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Original Research Article

A histopathological spectrum of central nervous system lesion: Tertiary care hospital

Mital Bharatbhai Lakhani[1,2,*], Manisha Manish Shah[1,2], Heena Shailesh Parikh[1,2], Gena Kamal Ramchandani[1,2], Kuldeep Pravinbhai Prajapati[1,2]

[1] *Dept. of Pathology, S.S.G Hospital, Vadodara, Gujarat, India*
[2] *Medical College Baroda, Vadodara, Gujarat, India*

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ABSTRACT

Introduction: CNS lesions have variety in an aetiology like infections, neoplastic, inflammatory and any vascular malformation. With advance in neuro-imaging we can early recognise and diagnose it. Majority of patients with CNS neoplasms present clinically with headache, vomiting and/or seizures confusing with non-neoplastic lesions. So to differentiate between neoplastic and non-neoplastic lesions histopathological examination which is gold standard is required.

Materials and Methods: In period between January 2019 to April 2021, we have received total 69 CNS lesions biopsy and histopathological examination was done and they are classified according to WHO classification. All the data were collected retrospectively from Department of Pathology, Medical College, Baroda.

Results: Patient's age ranged from 45 days to 72 years. Out of total 69 cases, there were 15 were non-neoplastic lesions and 54 were neoplastic lesions. Among neoplastic lesions, 50 cases were primary CNS tumors and 04 cases were metastatic tumors.

Conclusion: Low grade CNS lesions were found to progress to high grade CNS tumours. Proper clinical history, neuroimaging study and exact histopathological diagnosis is essential to predict prognosis and treatment.

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1. Introduction

Human brain is considered to be the main centre of the body as it provides all the signals to organs to perform various functions.[1] Space occupying lesions of CNS have variety in an aetiology like infections, neoplastic, inflammatory and any vascular malformation. There for, it is of great importance to establish an accurate diagnosis for timely neurosurgical intervention.[2]

CNS can develop non-neoplastic space occupying lesions such as developmental malformation, cystic lesions and, infections. It can mimic tumour clinically and radiographically. Some of these lesions may require surgical resection. Recognition of any CNS lesions are necessary by clinically and imaging studies, because failing to differentiate between the nonneoplastic and neoplastic lesions may delay treatment in malignant tumours or result in unnecessary treatment in non-neoplastic lesions.[3]

A variety of non -neoplastic CNS lesion with diverse etiopathogenesis occurs. With advance in neuro-imaging we can early recognise and diagnose it.[3]

Most of non-neoplastic lesions are asymptomatic and they become symptomatic either by rupture, pressure or secondary inflammation. However, treatment and prognosis of these non-neoplastic lesions depends on type of the

* *Corresponding author*.
E-mail address: mitallakhani5.ml@gmail.com (M. B. Lakhani).

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lesions; hence, histopathological examination of these lesions are necessary despite radiological findings.

Brain tumour constitute <2% of all neoplasms. It has bimodal age distribution with a peak at childhood and adult age group of 45-70 years. In children CNS tumours are 2^{nd} most common tumours after leukemia.[4]

Majority of patients with CNS neoplasms present clinically with headache, vomiting and/or seizures confusing with non-neoplastic lesions. So to differentiate between neoplastic and non-neoplastic lesions histopathological examination is required. Some of them with atypical presentation, requires advanced neuro-radiological procedures such as Computed Tomography scan (CT scan) and/or Magnetic Resonance Imaging scan (MRI scan) to localise site of CNS lesions.[5]

The purpose of this study is to provide current overview of epidemiology of CNS lesions in our hospital setup and study the incidence of neoplastic lesions by using revised WHO classification 2016.

2. Materials and Methods

Retrospective study of total 69 CNS lesions was carried out in the Department of Pathology, Government Medical College and Hospital, Vadodara, Gujarat, India during period of January 2019 to April 2021.

2.1. *Inclusion criteria*

All CNS biopsies received in the department of pathology during the study period.

2.2. *Exclusion criteria*

Inadequate biopsies and poorly preserved tissue specimens were excluded from study.

2.3. *Data analysis*

Data was compiled in MS Excel, checked for its correctness and then analyzed.

2.4. *Method*

Biopsies of CNS lesions were preserved in 10%formalin, followed by fixation for 24 hours. Haematoxylin and Eosin stained sections of these CNS lesions were obtained by routine processing and paraffin embedding.

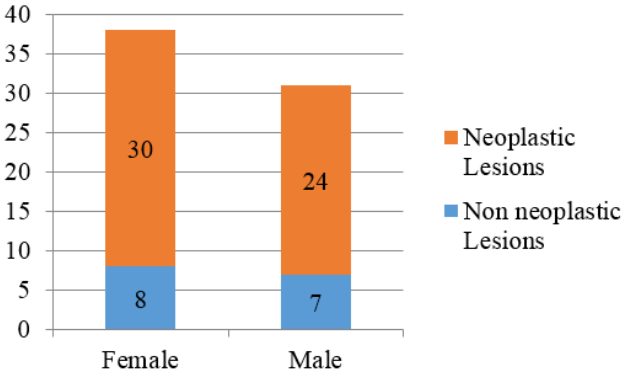
Clinical history of all cases was collected in a pretested proforma meeting the objectives of the study. Diagnosis is made in accordance with the WHO classification and diagnostic criteria for CNS neoplasms.

3. Result

Total 69 CNS lesion biopsies are examined during period of January 2019 to April 2021.

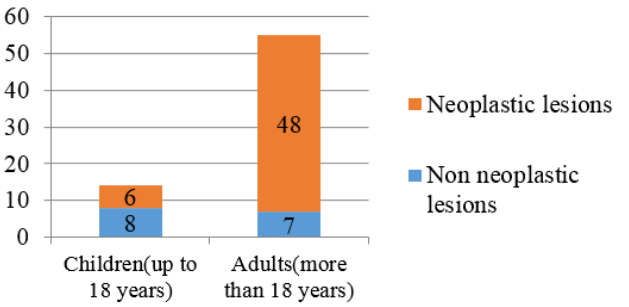
Out of total 69 cases, 54(78.26%) were neoplastic lesions and 15(21.74%) were non – neoplastic lesions.

Out of total 69 cases there were 38(55.07%) in female and 31(44.93%) in male. Out of total 38 biopsies from female patients, 30 were neoplastic and 08 were non-neoplastic. Out of the total 31 biopsies from male patients, 24 were neoplastic and 07 were non-neoplastic. (Graph 1)



Graph 1: Sex wise distribution of various CNS lesions.

Out of total 69 biopsies, 14(20.29%) were from children (up to 18 years) and 55(79.71%) were from adult(more than 18 years). In children out of total 14 cases, 06 were neoplastic and 08 were nonneoplastic. In adult out of total 55 cases, 48 cases were neoplastic and 07 cases were non-neoplastic. (Graph 2)



Graph 2: Age wise distribution of various CNS lesions

Headache, convulsion and midline swelling were the most frequent presenting symptoms (headache being the most common) of patients and radiological examination showed SOLs (space occupying lesions) in most of the cases. (Table 1)

Out of 54 cases, 50(92.59%) were primary CNS tumours and 04(7.40%) were metastatic CNS lesions. Among primary CNS tumours, majority cases were Astrocytic tumours (n=15), followed by sellar region tumour (n=09), Schwannomas (n=07) and Meningiomas (n=07). (Table 2)

Out of total of 69 cases, 15 (21.74%) cases were non-neoplastic. Majority cases were showing cystic lesions (n=7,

Table 1: Clinical presentations of CNS lesions.

Clinical features	Total no. of cases
Headache	19
Convulsion	12
Swelling	10
Difficulty in walking	08
Diminished vision	08
Vertigo	05
Generalised weakness	05
Difficulty in speaking	01
Hearing loss	01
Total	69

Table 2: Distribution and frequency of various neoplastic lesions.

Diagnosis according to who classification	Total no. of cases
Diffuse astrocytic and oligodendroglial tumors	(14)
1). Diffuse astrocytoma	02
2). Anaplastic astrocytoma	02
3). Glioblastoma	08
4). Oligodendroglioma	02
Other astrocytic tumors	
Pilocytic astrocytoma	03
Ependymal tumors	
Myxopapillary ependymoma	01
Tumors of meninges	
Meningioma	07
Tumors of cranial & paraspinal nerves	
Schwannomas	07
Choroid plexus tumors	
Choroid plexus papilloma	02
Embryonal tumour	
Medulloblastoma	02
Neuronal and mixed neuronal-glial tumors	(04)
1). Ganglioglioma	02
2). Central neurocytoma	01
3). Diffuse leptomeningeal glioneuronal tumour	01
Mesenchymal non-meningothelial tumors	
Hemangioblastoma	01
Tumors of sellar region	(09)
1). Craniopharyngioma	03
2). Pituitary adenoma	06
Metastatic tumors	04
Total	54

46.67%) and developmental malformation (n=6,40.00%). (Table 3)

4. Discussion

The present study shows that 69 cases of CNS lesions share many of the features common with other published series (Table 4). Patients' age ranged from 45 days to 72 years.

Table 3: Distribution and frequency of various non-neoplastic lesions.

Diagnosis according to who classification	Total no of cases
Developmental malformation	(06)
1)Lipomeningomyelocele	02
2)Meningomyelocele	03
3)Meningocele	01
Granulomatous lesions	01
Cystic lesions	(07)
1)Dermoid cyst	01
2)Epidermoid cyst	04
3)Arachnoid cyst	02
Hemangioma	01
Total	15

The most common presenting symptom in present series was headache which is supported by the findings of many other studies as well.[5,7,10]. In non-neoplastic lesions, frequency of cystic lesions of CNS in the present study (n=7) compared well with other studies,[5,10] which also revealed epidermoid cyst to be the predominant cystic lesion.

In the present study, tumours of the neuroepithelial origin (n=27,50%) represented maximum number of cases of intracranial neoplasms amongst all primary CNS tumours - in close agreement with observations made in various other studies by Ajay S T et al, Nidhi V S et al and T.S. Surawicz et al.[6,7,9]

The studies by CH Lee et al (19.4%) and Aryal G (38.6%)., showed lower relative frequencies of neuroepithelial tumours[8,11].

Astrocytoma constituted predominantly 22.22% of all CNS neoplasms which is comparable to 26.15%, 27.4% and 29.46% incidence reported by Nidhi S et al, Himanshu J et al and Jay P et al.[1,5,7] The relative frequency of 12.9% of tumours of cranial and paraspinal nerves in the present study is in close agreement with other studies which reported 16.92% (Nidhi S et al.), 16.0% (Ajay S et al.) and 11.1% (CH Lee et al.).[7,8] However, choroid plexus papilloma constituted 3.7% in a similar way in studies done by Nidhi S et al but differed from other studies done by Kailash C J et al which was 1.69%.[7,12]

The relative frequency of pituitary tumours in the present study was 16.67%, in close agreement with study done by CH Lee et at in Korea, which showed a relative frequency of 15.8%.[8] This difference in relative frequencies of different CNS lesions in the present study with other similar published studies may be attributed to differences in sample size, population and regional characteristics. Cystic lesions and developmental malformations were the predominant non-neoplastic lesions of present study.

Five most common primary site for malignant CNS tumour is lung, breast, skin (melanoma), kidney and

Table 4: Comparison of present study with different another CNS lesions study.

	Present study	Jay Prakash et al [1]	Ajay S T et al [6]	Nidhi V S Et al [7]	Himanshu J et al [5]	Chang-Hyun L et al [8]	T,S, Surawicz [9]
Neuroepithelial tumours	27 (50%)	57 (50.89%)	127 (47.20%)	22 (43.13%)	33 (53.20%)	1102 (19.4%)	10635 (51.21%)
Meningeal tumours	07 (12.96%)	21 (18.75%)	59 (21.93%)	13 (25.49%)	12 (19.40%)	1775 (31.2%)	5257 (25.32%)
Tumours of cranial & paraspinal nerves	07 (12.96%)	19 (16.96%)	42 (15.60%)	11 (21.57%)	14 (22.60%)	634 (11.1%)	1357 (6.53%)
Pituitary Tumours	09 (16.67%)	05 (4.46%)	36 (13.38%)	04 (7.84%)	2 (3.20%)	901 (15.8%)	1853 (8.92%)
Metastatic tumours	04 (7.41%)	10 (8.92%)	3 (1.10%)	01 (1.96%)	1 (1.60%)		

gastrointestinal tract.[4] In present study also out of total 4 metastatic CNS tumours 2 were from Breast and 1 from skin had been reported.[13]

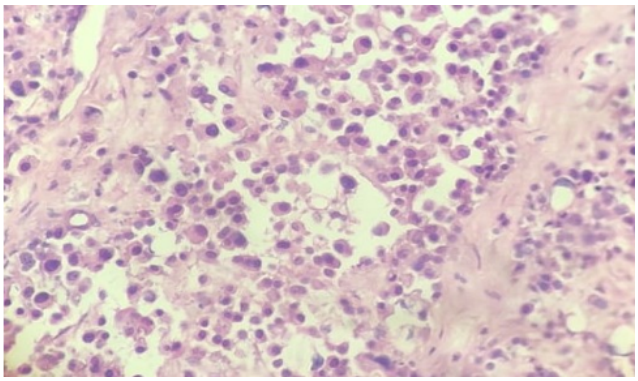


Fig. 1: Metastatic CNS lesions, highly discohesive cells are seen in groups. Some of cells are also show signet ring appearance. Metastatic cells most likely from lobular carcinoma of breast. (H&E x 100)

A variety of tumours occurs in CNS, but still accounts for less than 2% of all malignancies. But because of their location and mass effects, they generally have a poor prognosis.[8,14]

5. Conclusion

In Central nervous system lesions Low grade tumours include low-grade astrocytoma, oligodendroglioma and mixed tumours, have been found over time to progress to high grade tumours. The time varies depending on the genetic and morphological makeup of the tumours. The same can be determined by proper examination of surgical specimen. Incidence and pattern of CNS neoplasm are subject to considerable geographical and racial variations. The availability of clinical information and neuro imaging techniques like CT scan and MRI imaging are of considerable importance for final histopathological

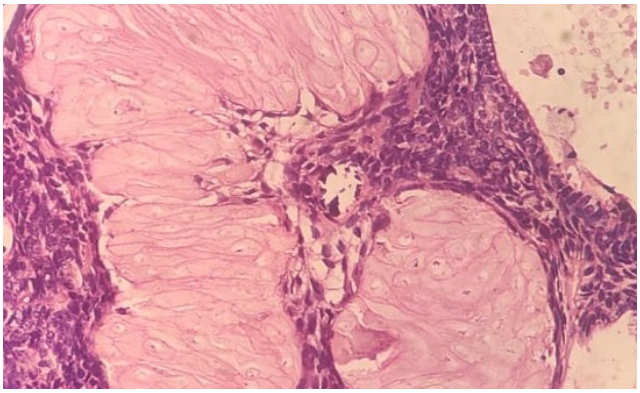


Fig. 2: Craniopharyngioma, cords and lobules of well differentiated squamous cells and nodules of plump, anucleate squamous cells and wet keratin.(H&E x 100)

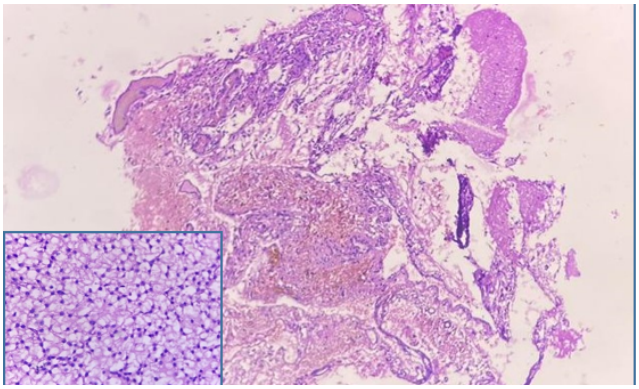


Fig. 3: Diffuse Leptomeningeal Glioneuronal Tumour, Infiltration of leptomeninges by scattered cells with round nuclei and clear cytoplasm without significant atypia and mitosis. (H&E x 100)

diagnosis. The exact histopathological diagnosis of CNS lesions is essential to predict the prognosis and treatment because prognosis of high-grade tumour is grave and few of the patients may not even survive one year after diagnosis.

6. Conflict of Interest

None.

7. Source of Funding

None.

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Author biography

Mital Bharatbhai Lakhani, Senior Resident https://orcid.org/0000-0002-0695-9728

Manisha Manish Shah, Associate Professor

Heena Shailesh Parikh, Associate Professor

Gena Kamal Ramchandani, Associate Professor

Kuldeep Pravinbhai Prajapati, Senior Resident

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