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Clinopathological Study of Primary Central Nervous System Tumors

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Abstract:
Background: *The CNS tumours have become one among the leading cause of cancer death in the present days. This study was conducted with an objective of correlating the clinical features with histopathological characteristics of the primary CNS tumours and to classified the primary CNS tumors based on World Health Organization (WHO) 2021 classification.*
Materials and Methods: *A total of 60 cases of primary central nervous system tumors were studied retrospectively over the period from July 2020 to Dec 2021 in Pathology department of Smt. N.H.L. medical college.Data regarding clinical presentation of all cases were collected and Histopathological diagnosis was correlated with clinical diagnosis. .*
Results: *Maximum numbers of patients are in age group 41-50 years. Males(58.4%)are more frequently affected as compared to female. Headache and vomiting were most common clinical presentation(41.67%). Out of 60 cases of primary central nervous system tumors, Gliomas(38.3%) were most common and Meningeal tumors (33.4%) were second most common tumor in this present study.*
Conclusion: *In the present study, a systematic analysis of primary central nervous system tumour has been done. The present study also showed a significant correlation with that of other studies. Despite of having modern imaging technique, the histopathological examination remains as the gold standard in diagnosing CNS tumours*

Key words: *CNS Tumors, Histopathological subtypes, Incidence*

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I. Introduction

Central nervous system (CNS) tumors accounts for 2% to 5% of all tumors in the human body.Among these tumors, 80% involve the brain and 20% involve the spinal cord. The CNS tumors have become one among the leading cause of cancer death in the present days.[1] Preoperative evaluation of patients by MRI or CT scan are essential for the optimal management of the patients, but definite diagnosis can be done only by the study of histological sections. [2][3]The exact histopathological diagnosis of CNS tumors using newer diagnostic criteria and techniques such as use of histochemical stain and immunohistochemistry (IHC) has played a major role in differential diagnosis and improving diagnostic accuracy which is essential to predict the grading and the prognosis.[4]

II. Aims and Objectives

1. To analysed histopathological spectrum of CNS tumors
2. To find out incidence of various types of CNS tumors with regard to site, age and gender distribution
3. To categorize the tumors according to W.H.O (2021) classification of central nervous system tumors.

III. Material and Method

Source of data:

This study of 60 cases of primary central nervous system tumors was done inDepartment of Pathology at SVP Hospital, ahmedabad from July 2020 to Dec 2021. All thebiopsies were obtained from neurosurgery department. They were processed by standard routine parafin embedding technique and stained by Hematoxylin and eosin stain. Complete clinical history, clinical and radiological diagnosis were noted down in all the cases.

Inclusion criteria:

All CNS biopsy specimens with radiological diagnosis of CNS Tumors referred to the SVP hospital for histopathological evaluation during the study period will be considered in this study.

Exclusion criteria:

post-therapeutic, metastatic and recurrent tumors are excluded from this study.

IV. Result

The study is based on evaluation of Clino-pathologicalspectrum of CNS tumors in the all biopsies that received at Pathology department of SVP hospital from July 2020 to Dec 2021. A total of 60 casesof Central nervous system biopsies were received, and histopathological examinationwas performed.

Table 1: Age wise distribution of Primary CNS tumor

Histological types	Age group (years)								
	0-10 year	11-20 year	21-30 year	31-40 year	41-50 year	51-60 year	61-70 year	71-80 year	81-90 year
Gliomas	1	4	2	5	4	4	2	1	
Glioneuronal and neuronal tumor		1							
Ependymal tumor				4					
Embryonal Tumor	1								
Cranial and paraspinal nerve tumor			5						
Meningeal tumor		1			10	5	4		
Tumor of sellar region			1	1	4				
Total	2	6	8	10	18	9	6	1	-

Majority of tumor belong to the age group of 31-60 years.In our study we had not received any biopsy of age greater than 80 years.[Table 1]

Table 2: Gender wise distribution of Primary CNS tumor

Histological types	Gender	
	Male	Female
Gliomas	15	8
Glioneuronal and neuronal tumor	1	
Ependymal tumor	4	
Embryonal Tumor	1	
Cranial and paraspinal nerve tumor	4	1
Meningeal tumor	8	12
Tumor of sellar region	2	4
Total	**35 (58.4%)**	**25(41.6%)**

Males (58.4 %)were more affected than Females(41.6 %) with male to female ratio was 1.4:1. In present study, maximum numbers of Gliomas occur in Male , while female preponderance was seen in Meningiomas. Table 2]

Commonest clinical presentation for primary central nervous system tumor were headache and vomiting (41.67%) only or associated with seizure(23.3%), gait instability(16.67%), vision disturbances(10%)and motor weakness(8.4%).

According to site of involvement, majority of tumours were superatentorial (43 cases, 71.67%).Among all the supratentorialtumors, 24 cases (40%) were arise from the frontal lobe, which was the most common location of primary central nervous system tumours. There were 17 cases (28.3%) were of infratentorialin location.

Table 3: Histopathological Diagnosis of primary CNS tumor according to WHO classification 2021,5th edition

Histological types	Subtypes	WHO GRADE I	WHO GRADE II	WHO GRADE IV	No of cases
Gliomas [Total cases : 23] (38.3%)	(1) ADULT TYPE DIFFUSE GLIOMA [16 cases]				
	Astrocytoma	1	4	-	5
	Oligodendroglioma	-	4	-	4
	Glioblastoma	-	-	7	7
	(2) PEDIATRIC TYPE DIFFUSE LOW GRADE GLIOMA [02 cases]				
	Diffuse Astrocytoma	2	-	-	2
	(3) PEDIATRIC TYPE DIFFUSE HIGH GRADE GLIOMA [01 cases]				
	High grade glioma	-	1	-	1
	(4) CIRCUMSCRIBED ASTROCYTIC GLIOMAS [04 cases]				
		3	-	-	3
	Pilocyticastrocytoma	1	-	-	1
	Subependymalastrocytoma				
Glioneuronal and neuronal tumor [Total cases: 01] (1.67 %)	Gangliogliomas	1	-	-	1
Ependymal tumor [Total cases: 04] (6.67 %)	Myxopapillaryependymoma	-	1	-	1
	Ependymal tumor	-	1	-	1
	Giant cell ependymoma	-	1	-	1
	Subependymoma	1	-	-	1
Embryonal Tumor [Total cases: 01] (1.67%)	Medulloblastoma	-	1	-	1
Cranial and paraspinal nerve tumor [Total cases: 05] (8.3 %)	Schwannoma	5	-	-	5
Meningeal tumor [Total cases: 20] (33.4 %)	Meningiomas	18	2	-	20
Tumor of sellar region [Total cases: 06] (10%)	Pitutary adenoma	3	2	-	5
	Papillary craniopharyngioma	1	-	-	1
Total cases : 60 (100%)		**36**	**17**	**07**	**60**

Among 60 cases of primary central nervous system tumors, most common tumors in our present sudy were gliomas 23 case(38.3%) Followed by Meningeal tumors 20 cases (33.4%).

Out of all the gliomas, Most frequent type was glioblastoma grade(IV) 7 cases (11.65%) and second most frequent type was astrocytoma 5 cases (8.32 %). Among the cases of astrocytoma, 4 cases were of grade II and 1 case was of grade I. According to WHO 2021 claasification, 5th edition Adult type diffuse glioma was the most common subtype of glioma seen in our present study.

From the 20 cases of Meningiomas, 18 cases were of grade I and only 2 cases were of grade II.

In our study, Majority of cases of primary CNS tumors were included in WHO grade I category (36 cases). 17 cases were included in WHO grade II category, while in WHO grade IV category 7 cases were included. Not a single case of WHO grade III category was found in present study.

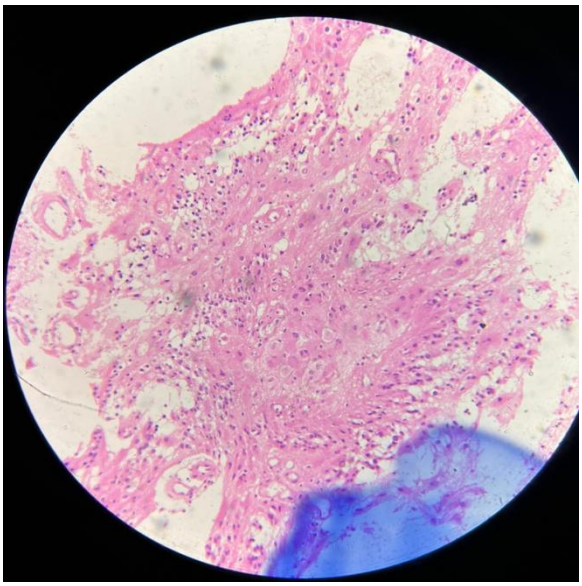

Figure 1: Diffuse Astrocytoma[H&E stain 10 x]

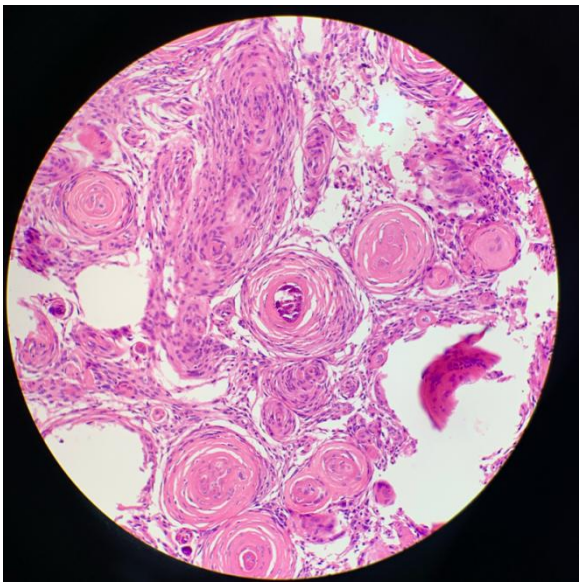

Figure 2: Meningioma [H&E stain 10x]

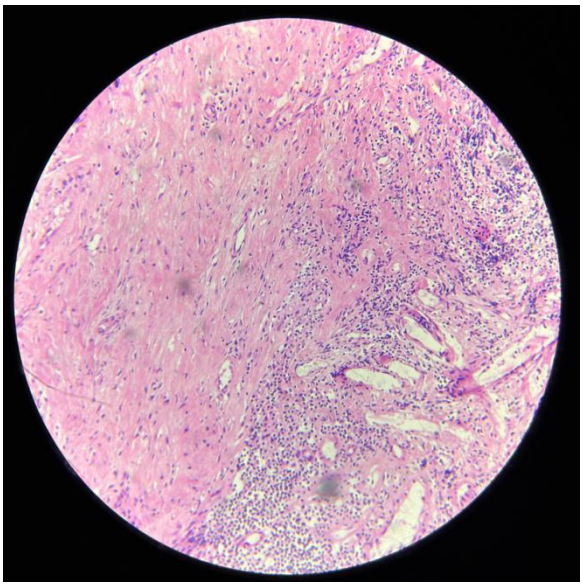

Figure 3: SCHWANNOMA[H & E stain 10 x]

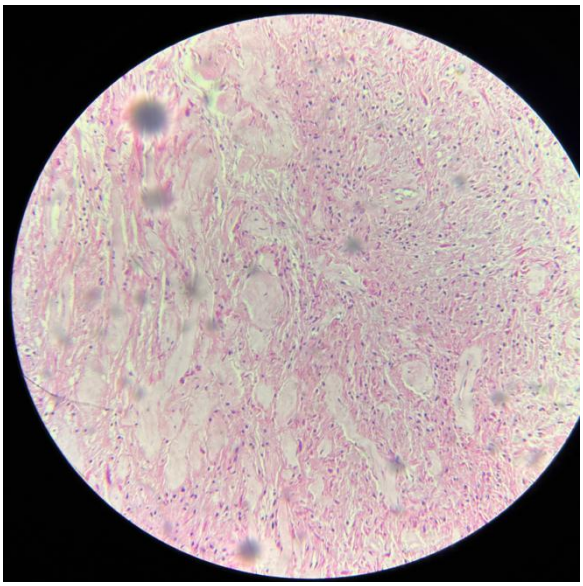

Figure 4: Pilocytic astrocytoma [H&E stain 10 x]

V. Discussion

Source of data:

This study of 60 cases of primary central nervous system tumors was done inDepartment of Pathology at SVP Hospital, ahmedabad from July 2020 to Dec 2021. All thebiopsies were obtained from neurosurgery department. They were processed by standard routine parafin embedding technique and stained by Hematoxylin and eosin stain. Complete clinical history, clinical and radiological diagnosis were noted down in all the cases.

The primary CNS Tumors refer to a heterogeneous group of tumors arising from cells within the CNS and can be benign and malignant. Malignant primary brain Tumor remain among the most difficult cancer to treat, with a 5 yearoverall survival no greater than 35%.[5]The most common malignant primary brainTumor in adult is Gliomas. Globally, there is a large variability in the trends of braintumor diagnoses given the vast different histological subtypes.[6]

Hence, it is of paramount importance to diagnose CNS lesions withaccuracy. Tumors of the nervous system are classified by the WorldHealth Organization (WHO),2021, fifth edition classfication as Gliomas,Glioneuronal and neuronal tumor, Ependymal tumor, Embryonal tumor,Pinealtumors, Cranial and paraspinal nerve tumors, Meningiomas,Mesenchymal and non meningothelialtumors, Tumors of sellar regionsAnd Metastases to the CNS. The emergence of new entities is a reflection of our increasingability to parse large categories of tumours into more refined, clinicallyand biologically meaningful subtypes for patient prognosis and treatmentstratification.

The present study being a clinopathology based research study. It provides a primary baseline tool to workup for future population targeted studies on brain tumors.It also served the purpose of providing basic demographic andclinicopathological data, which can be compared with available studies in the literature.

Table 4: Comparison of maximum numbers of cases in Age group wise distribution

	PRESENT STUDY	Jaiswal J et al. [7]	Kadaru MR et al.[12]
Common age group	41-50 years	31-40 years	41-50 years

The peak age of occurrence was noted in the age group of 41-50 years in present study.Similar findings was seen in Kadaru MR et al. Study, while In Jaiswal J et al. Study found the most common age group to be 31-40 years. [Table 4]

Table 5: Male to female ratio comparison with other studies

	Present study	Jaiswal J et al.[7]	Masoodi T et al. [9]
M:F ratio	1.4 : 1	1.3 : 1	1.12 : 1

In our study, M:F ratio observed was 1.4:1. Studies conducted by Jaiswal J et al. and Masoodi T et al. Showed M:F ratio of 1.3:1 and 1.12:1 respectively. [Table 5]

Frontal lobe (40%) was found the most common site for the primary CNS tumors in this study. Similar findings was observed in krishnatreya M et al. study.

Table 6: Comparison of histopathological diagnosis according to WHO classification 2021, fifth edition

	Present study	Patil MB et al. [10]	CBTRUS study[11]
Gliomas	38.3 %	33.01 %	19.8 %
Glioneuronal and neuronal Tumor	1.67 %	0 %	1.20 %
Ependymal Tumor	6.67 %	0.94 %	1.70 %
Cranial and paraspinal nerve Tumor	8.3 %	21.69 %	8.60 %
Meningeal Tumor	33.4 %	13.20 %	37.60 %
Tumor of sellar region	10 %	7.54 %	17.50 %

In present study, Most common primary CNS Tumor found was gliomas(38.3%). Study conducted by Patil MB et al. also found gliomas(33.01%) was most common, while in CBTRUS study Meningeal Tumor(37.60%) was found more common than other primary CNS Tumor. Embryonal Tumors were not included in Patil MB et al. and CBTRUS study. [table 6]

Table 7: Comparison of Primary CNS tumors distribution according to WHO grades

	Present study	Jat et al. Study [13]
WHO grade I	60 %	32.70 %
WHO grade II	28.3 %	29.10 %
WHO grade IV	11.7 %	32.70 %

In present study, 60 cases were graded according to WHO classificationmost common was grade I (60%) followed by Grade II and Grade IV had 28.3 % and 11.7 % respectively, No any case of grade III was found.In Jat et al. Study found majority of cases were belong to Grade I (32.70%) and grade IV (32.70 %), followed by grade Grade II (29.10 %). [table 7]

VI. Conclusion

The exact histopathological diagnosis ofCNS tumors using newer diagnostic criteria, techniques like use ofhistochemical stain, immunohistochemistry (IHC)and molecular signaturegene results has played major role in differentialdiagnosis and improvingdiagnostic accuracy which is essential to predict the grading andprognosis.Despite of having modern imaging technique, the histopathological examination remains as the gold standard in diagnosing CNS tumours.

References

[1]. Moliah N, Baki A,Afzal N, Hossen A. Clinical and Pathological Characteristics of Brain Tumor.BSMMU J 2010;3(2):68-71
[2]. Patty ISH. Central Nervous System Tumors -A clinicopathologicalstudy.JDohukUniv 2008;11(1):173-180.
[3]. Kerr PB,Caputy AJ, Horwitz NH.A history of cerebral localization.Neurosurg Focus 2005;18(4).
[4]. Louis DN, Perry A, Reifenberger G, von Deimling A, Figarella-Branger D, Cavenee WK, Ohgaki H, Wiestler OD, Kleihues P, Ellison DV. The 2016 World Health Organization Classification of Tumors of the Central Nervous System: a summary. Acta Neuropathol. 2016 Jun;131(6):803-20, do: 10.1007/s00401-016-1545-1. Epub 2016 May 9. PMID: 27157931.

[5]. Jibrin P, Ibebuike K, Ado-Wanka AN. Histo-pathological pattern of intracranial tumours in the National Hospital, Abuja, Afr Health Sci. 2018 Jun;18(2):281-286. doi:10.4314/ahs.v1812.12. PMID: 30602954; PMCID: PMC6306972.
[6]. Arora RS, Alston RD, Eden TO, Estlin EJ, Moran A, Birch JM. Age-incidence patterns of primary CNS tumors in children, adolescents, and adults in England. Neuro Oncol. 2009;11:403–13.
[7]. Jaiswal J, Shastry AH, Ramesh A, Chickabasaviah YT, Arimappamagan A, Santosh V, Spectrum of primary intracranial tumours at a tertiary care neurological institute: A hospital based brain tumour registry Neurol India 2016 64:494-501.
[8]. Krishnatreya M, Kataki AC, Sharma JD, Bhattacharyya M, Nandy P, Hazarika M, Brief descriptive epidemiology of primary malignant brain tumours from North-East India Asian Pac J Cancer Prev 2014 15(22):9871-73.
[9]. MasoodiTamkeen. Pattern of Central Nervous SystemNeoplasms: A study of 106 Cases-Epidemiology, JK-Practitioner. 2012;17(4).
[10]. Patil M, Karandikar M. Retrospective analysis of intracranial and intraspinal space-occupying lesions at a tertiary care center: A 5-Year study. Journal of DattaMeghe Institute of Medical Sciences University.2018;13(4):175.
[11]. Ostrom QT, Cioffi G, et al... CBTRUS Statistical Report: Primary Brain and Other Central Nervous System Tumors Diagnosed in the United States in 2012–2016. Neuro- Oncology. 2019 Oct;21(Supplement_5):v1–100.
[12]. Reddy Kadaru M. Clinico-pathological study of centralnervous system tumors. Indian Joumal of Pathology andOncology- 2019 Aug 15;6(3):393-9.
[13]. Jatt K, Vyash S,Bihari N. Mehra K.Centralnervous system tumour: ahistopathological study.Int J Res Med Sci. 2016;4(5):1539-45.

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