Computed Tomography in Evaluation of Supratentorial Tumors

[1]Dr. Manimozhi Madhichettiar Dhayalan, [2]Dr. Parthasarathi Achappa, [3]Dr. Gautam Muthu

[1]Junior Resident, [2]Professor, [3]Professor and Head
Department of Radiodiagnosis
Rajarajeswari Medical College andHospital
Bengaluru, Karnataka, India.

Abstract-
Background and objectives: 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,l ocalization and extent of supratentorial neoplasms. Methods: Fifty cases with symptoms of intracranial pathology and on CT found to have supratentorialtumours were studied. Results: The CT patterns of 50 supratentorial tumours were reviewed, out of which 30cases i.e. 60% were found to be intra- axial and 20 i.e.40% extra – axial tumours. GBM formed the major groupof the intra axial tumours i.e. 18 % andmeningioms formed the major extra- axial tumours forming 26 %. Interpretation and Conclusion: Tumours was 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.
Inclusion Criteria: All age groups with supratentorial tumours will be included. Exclusion Criteria: All cases with supratentorial pathology and sympatomatology due to infections, congenitalmalformations, trauma or cerebrovascular accidents etiology will be excluded.

***Key words*: Supratentorial tumors, Meningioma, CT scan**

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 childrenand 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 intraV/sextra parenchymallocation
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.

OBJECTIVES

1. Tostudythedistributionofvarious supratentorial neoplasms.
2. TostudyCTfeaturesofsupratentorial neoplasms.

Technique:
Routine axial scans were performed in all 50 cases, taking orbitomeatal line as thebase line. 5mm slice thickness with 5mm table increment for the posterior fossa and 10 mm slice thickness with 10mm table increment for the supratentorial region were employed routinely, with a scan time of 3 seconds per slice. Thin contigous slices of 2 mm or 3 mm were done whereever necessary.
Multiple coronal and sagittal reformatted images were frequently used to further analyse thelesions detected on axial scans.
For contrast enhancement a bolus injection of Diatrizoate meglumine and iatrizoate sodium (Trazograf 76% or Urograffin 76%) in a dose of 300 mg of iodine/kg

Results:
Intraaxial – 30 – 60%
Extraaxial – 20 – 40%

Sex distribution

Gliomas	**Sex**	
	M	**F**
Low grade glioma	3	2
High grade glioma	9	6
Oligodendroglioma	1	0
Ependymoma	1	0
Subependymoma	1	0

Supratentorial Tumours (Intraxialtumours) Astrocytomas (Number of Cases 20)

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

Oligodendroglioma (No. of Case 1)

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

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%

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

Post Contrast features

Post Contrast	LGG	HGG	Oligo	Ependymoma	Subependymoma
1.POSITIVE	2	15	1	1	1
Slight	2	1	1	0	1
Moderate	0	5	0	1	0
Marked	0	9	0	0	0
2.NEGATIVE	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 is21.7% 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 orcompression 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 natureof 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. OnCECT there was slight homogenous enhancement with tumour extension into thecortex.

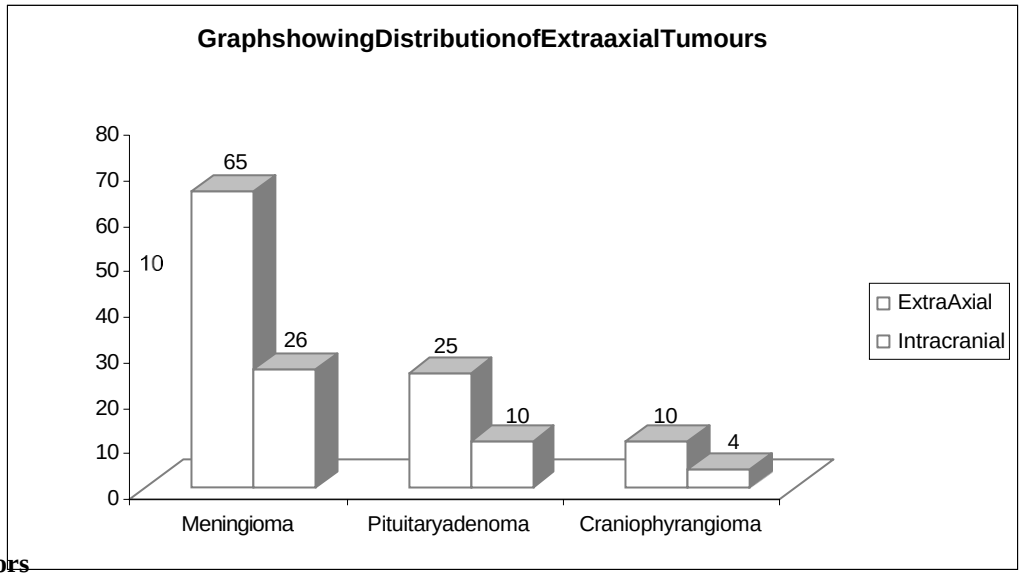
Ependymoma:

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.

Subependymoma:

Graph showing Distribution of Other Intra axial Tumours



Extra axial tumors

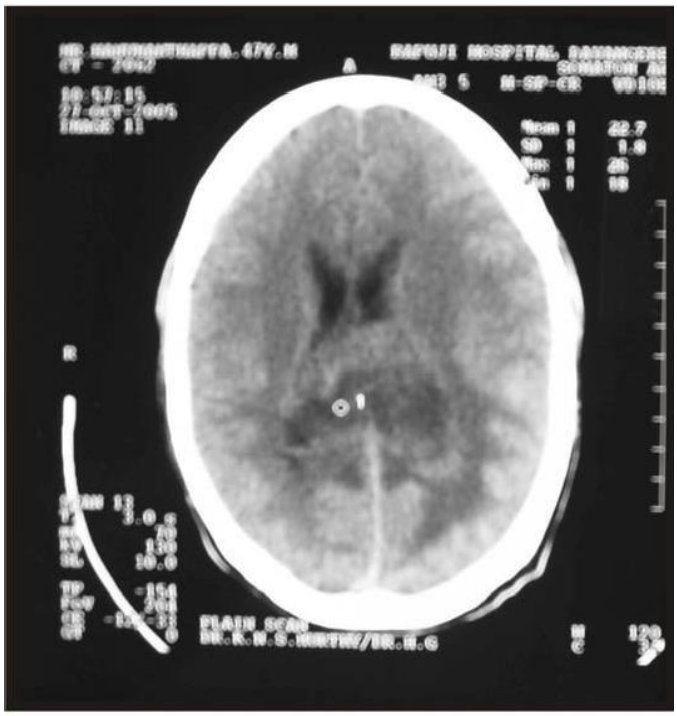
Tumors	Nos.	Extra Axial	Intracranial
Meningioma	13	65%	26%
Pituitary adenoma	5	25%	10%
Craniophyrangioma	2	10%	4%

Presenting symptoms and number o fpatients

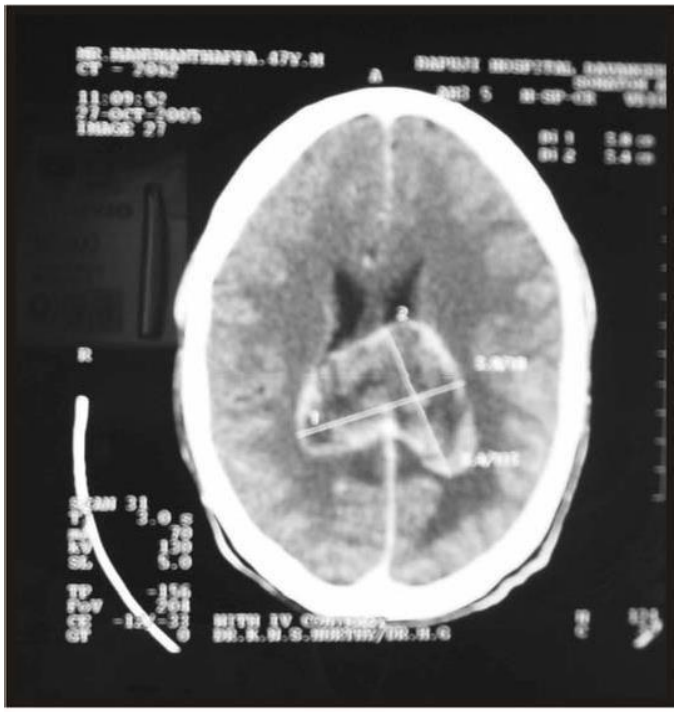
Symptoms	Meningioma (n=13)	Pituitary tumour (n=5)	Craniopharyngiomas (n=2)
Headache	7	3	2
Convulsions	4	1	0
Deafness	1	0	0
Vertigo	1	0	1
Ataxia	2	0	0
Tinnitus	2	0	0
Hemiplegia	5	0	0
Blindness	2	4	1

Percentage

GLIOBLASTOMA MULTIFORME

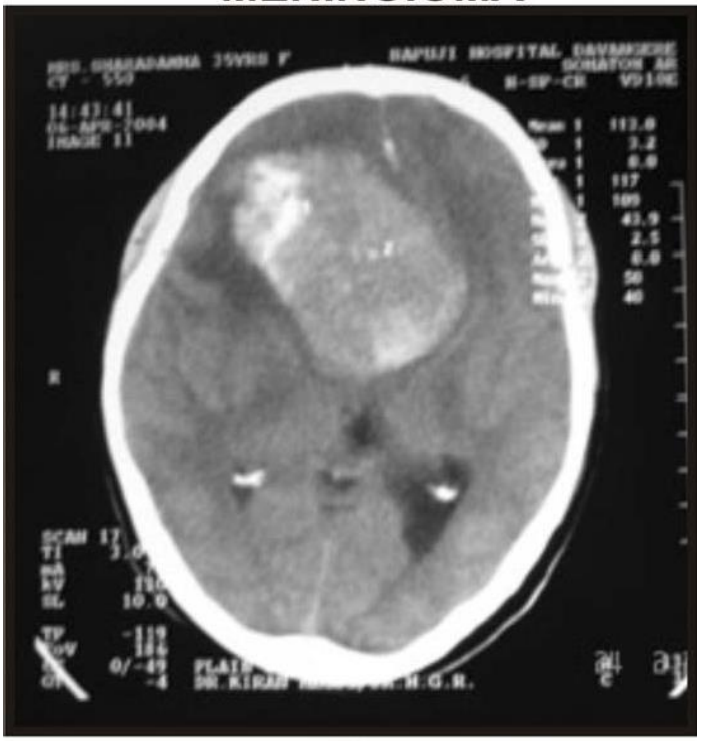


NECT

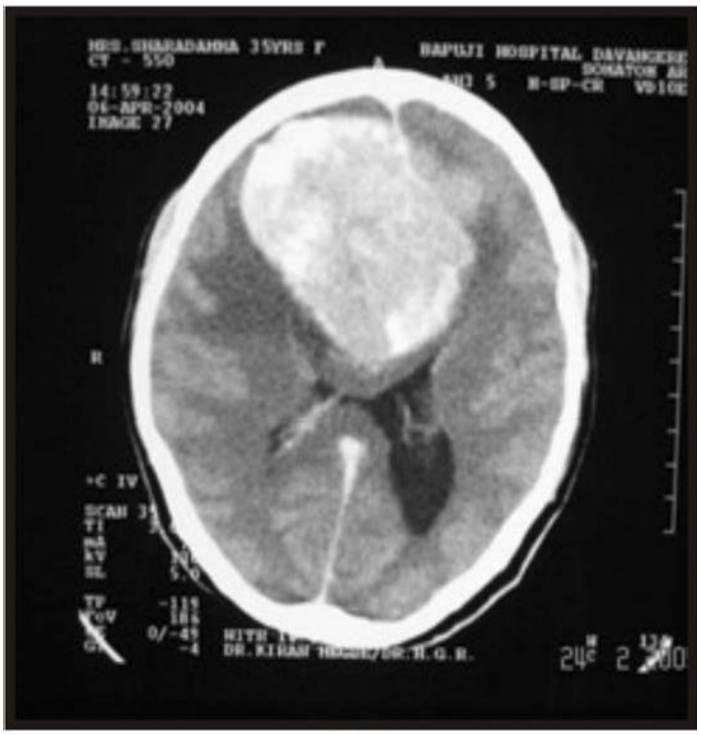


CECT
Well defined heterogenous mid line mass with areas of necorosis andthick rind of peripheral enhancement

MENINGIOMA



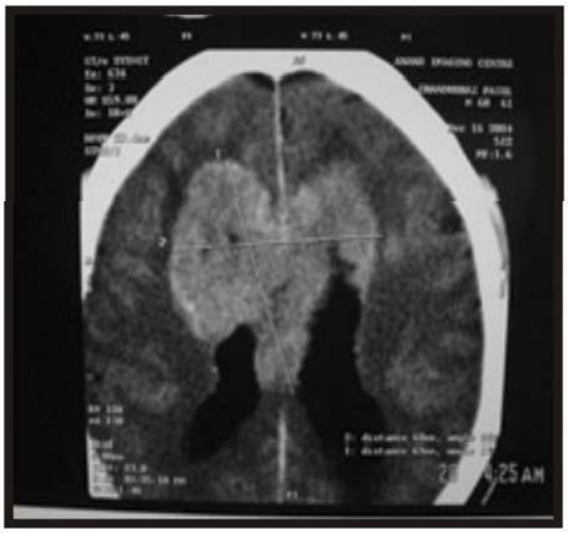
NECT



CECT

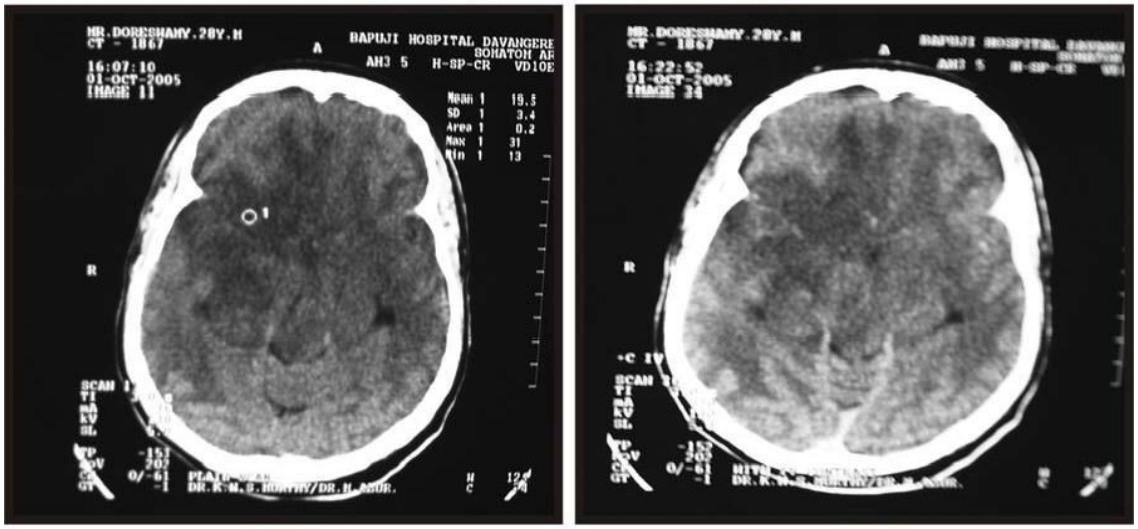
Well defined enhancing extraaxial hyperdense lesion arising from anterior falx with minimal surrounding perilesional edema

LYMPHOMA



Well defined enhancing hyperdense lesion in the frontal lobe crossing the midline with involvement of corpus callosum

LOW GRADE GLIOMA



NECT CECT

Ill defined nonenhancing lesion with contralateral midline shift and minimal perilesional edema

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 yearsage 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.

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 roundedhyperdense 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 wasseen in 5 cases.

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 allmost all the cases.

Nine cases showed intense, homogenous enhancement of more than 40 HU, while4 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.

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 intraaxialtumours
,GBM formed 18%, 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%.
A great variety of CT patterns were found with glioblastoma the most typical being a tumourwith mixed attenuation values .Low grade astrocytomas appeared as low density lesions.The characteristic appearance for meningiomas was a homogenous density,with an obviousincrease in density after contrast injection.Metastasis appeared aslow or high density lesions with marked edema surrounding the tumour.Some minor groups such as craniopharyngiomasand pineal tumours were described.
There were 2 cases of GBM which showed involvement of corpus callosumcausing the "BUTTERFLY COMPONENT".There was a case of ependymoma showing extension to theCP angle cisterns.There were other cases of subependymoma and germinoma causing hydrocephalus. Primary CNS lymphoma cases showed involvement of corpus callosum and subependymal extension.

Financial or Other Competing Interests
None.

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