



HISTOPATHOLOGICAL SPECTRUM OF CENTRAL NERVOUS SYSTEM TUMORS

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ABSTRACT

Background: Central nervous system (CNS) tumors are considered as most notorious in all types of cancers. Incidence of CNS tumors in developing countries is lower as compared to developed countries, but increased rate has been observed in both. The aim of the study was to highlight the incidence and histological spectrum of CNS tumors in our region, to diagnose and classify CNS tumors according to WHO classification. **Material and Methods:** this retrospective histological analysis of CNS tumors was carried out in the department of pathology from July 2015 to June 2018. During this period, a total of 305 neurosurgical specimens were received in the department. The specimens were processed by routine histotechniques and immunohistochemistry was performed whenever required. The diagnosed CNS tumors were studied and classified according to WHO classification. **Results:** among 305 cases, astrocytomas (37%) were commonest followed by meningiomas (26%). Cranial and spinal nerve sheath tumors (11%) and metastatic tumors (9%) were encountered. Tumors were seen in all age groups but mean age group affected was 41-50yrs accounting for 79(26%) cases. Male to female ratio of 1:1.4 was noted with female preponderance. **Conclusion:** the present study helps to provide information regarding the burden of disease in our area. Despite the use of modern imaging technique that helps in provisional diagnosis of disease, histological examination is gold standard in diagnosis of varied types. Further utility of immunochemistry aids in confirmation and prognosis of disease.

KEYWORDS : CNS tumors, Glioma, Meningioma, Histopathology, Immunohistochemistry.

INTRODUCTION

With the variation in histopathology, tumors of CNS differ from other body part tumors. The incidence in 2002 was 3.7 per lacs in male and 2.6 per lacs in females. The frequency was higher in developed countries than in developing countries¹. The most important symptoms include headache and vomiting. The headache being classically worse in the morning fades away with vomiting. Other symptoms include seizures, altered vision. Speaking and walking difficulties, abnormal sensation may be observed. Unconsciousness may occur in severe cases². With increased availability of diagnostic facilities and better healthcare, the incidence of CNS tumors seems to be on the rise in developing countries. All the CNS tumors were divided into seven categories: Tumors of neuroepithelial tissue; tumors of the cranial and paraspinal nerves; tumors of the meninges; lymphomas and hematopoietic neoplasms; germ cell tumors; tumors of sellar region and metastatic tumors³. This study determined the type of brain tumor in study population.

Materials & Methods

This retrospective study was done in Department of Pathology over a period of three years from July 2016 to June 2018 on neurosurgical biopsies received from department of Neurosurgery. A total of 305 biopsies of CNS tumors were received. Patients clinical data including details of imaging investigations and perioperative findings were obtained in all cases. Gross features of all specimens assessed and processed by routine paraffin embedding techniques. Sections were stained with H&E technique, histological characterization was done with WHO classification. Immunohistochemistry (IHC) was done whenever required. Final results were analyzed and data was prepared to study histological patterns of CNS tumors with age and sex distribution in our area.

Results

Among 305 cases, astrocytomas (37%) were commonest followed by meningiomas (26%). Cranial and spinal nerve sheath tumors (11%) and metastatic tumors (9%) were encountered. Tumors were seen in all age groups but mean age group affected was 41-50yrs accounting for 79(26%) cases. Male to female ratio of 1:1.4 was noted with female preponderance.

Tumors of neuroepithelial tissue

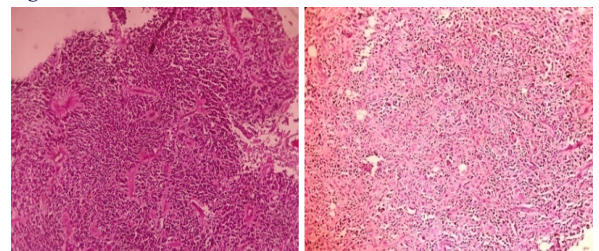
Among the 146 tumors of neuroepithelial tissue, astrocytoma was the most common histological type(112cases,37%) followed by embryonal tumors(19cases,6%), oligodendroglioma (6cases,2%),

ependymoma(6cases,2%) and choroidplexus papilloma(3case, 1%). The most common type of astrocytoma was WHO grade IV type

TABLE 1: HISTOLOGICAL SPECTRUM AND GENDER WISE DISTRIBUTION OF CNS TUMORS

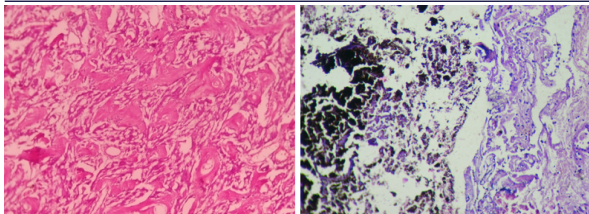
TYPE	MALE		FEMALE		TOTAL		M:F
	NO	%	NO	%	NO	%	
ASTROCYTOMAS	68	60	44	40	112	37	3:2
MENINGIOMAS	22	26	60	73	82	26	1:3
SCHWANNOMA	9	26	25	73	34	11	1:3
SECONDARIES	15	50	15	50	30	9	1:1
EMBRYONAL TUMORS	10	52	9	48	19	6	1:1
EPENDYMOMAS	1	20	4	80	5	1	1:4
MESENCHYMAL TUMORS	3	50	3	50	6	1	1:1
SELLAR	3	50	3	50	6	1	1:1
LYMPHOMAS	2	66	1	33	3	1	2:1
CHOROID PLEXUS PAPILOMA	2	66	1	33	3	1	2:1
NEUROCYTOMA	-	-	2	100	2	1	-
MELANOMA	1	100	-	-	1	1	-
ASTROBLASTOMA	1	100	-	-	1	1	-
TERATOMA	-	-	1	100	1	1	-
TOTAL	137	44	168	56	305	100	5:7

Figures: some rare cases of CNS tumors



1)Astroblastoma

2)Anaplastic pleomorphic xanthoastrocytoma



3) Metaplastic meningioma 4) Meningeal melanoma Tumors of non-glial tissue

Of the 82 cases of meningeal tumors, there were 72 cases of grade I (88%), grade II were 6 cases (7%) remaining were grade III (5%) with high risk of recurrence. The nerve sheath tumors consist of 34 cases. Among haematopoietic tumors 3 cases of lymphoma and 1 case of cavernous hemangioma. Both cases of craniopharyngioma were adamantomatous type consisting of broad strands, cords and bridges of a multistratified squamous epithelium with peripheral palisading of nuclei. Rare cases like teratoma and melanoma were noticed.

Metastatic tumors

Among the metastatic tumors, the most common histological type was adenocarcinoma. There was 1 case of hepatocellular carcinoma and 1 case of transitional cell carcinoma noted.

DISCUSSION

CNS is the host of the greatest variety of tumors, accounting for less than 2% of all malignancies and because of their location they have a guarded prognosis³⁵. However the pathogenesis of spontaneously occurring CNS neoplasms in man is unknown, but recently there is an increased incidence of CNS lymphoma observed due to AIDS pandemic.

In our study, we noticed that astrocytoma (37%) is the most common tumour followed by meningioma (26%), studies from other countries in the world showed that most common CNS tumours were astrocytomas in United states (49.6%)⁷, Germany (41.7%)⁷, Croatia (58.%)⁸ and from India Dastur and Lalita et al⁹; published some similar results in their study. Similarly in our study incidence of CNS tumors were in accordance with various literatures published in India and Worldwide.

TABLE2: SHOWING THE INCIDENCE OF CNS TUMORS IN COMPARISON WITH OTHER STUDIES

Histological type	Present study India	Shivraj Nagnath et al India	Verma et al India	Monga K et al India	Aryal G et al Nepal	Lee et al Korea	Katsu et al Japan
Neuroepithelial tumors	48%	34.21	61.6	51.42	38.6	17.7	31.68
Meningeal tumours	26%	39.47	14.8	17.14	14	30.6	15.71
Cranial nerve tumours	11%	18.42	4.95	4.28	5.2	11.1	11.85
Metastatic tumours	9%	5.26	3.89	1.42	14	-	4.28

In present study, out of 112 cases of astrocytoma, Grade IV astrocytoma (60%) were more common followed by grade II, grade I and grade III. Late presentation of our patients to the hospital could be the main cause of getting high grade astrocytomas in our study. This grading of tumour improves the prognosis of patients, aids the neurosurgeon in choosing chemo or radiotherapy. Neuroepithelial tumors could be found in any age group from infancy to over 70 years with most of them occurring in the 4th decade of life¹⁰.

In our study CNS tumors were commonly seen in fifth decade (41-50 years) followed by sixth decade and fourth decade, this finding was correlated with Jat KC et al¹¹ and Renu thambi et al¹².

There is in general male preponderance in most parts of the world including Indian subcontinent where sex ratio was found to be 2.2:1. Males were affected more than females, where as in our study female preponderance is noted with male to female ratio being 1:1.4, in contrast to previously published Indian and foreign studies but in accordance with the findings of Aryal G (0.91)¹³ and Lee et al (1:1.43)¹⁴

CNS tumors are heterogeneous as most of them differ in histomorphological features. Though there is availability of advanced imaging techniques, histopathological examination is gold standard in diagnosis of them. Sometimes there may be a diagnostic dilemma in pathologist mind due to overlapping histomorphological features in benign as well as certain non-neoplastic lesions which mimic many brain tumours. Use of immunohistochemistry becomes authoritative in such cases for confirmatory diagnosis of brain tumours. In the present study use of IHC helped us to diagnose the anaplastic meningioma in a middle aged woman, which was clinically and radiologically diagnosed as a metastatic lesion. On histology it displayed the morphology and features of poorly differentiated carcinomatous deposit, later on, we confirmed it by using IHC markers as anaplastic meningioma.

Conclusion

Primary CNS tumors are heterogenous, comprising a large spectrum of different tumour entities associated with distinct biological background and disease course. Histological study helps in knowing their epidemiology and burden of disease in community. From practical point of view, an accurate diagnosis of brain tumour is possible after careful assessment of histomorphological features along with clinical and radiological imaging information. Though the conventional H and E staining is the mainstay for pathological diagnosis, IHC also plays a major role in differential diagnosis and improving diagnostic accuracy in Neuro-oncologic pathology

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