Original Research Article

A study of supratentorial neoplasms by CT imaging

Puneet V Nayak[1], Manjunath D Abbigeri[2*], G C Patil[3]

[1]Assistant Professor, [3]Professor & HOD, Department of Radiodiagnosis, Karnataka Institute of Medical Sciences, Hubblli, Karnataka, INDIA.
[2]Assistant Professor, Department of Radiodiagnosis, Gadag Institute of Medical Sciences, Gadag, Karnataka, INDIA.
Email: drpuneet03@gmail.com , drmanju98@gmail.com

Abstract

Background: Computed tomography has become the most important diagnostic procedure in evaluating patients suspected of harboring an intracranial tumor. **Aim and objective:** To study the distribution, features, localization and extent of supratentorial neoplasm by Computed Tomography at a tertiary health care center **Methodology:** Fifty cases with symptoms of intracranial pathology which on CT were found to have supratentorial tumors were studied during the period from May 2011 to April 2013. **Results:** The CT pattern of 50 supratentorial tumors were reviewed, out of which 31(62%) cases were intra-axial and 19 (38%) were extra-axial tumour. Gliomas formed the major group of the intraaxial tumors i.e 46% and meningioma formed the major extra –axial forming 26 %.
Key Word: supratentorial neoplasms.

[*]**Address for Correspondence:**
Dr Puneet V Nayak, Assistant Professor, 3Professor & HOD, Department of Radiodiagnosis, Karnataka Institute of Medical Sciences, Hubblli, Karnataka, INDIA.
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INTRODUCTION

The concept of a tumor of the brain is, for most individuals and many physicians as well, one of the dramatic form of human illness. Brain tumor occurs the second most common form of malignancy in children andprimary brain Tumors rank from 6th and 8th in frequency of all neoplasms in the adult.[1,2] The annual incidence of primary intracranial neoplasm is estimated to be 12.3 persons per one lakh population and it is increasing in frequency. Since majority of these tumors present with non specific complaints 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 roles in deciding the long term prognosis. Radiological diagnosis is based on.

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

Computed tomography remains the most widely used form of neuroimaging for the diagnosis of brain tumor due to its wider availability and lower cost. Recent advances in imaging technique have exploded into the horizon of using many different modalities like MRI, CT perfusion, PET and SPECT. These imagining modalities have revolutionized the diagnosis and management of brain tumors. Present study was conducted to study the distribution, features, localization and extent of supratentorial neoplasm by Computed Tomography at a tertiary health care center

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MATERIAL AND METHODS

Present study was a prospective study conducted at Department of Radio-diagnosis of a tertiary health care center between April 2011 and May 2013. Study population was patients with suspected brain tumor from Karnataka Institute Of Medical Sciences, Hubli and NMR Medical Institute Pvt Ltd, Hubli

Inclusion Criteria: 1.patients of all age groups with supratentorial tumors .

Exclusion Criteria: 1.All cases with supratentorial pathology and symptomatology due to infections, congenital malformations, trauma or cerebrovascular accidents 2. Patients not willing to participate in the study

Study was approved by ethical committee of the institute. A valid written consent was taken from the patients or their parents after explaining study to them. After considering inclusion and exclusion criteria 50 patients were enrolled for the study. Data was collected with pretested questionnaire. Data included demographic data and through clinical history. Detailed clinical examination was done. All finding were noted. All the patients were investigated by computed tomography. All the cases were studied on A)Toshiba Asterion VF spiral CT available in NMR SCAN CENTER, HUBLI B) GE High speed dual slice CT available in KIMS, HUBLI. Routine axial scans were performed in all 50 cases, taking orbitomeatal line as the base line. 5mm slice thickness with 5mm table increment for the posterior fossa and 10mm slice thickness with 10mm table increment for the supratentorial region were employed routinely, with a scan time of 3 seconds per slice. Thin contiguous slice of 2mm or 3 mm were done wherever necessary. Multiple coronal and sagittal reformatted images were frequently used to further analyses the lesions detected on axial scans. Direct prone coronal sections at 90o to orbito-meatal line were obtained in cases where axial and reformatted images could not be conclusive in localization and extent of the tumour. Data was analysed with appropriate statistical tests.

RESULTS

In this study, the youngest patient was 6yr old who was diagnosed to have PNET. The oldest patient was aged 73yrs who was diagnosed to have glioblastoma multiforme. Majority of the patients were from the age group of 51-60 years (32%) followed by 41-50 and 61-70 years (16% each). (table 1) In our study 29 (58%) patients were male and 21(42%) were female. Males were more commonly affected than females in this study. Out of total 50 patients, 31 cases were intraaxial which constituted 62% of the cases and 19 cases were extraaxial which constituted 38% of the total cases. In our study 23 were hypodense, 15 were isodense, 12 were hyperdense and 3 showed heterogeneous density. Hypodense was most common pattern. (table 2) In our study, 27 cases showed heterogeneous enhancement, 18 cases showed homogeneous enhancement, 2 of the cases showed peripheral ring enhancement and 3 cases were non enhancing. Heterogeneous pattern of enhancement was most common . (table 3) Other CT findings were calcification (22%), necrosis (26%), bone erosion (12%) and perilesional edema (40%). The intra axial tumors in this study were 23 cases of glioma, 2 cases of lymphoma, one case of PNET , germinoma and choroid plexus papilloma each and three cases of metastases. (table 4) Glioma constituted the most common intra axial tumors. 11 of them were located in frontal, 3 in parietal, 3 in temporal, 4 in occipital and 1 ependymoma in intraventricular location. Extra axial tumors constituted 40% of tumors in our study. The tumors in this category were Meningioma, Pituitary adenoma and Craniopharyngioma. Meningioma constituted the most common extra axial tumor. (table 5) In our study, 7 meningioma were located in cerebral convexity, 5 in parasagittal region and 1 in sphenoid ridge. In this study convexity meningioma were most common lesions among meningiomas.

Table 1: Distribution of supratentorial neoplasms by age group

Sr no	Age group (years)	No of patients	Percentage
1	1-10	01	2
2	11-20	06	12
3	21-30	04	8
4	31-40	04	8
5	41-50	08	16
6	51-60	16	32
7	61-70	08	16
8	71-80	03	6
	Total	**50**	**100**

Table 2: Distribution of supratentorial neoplasms according to density on NECT

Sr. no	Density on NECT	No of cases	Percentage
1	Isodense(iso)	15	30
2	Hypodense(Hypo)	23	46
3	Hyperdense(Hyper)	12	24
4	Heterogeneous(Het)	3	6

Table 3: Distribution of supratentorial neoplasms according to Contrast enhancement on CECT

Sn	Contrast enhancement on CECT	No of cases	Percentage
1	Homogeneous	18	36
2	Heterogeneous	27	54
3	Ring enhancing	2	4
4	Non enhancing	3	6

Table 4: Distribution of Intra axial Tumours

Sn	Tumors	No of cases	% of total no of cases	% of intra axial tumors
1	Glioma	23	46%	76%
2	Lymphoma (Lymp)	2	4%	6%
3	PNET	1	2%	3.3%
4	Germinoma	1	2%	3.3%
5	Choroid plexus carcinoma(cpc)	1	2%	3.3%
6	Metstases	3	6%	10%

Table 5: Distribution of Extra axial Tumours

Sn	Tumors	No of cases	Percentage of extra axial cases	Percentage of total no of cases
1	Meningioma(menin)	13	68.4%	26%
2	Pituitary adenoma(pit ade)	5	26.3%	10%
3	Craniopharyngioma(cp)	1	5.2%	2%

DISCUSSION

Primary cerebral gliomas are the largest single group of all intracranial tumors. Baker *et al.* (1974-1977) [4] out of 1,071 intracranial neoplasms reported an incidence of 34% for gliomas of which 28.38% were supratentorial5. In our study gliomas represented 46% of all primary intracranial tumors and 76% of all intra axial tumors in the supratentoiral region.

According to Leeds NE *et al.* [5] of 100 cases of supratentorial gliomas, included, 29% were low grade gliomas. Our study encompassing 23 cases of supratentroial gliomas included 5 were low grade gliomas i.e 21.7%. A study by Bulter AR *et al.*(1979) [6] among 14 cases of low grade glioma,9 were males and 5 females . Our study of 5 patients of low grade gliomas we had 4 males and 1 female i.e 80% suggesting male preponderance as per the study done by Butler AR *et al.* [6] In our study we had 60% having primary location of the lesion in the frontal lobe which is 60%. Similar findings were seen in Butler AR *et al.* [6] As per the study it was seen in 48% (14/29). In our study 2 out of 5 cases showed contrast enhancement i,e 40%. Our study correlated well with the study done by Leeds NE *et al.* [5] In our study out of 23 cases of gliomas 18 were high grade gliomas i,e 65% out of which, 6 were Anaplastic type and 9 were glioblastoma multiforme (GBM) type i,e 26 % and 39.1% respectively. Similarly Butler AR *et al.* (1979) [6] found 46 cases out of 60 cases were high grade gliomas i,e 76%. In our study we had 7 patients with frontal lobe predominance out of 15 cases which is 46 % correlating well with the study done by Butler *et al.* [6] In our study out of 10 cases of high grade gliomas showing unilocular or multiocular ring enhancement on CECT, 6 showed no ring enhancement on CECT ,while 3 had an incomplete ring enhancement and only 1 showed complete ring enhancement. On NECT there was only 1 patient who had calcifications (6.6%). Nodular mass with calcification was seen in 2 patients (13.3%). Bulky enhancing mass was seen in 6.6% of our study and 2 cases showed exophytic growth (13.3%). our study correlates well with the study done by Leeds NE *et al.* [5]

We had a case of Oligodendroglioma in a 49 year old man with history of headache and Seizures. Similar results were observed in Birjandi A *et al.* [7]

Our study had one case of ependymoma. A 16 year old male child with history of headache. It was a hypodense lesion located periventricularly with no calcification, moderately marginated showing moderate homogenous enhancement with minimal edema and no haemorrhages. Our study correlated well with study done by Osbron AG *et al.* [8] Our study had a case of subependymomas, an elderly 57 year old male presenting with history of

headache. In our study we had a hypodense lesion located in the lateral ventricle cystic inconsistency showing minimal heterogeneous enhancement on CECT. Similar findings were observed in Jones RV *et al.* [9] In our study we found 2 patients of primary CNS Lymphoma i.e 6.6% of the intra- axial tumour and 4% of total intracranial tumors in which both were males with age between (57-70 Yrs) and mean age 60.5Yrs. Our study matched well with the study done by Jack CR *et al.* [10] In our study we found one case of primary cerebral neuroblastoma in a 6 year old male child forming 3.3% of extraaxial tumors and 2% of the intracranial tumors correlating well with the study done by Chambers *et al.* (1972-1980). [11] In our study metastasis formed 6% of the intracranial neoplasm, which we found 3 cases i.e 3.3% of intraaxial tumors. All our 3 cases were males with an age range between 51-70 years with symptoms of seizures, headache and ataxia seen in 1 patient .Our study matched well with the study done by Potts *et al.* [12] In our study there was 1 case of Ganglioneuroblastoma forming 3.3% of total intraaxial tumors and % of entire intracranial tumors . The lesion was located in the pineal region correlating well with the study done by Fujimaki *et al.* [13] In our study meningiomas representing 26% of all primary intracranial tumors and 65% of all extra axial tumors with a female sex preponderance as noted in most of the studies. [14] Pituitary adenomas in our study constitute about 10% of all intracranial neoplasm and 25 % of all extra axial tumors. Similar findings were seen in Kovac SK *et al.* (1984). [15] In our study solitary case of pediatric craniopharyngioma showed nodular calcification. Tumor content are slightly higher in attenuation than CSF. It was well correlated with Fitz RC *et al.*[16]

CONCLUSION

CT proves to be a valuable modality of imaging in evaluating the distribution, features, localizing and assessing the extent of various intra and extra –axial tumors in the supratentorial region.

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