

**CT Evaluation of Supratentorial Lesions**Irfan Ahmad<sup>1</sup>, Nisha Rai<sup>2</sup>, Sanjay Kumar Jha<sup>3</sup><sup>1</sup>Associate Professor, Department of Radio-diagnosis, Darbhanga Medical College and Hospital, Laheriasarai, Bihar.<sup>2</sup>Assistant Professor, Department of Radio-diagnosis, RIMS, Ranchi, Jharkhand.<sup>3</sup>Professor and HOD, Department of Radio-diagnosis, Darbhanga Medical College and Hospital, Laheriasarai, Bihar.

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**Abstract**

**Background:** Brain neoplasms may be classified by location of supratentorial, infratentorial and midline tumours. Of the supratentorial neoplasms meningiomas are the most frequent extra-axial neoplasms. CT has become the most important diagnostic procedure in evaluating patients suspected of harbouring an intracranial tumour. It is still considered the basic radiologic study since it gives specific information for the management of brain tumours and is minimally invasive. The purpose of this study was to assess the distribution, features, localization and extent of supratentorial neoplasms.

**Methods:** Fifty cases with symptoms of intracranial pathology and on CT found to have supratentorial tumours were studied.

**Results:** The CT patterns of 50 supratentorial tumours were reviewed, out of which 30 cases i.e. 60% were found to be intra-axial and 21 i.e. 42% extra-axial tumours. GBM formed the major group of the intra-axial tumours i.e. 18% and meningiomas formed the major extra-axial tumours forming 26%.

**Conclusion:** Tumours were done on 50 cases. The patients who were referred to department of Radio-diagnosis after suspected to have brain tumours by clinicians, are taken up for radiological evaluation and try to detect by CT scan. Thorough clinical history and clinical examination were done before CT examination.

**Keywords:** Supratentorial tumors, Meningioma, CT scan.

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**Introduction**

The concept of a tumour of the brain is, for most individuals and many physicians as well, one of the most dramatic forms of human illness. Brain tumour occurs the second most common form of malignancy in children and primary brain tumours rank from 6th to 8th in frequency of all neoplasms in the adult.[1,2]

The annual incidence of primary intracranial neoplasms is estimated to be 12.3 persons per 1 lac population and it is increasing in frequency.

Since majority of these tumours present with nonspecific complaints such as headache, stroke like syndromes, or seizures, often a diagnosis is made or suggested initially by the findings on imaging studies.[3]

However prognosis of these patients has improved considerably due to recent advances in diagnostic techniques, microsurgery and radiotherapy.

Clinical evaluation, radiology and pathology play big roles in deciding the long-term prognosis.

Radiological diagnosis is based on

1. Topography of the lesion.
2. Characterization into intra-axial / extra-axial parenchymal location.
3. Morphology analysis and
4. Presence of secondary changes adjacent to the lesion.

Recent advances in imaging techniques have exploded into the horizon of using many different modalities like MRI, and CT perfusion, PET and SPECT.

These imaging modalities have revolutionized the diagnosis and management of brain tumours.

**Material and Methods**

In this prospective study 50 cases of any age group and of either gender were included with complain

of headache and seizures referred to Radiology department of Darbhanga Medical College and Hospital, Laheriasarai, Bihar from September 2025 to May 2025. Patients of all age groups presenting with supratentorial tumors were included in the study. Patients with sign or symptoms pertaining to posterior fossa lesions will be excluded.

All patients history taking the potential general and patient-specific risks related to multidetector computed tomography (MDCT) evaluation were explained thoroughly, and written informed consent was obtained. Patients were subsequently evaluated

using the GE Revolution EVO 128-slice CT scanner. Each lesion was analyzed for various radiological parameters, including size, anatomical extent, and attenuation characteristics. Relevant laboratory investigations were performed when deemed necessary.

Data collected were compiled, analyzed, and the results interpreted.

**Result**

- Intraaxial – 30 – 60%
- Extraaxial – 20 – 40%.

**Table 1: Sex distribution**

Gliomas	Sex	
	Male	Female
Low grade glioma	3	2
High grade glioma	9	6
Oligodendroglioma	1	0
Ependymoma	1	0
Subependymoma	1	0

**Table 2: Supratentorial Tumours (Intraaxial tumours) Astrocytomas (Number of Cases20)**

		Number of cases	Intra Axial	Intracranial	(Out of gliomas)
	LGG	5	16.6%	10%	21.7%
HGG	Anaplastic	6	20%	12%	26%
	GBM	9	30.0%	18%	39.1%

**Table 3: Oligodendroglioma (No. of Case1)**

Number of cases	Intra Axial	Intra cranial	(Out of gliomas)
1	3.3%	2%	4.3%

**Table 4: Ependymal (No.of Cases 2)**

	Number of cases	Intra axial	Intra cranial	(Out of gliomas)
Ependymoma	1	3.3%	2%	4.3%
Subependymoma	1	3.3%	2%	4.3%

**Table 5: Pre Contrast features**

Features(pre- contrast)	LGG	HGG	Oligo	Epend	Subependymoma
Hyperdense	0	1	0	0	0
Isodense	2	3	0	0	0
Hypodense	3	11	1	1	1
Calcifications	-	1	1	0	0
Multiplicity	0	0	0	0	0

**Table 6: Post Contrast features**

Post Contrast	LGG	HGG	Oligo	Ependymoma	Subependymoma
<b>POSITIVE</b>	2	15	1	1	1
Slight	2	1	1	0	1
Moderate	0	5	0	1	0
Marked	0	9	0	0	0
<b>NEGATIVE</b>	3	0	0	0	0
Haemorrhage/ Necrosis	0	14	0	0	0
Edema	1	15	0	1	0
Extent	0	2	1	1	1

**Low grade gliomas:** Primary cerebral gliomas are the largest group of all intracranial tumours. Our

study encompassed 23 cases of gliomas which included 5 low grade gliomas that is 21.7% of the

gliomas. We had 3 males and 2 females. Commonest location was the frontal lobe (i.e.3 cases) and in other 2 cases it was found in the parietal and temporal lobe respectively.

On NECT the lesions had irregular borders and minimal edema in one case. On CECT 2 out of 5 cases showed slight contrast enhancement.

**Extent:** On NECT, the infiltrating pattern of the lesions could be seen with obliteration or compression of sub arachnoid spaces.

Tumour margins were blurred in 2 of the cases located in the frontal lobe which showed extension into the contra lateral hemisphere, indicating infiltrating nature of neoplasm.

**Oligodendroglioma:** Out of 23 cases of gliomas, we found 1 case of oligodendroglioma in a man presenting with history of seizures and headache

showed a hypodense lesion in the subcortical region of the frontal lobe with discrete calcification on NECT. On CECT there was slight homogenous enhancement with tumour extension into the cortex.

**Ependymoma:** In our study of 49 cases of primary intra cranial neoplasms we found one case ofependymoma that is 2% of all primary intracranial neoplasms.

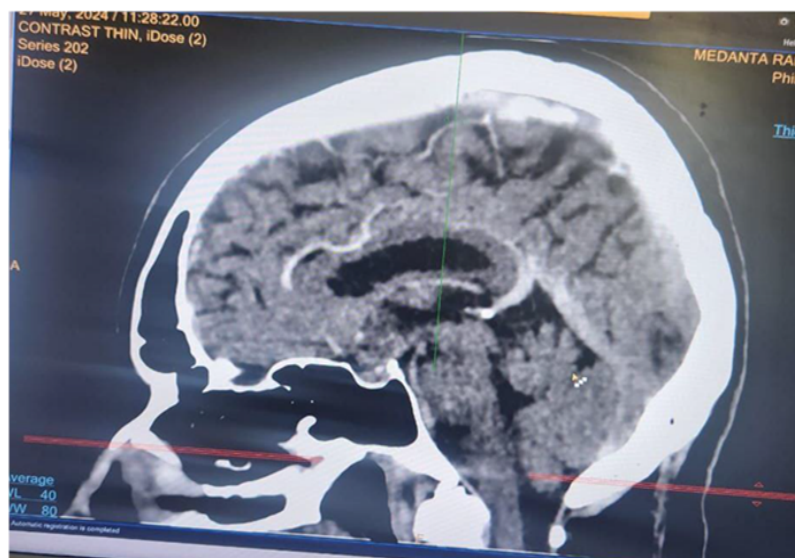
There was a 5yr old male child with history of headache and ataxia showing a hypodense solid mass located in the periventricular region, moderately marginated and showed moderate homogenous enhancement on CECT with minimal edema and no haemorrhage or calcification with evidence of extension noted to the CP angle cisterns.

**Table 7: Extra axial tumors**

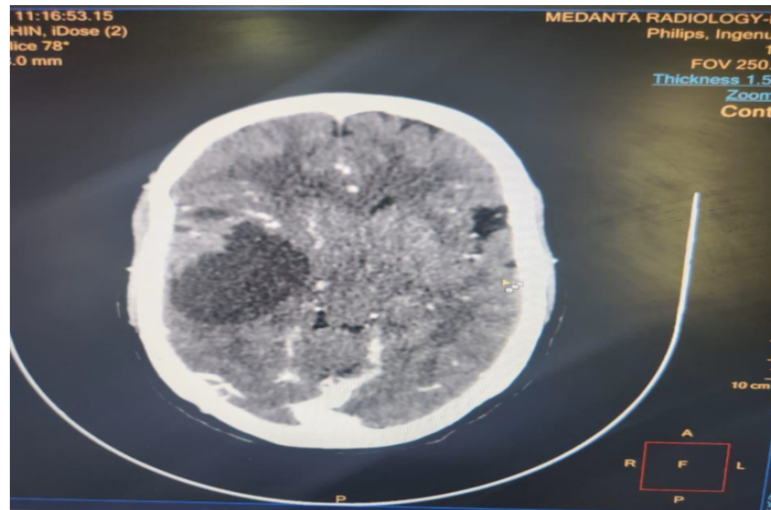
Tumors	No. of cases	Extra Axial	Intracranial
Meningioma	13	65%	26%
Pituitaryadenoma	5	25%	10%
Craniophyngioma	2	10%	4%

**Table 8: Presenting symptoms and number of patients**

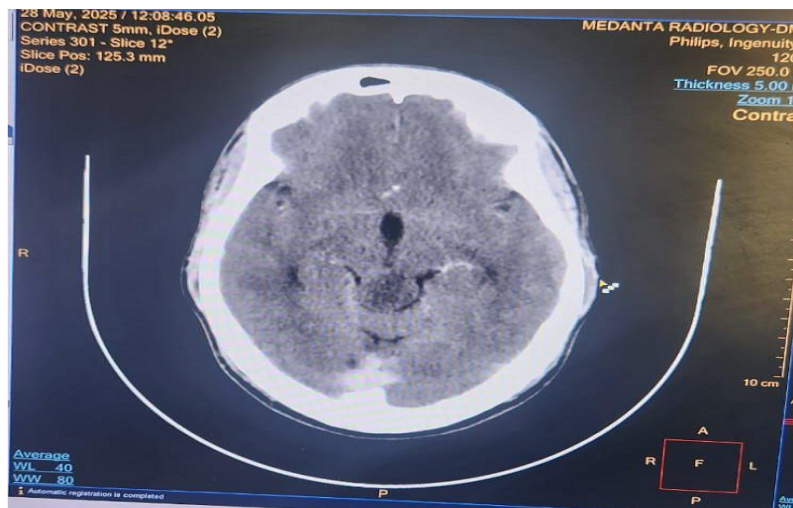
Symptoms	Meningioma (n=13)	Pituitary tumour (n=5)	Craniopharyngiomas (n=2)
Headache	7	3	2
Convulsions	4	1	0
Deafness	1	0	0
Vertigo	1	0	1
Ataxia	2	0	0
Tinnitus	2	0	0
Hemiplegia	5	0	0
Blindness	2	4	1



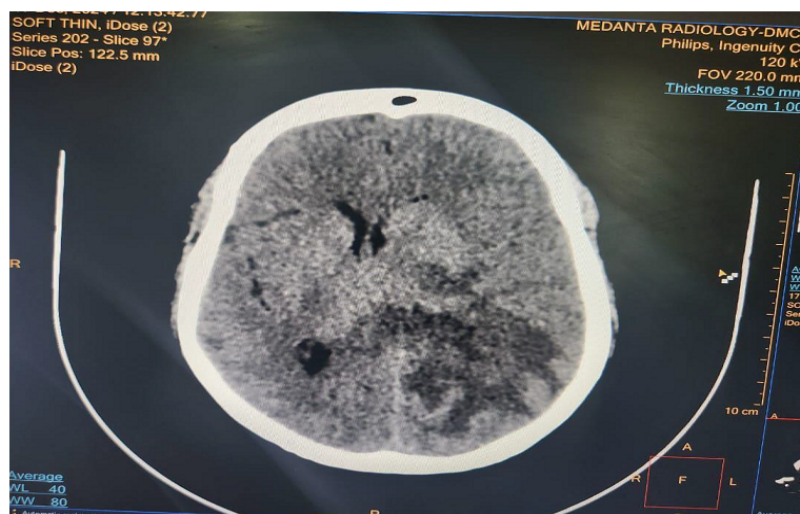
**Fig 1: Pituitary Macroadenoma-** A well-defined isodense to mildly hyperdense soft tissue mass is seen in sellar and suprasellar region of size 22x8 mm. the lesion appears to expand the Sella. On contrast there is heterogenous contrast enhancement



**Fig 2: Low Grade Glioma-** A hypodense lesion seen involving left cerebral hemisphere predominantly in posterior frontal and parietal lobes of size =  $4 \times 2 \times 2$  cm. No surrounding edema or midline shift noted.



**Fig 3: Germinoma** → A well-defined heterogeneously enhancing mass lesion of size =  $(18 \times 4)$  mm noted in pineal region with streaks posterior to 3rd ventricle



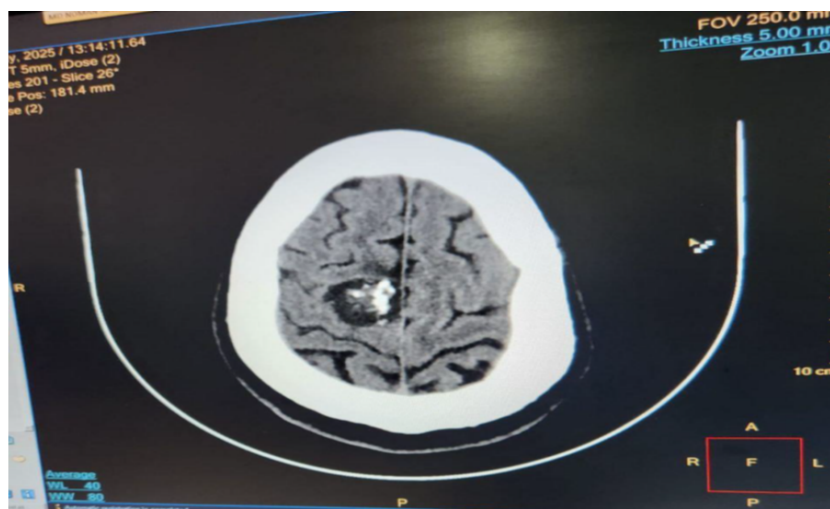
**Fig 4: HGG (High Grade Glioma)** An ill-defined heterogeneously hypodense lesion is seen in left parieto-frontal region with areas of necrosis and irregular margin of size  $(50 \times 25)$  mm. Corresponding effacement of adjacent sulci noted. Midline shift towards right absent.



**Fig 5: Pineocytoma - A well-defined homogeneously enhancing soft tissue mass is noted in pineal region. The lesion is mildly hypodense on pre-contrast image. No perilesional edema**



**Fig 6: High grade glioma - A heterogeneously irregularly enhancing lesion is seen in right left cerebral hemisphere predominantly involving left basal ganglia and post ventricular region. Lesion has central hypodensity with irregular rim enhancement that is surrounded by edema and mass effect**



**Fig 7: Meningioma - A well-defined hyperdense extraaxial mass lesion in the right parasagittal location of S.F. (30×72) mm. Coarse calcification noted with broad base towards dura. The lesion shows dense contrast enhancement.**

## Discussion

This study had 13 cases of meningiomas in our study, which constituted 65% of extra-axial tumours and 26% of all intracranial tumours. There was female preponderance. Out of 13 cases there were 9 females and 4 males. The most common age group was in the 50-70 years age group (i.e.7/13). Nine cases presented with either hemiplegia or hemiparesis and 1 case presented with vertigo and tinnitus. Two cases presented with either blindness or visual blurring and 2 cases presented with ataxia. Singh, H., et al. reported that the adult age group 30- 65 years was most commonly affected by Supratentorial tumours (especially gliomas). In children also gliomas can occur in the age group 1-4 years mostly. 31-40 years age group was mostly affected with 33.3% incidence of tumours and 23.8% incidence was present in 61-60 years age group.[3,6]

Baker et al in 1980 in which Glioma was the commonest primary supratentorial tumour (50.2%). [15] Glioma mostly presented as hypodense lesion in NCCT and majority of them showed variable degree of enhancement on CECT, (22/25cases).

The cerebral convexity was most common location, accounting for 7 cases. Next common was parasagittal accounting for 5 cases. On NECT scan the most common appearance was a well-defined rounded hyperdense lesion with perilesional edema, seen adjacent to either bone or falx. Seven cases were hyperdense, 3 cases were isodense and 3 cases were of mixed density. No cases of hypodense lesions were recorded. Calcification was seen in 5 cases.

All these findings correlate with earlier studies by Rohringer (1989) and Smirinopolous (2000).[7,8]

Three cases showed either bone destruction or bone hyperostosis. Necrosis as seen in one case. Following IV contrast administration the extra-axial features were more prominent, the broad base to bone or falx was seen in all most all the cases. The present observation is similar to that of Potts (1980), JS Nelson and Von Daimiling in 2000.[9,10]

Nine cases showed intense, homogenous enhancement of more than 40 HU, while 4 cases showed moderate enhancement and only one case showed mild enhancement of around 20 HU. We recorded 1 case of multiple meningioma; occurring in a female. Similar findings have been reported in an extensive study on Craniopharyngioma done by Crotty and Young (1995). [11] In the other case in a female aged 60 years presented with headache had lesions at left sphenoid ridge and left parietal convexity. Both lesions showed dense areas of calcifications. There was no perilesional edema. The CT patterns of 50 supratentorial tumours were

reviewed, out of the intraaxial tumours, GBM formed 18%, and anaplastic astrocytoma 12%, Low grade glioma 10%, metastasis 6%, ependymoma 2%, subependymoma 2% and germinoma 2%. Out of the extraaxial tumours meningioma formed 26%, pituitary adenoma 10% and craniopharyngioma 4%. Walker MD et al in 1975 in a behalf of American cancer society reported GBM incidence as high as 50% of all intracranial glioma.[13]

A great variety of CT patterns were found with glioblastoma the most typical being a tumour with mixed attenuation values. Low grade astrocytomas appeared as low density lesions. The characteristic appearance for meningiomas was a homogenous density, with an obvious increase in density after contrast injection. Metastasis appeared as low or high density lesions with marked edema surrounding the tumour. Some minor groups such as craniopharyngiomas and pineal tumours were described. Most were located in frontal lobe. CT characteristics of this subtype were similar to those reported by Vonofakos (1979).[13]

There were 2 cases of GBM which showed involvement of corpus callosum causing the "BUTTERFLY COMPONENT". There was a case of ependymoma showing extension to the CP angle cisterns. There were other cases of subependymoma and germinoma causing hydrocephalus. Primary CNS lymphoma cases showed involvement of corpus callosum and subependymal extension. Similar findings have been reported by NE Leeds and Elkincus (1984).[14] According to Singh, H., et al. there was majority (81%) lesions showed hypo dense as CT feature and 26.2% of the cases with no enhancement in CT imaging. More or less similar results observed in our study as 38% of the tumours were hypo dense on CT. Whereas equal proportion of the tumours were isodense and hyper dense (32% each). There were 40% of the lesions with mild to moderate enhancement with marked enhancement seen in 42%.

## Conclusion

Computed Tomography is best way in evaluation of Supratentorial Lesions as included in the study for all supratentorial tumors. It is easily accessible and rapid. CT imaging, especially when enhanced with contrast, provides vital information regarding tumor location, size, density, enhancement patterns, presence of calcification, necrosis, edema, hemorrhage, and bony involvement. These guided as initial evaluation of supratentorial lesions. These are cost effective. CT technology and integration with clinical and laboratory data will continue to enhance its diagnostic utility in neuro-oncology. CT remains a crucial first-line imaging modality, especially in emergency settings and in regions with limited access to MRI

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