings (Figure A-F: T2, FLAIR, T1, T1 postcontrast, SWI, T2 sagittal) shows a large, well-defined midline posterior fossa mass lesion is noted, located within the fourth ventricle. The lesion shows mixed/altered signal intensity with moderate heterogeneous post-contrast enhancement and heterogeneous diffusion restriction. There is diffuse, significant intralésional hemorrhage evident on SWI. Associated mass effect on the fourth ventricle is present, likely contributing to obstructive hydrocephalus.... MRI findings suggestive of medulloblastoma.

MRI serves as the gold standard imaging modality for brain tumour diagnosis and classification according to WHO 2021 standards, with demonstrated diagnostic accuracy comparable to histopathological confirmation for common entity categories

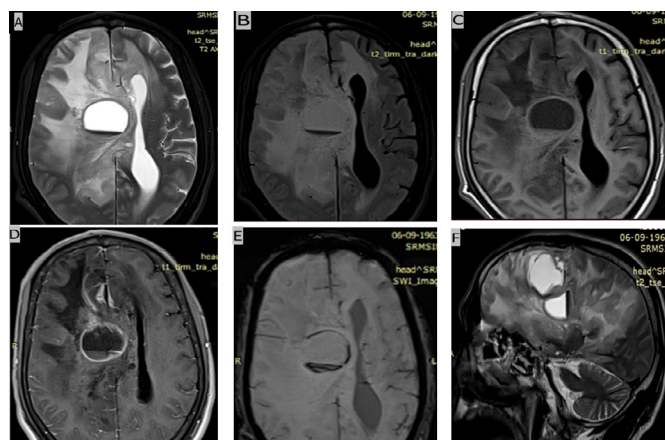


Figure 14: CEMRI brain Findings(Figure A–F: T2, FLAIR, T1, T1 post-contrast, SWI, T2 sagittal) demonstrates a large intercommunicating complex cystic lesions in right fronto-parietal cerebral hemisphere. The lesion demonstrate shaggy /irregular rim enhancement on post-contrast with internal components showing hemorrhagic contents on SWI. There is marked perifocal vasogenic edema with significant mass effect and subfalcine midline shift toward the left.... MRI findings suggestive of high-grade neoplastic lesion.

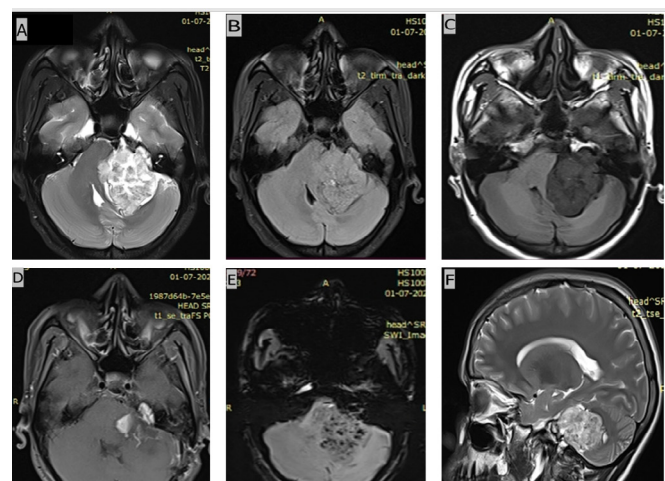


Figure 15: CEMRI brain Findings (Figure A–F: T2, FLAIR, T1, T1 post-contrast, SWI, T2 sagittal) shows a large extra-axial lesion in the left cerebellopontine (CP) angle cistern which shows intense, heterogeneous post-contrast enhancement within intracanalicular extension into the internal auditory canal. Associated mass effect on the adjacent cerebellum and brainstem is noted. There is mild upstream hydrocephalus, likely due to effacement of CSF pathways.... MRI findings suggestive of Acoustic Schwannoma.

such as extra-axial tumours, low-grade gliomas, high-grade gliomas, and metastases. The integration of conventional MRI sequences (T1, T2, FLAIR, DWI, post-contrast enhancement) with clinical-radiological correlation enables reliable tumour characterization, grade estimation, and prognostic assessment in the majority of patients.

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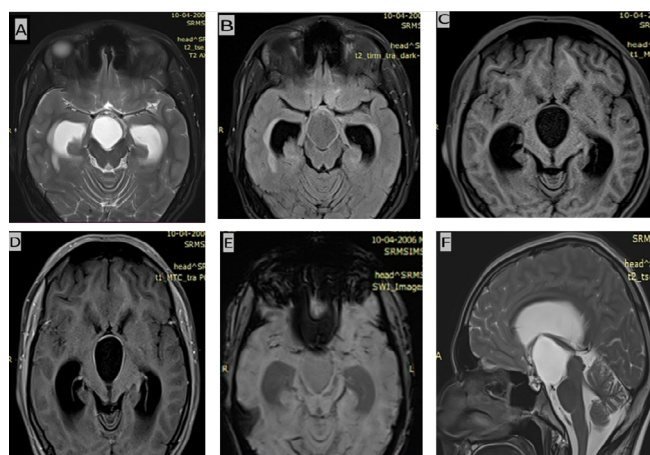


Figure 16: CEMRI brain Findings(Figure A–F: T2, FLAIR, T1, T1 post-contrast, SWI, T2 sagittal):A well-defined predominantly cystic suprasellar lesion. Inferiorly, there is a contiguous smaller heterogeneously enhancing soft-tissue sellar component, which shows blooming on SWI suggestive of calcific/hemorrhagic elements.... MRI findings suggestive of craniopharyngioma.

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