ORIGINAL RESEARCH PAPER

Pathology

HISTOPATHOLOGICAL STUDY OF CNS TUMOURS: A 3-YEAR STUDY IN A TERTIARY CARE CENTER IN INDIA

KEY WORDS: CNS, Astrocytoma, Meningioma.

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ABSTRACT

Introduction: Central nervous system (CNS) tumours represent a major public health problem and majority of patients die within first year of diagnosis of malignant lesion. The aim of this study was to observe recent incidence of different CNS tumours and to study clinical and histopathological spectrum in Ajmer zone.
Material & methods: The present study was conducted for a period of 3 years period from 2015 to 2017.
Results & conclusions: We studied 102 patients diagnosed with CNS tumors making 1.58% of total tumour burden. CNS tumours were more common in males (65.69%) and mean age was 38.21 years. CNS tumours were common in Frontal lobe (19.6%). Majority of tumours accounted for neuroepithelial tissue (62.75%) in which most common tumour subtypes were glioblastoma and diffuse astrocytoma. Since CNS tumours tend to present with a common set of clinical symptoms histopathological study is always required to arrive at correct diagnosis.

INTRODUCTION

Central nervous system neoplasms represent a unique, heterogeneous population of neoplasms and include both benign and malignant tumors. The tumors of CNS are reported to be less than 2% of all malignancies.[1] In India, tumors of the CNS constitute about 1.9% of all tumors.[2] The majority of patients die within first year of diagnosis of malignant lesion and less than 3% survive more than 3 years.[3] Signs and symptoms of intracranial tumors depend on the size of tumor, its location and its rate of growth.[4]

Our study is aimed to study the burden of central nervous system tumours and their morphological pattern, age and sex incidence in Ajmer region, and Also to correlate histopathological diagnosis with clinical and radiological findings.

MATERIALS AND METHODS

The present study was conducted for a period of 3 years, 2015 - 2017 in the Department of Pathology, J.L.N. Medical College and Associated group of hospitals, Ajmer on the patients admitted in the neurosurgery department. All the patients having intracranial space occupying and intraspinal neoplastic lesion were included in the study. All the sections were processed by fixation, dehydration, and clearing followed by impregnation with wax and cut in 5-6 µ sections & stained by hematoxylin and eosin stain. Diagnosis was done and tumors were classified according to the W.H.O classification (2016). Data were retrieved like hospital registration number, patient's name, age, sex, site and exact location of the tumour, physical signs and symptoms and X-Ray, CT, MRI, and intraoperative findings.

RESULTS:

We analysed our 102 cases according to age, sex, consistency, site, side of CNS involved, diagnosis and their grading according WHO 2016 classification. A total of 18841 specimens were received in the histopathology department during 2015 to 2017. 6452 of these were the tumour of all types, out of which 102 cases were CNS tumours, making 1.58% of total tumour burden.

Our study showed, CNS tumours were more common in males (67 cases, 65.69%) than females (35 cases, 34.31%). Overall male to female ratio was.1.91:1(Chart1A). The youngest patient in this study was 2 years and the oldest was 71 years of age. Maximum incidence of CNS tumours was in 4th decade (23 cases, 22.5%) and mean age was 38.21 years (Chart1B).

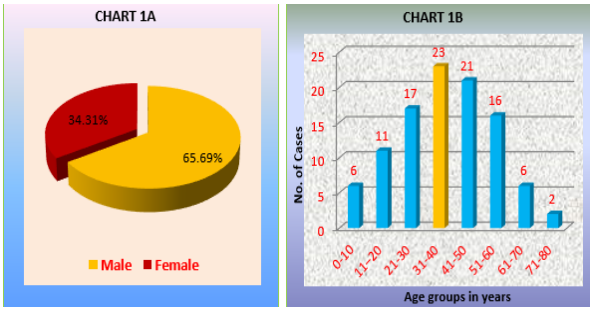

Chart 1A: distribution of CNS tumours among male and female population and chart 1B age wise distribution of different CNS tumours

Frontal lobe (20 cases, 19.60%) was found to be the most common location for CNS tumours followed by spinal cord (14 cases, 13.72%). CNS tumours were more common in midline or bilateral side (45 cases, 44.12%), followed by right side (39 cases, 38.23%) then left side (18 cases, 17.65%). Among 102 cases of CNS, 88 (86.27%) cases were intracranial (brain) in location and 14 (13.73%) were intra spinal (spinal cord) in location. Headache was the commonest first symptom (48.04%) followed by seizure (31.37%) and vomiting (23.53%). Headache, vomiting and seizure were commonest symptoms in astrocytic and meningeal tumour.

After categorization of neoplastic lesions according to tissue involved, majority (81.37% %) of tumours accounted for neuroepithelial tissue (62.75%) and tumours arising from the meninges (18.63%) of these tumours, the majority were astrocytomas (total astrocytomas =38). The most common tumour subtypes within this group were glioblastoma and diffuse astrocytoma, comprising 15 cases each.(Table 1)(Figure 1)

TABLE NO 1: DISTRIBUTION OF CNS TUMOURS ACCORDING TO WHO 2016 CLASSIFICATION

Major classes	Diagnosis	No. of Cases	%	Total	
				Cases	%
Diffuse astrocytic and oligodendroglial tumour	**Astrocytoma**	**21**	**20.59**	53	51.96
	Glioblastoma	**15**	**14.71**		
	Oligodendroglioma	6	5.88		
	Mixed glioma/oligoastrocytoma	11	10.78		
Other astrocytic tumours	Pilocytic astrocytoma	2	1.96	2	1.96
Ependymal tumours	Ependymoma	1	0.98	1	0.98
Choroid plexus tumours	Choroid plexus papilloma	2	1.96	2	1.96
Embryonal tumours	Medulloblastoma	6	5.88	6	5.88
Tumours of Cranial & Paraspinal nerves	Schwannoma	6	5.88	7	6.86
	Neurofibroma	1	0.98		
Meningiomas	**Meningioma varient**	**19**	**18.63**	**19**	**18.64**
Metastatic tumours	Metastatic carcinoma	12	11.76	12	11.76
Total		**102**	**100.0**	**102**	**100.0**

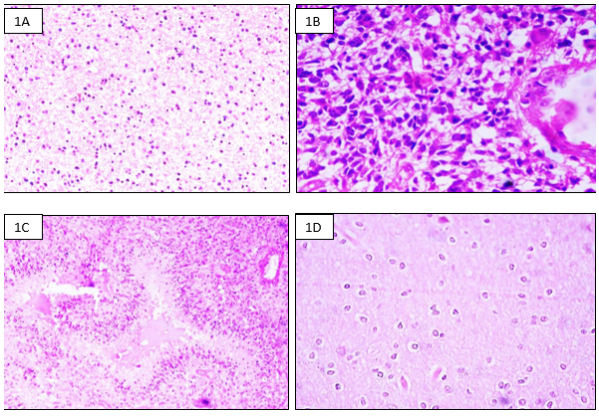

Figure 1A - Diffuse astrocytoma: Section shows slight increase in glial cellularity and a fibrillary background. 1B: Anaplastic astrocytoma: Section shows greater degree of cellularity, nuclear pleomorphism, and mitotic activity. 1C: Glioblastoma: necrotic areas creating pseudopalisading. 1D: Oligodendroglioma: showing fried egg or honeycomb appearance (H&E X 400)

Tumours derived from the meninges were the second most frequently occurring group of CNS tumours. Out of 19 cases 18 cases were grade I tumours, only 1 (5.26%) case was grade II atypical meningioma. The most common histological type was meningothelial type comprising 42.11% (n=8) of all meningiomas followed by fibrous, transitional, psammomatous each comprises 3 cases (15.79%). (Figure 2D)

Out of 19 cases of meningioma 18 (94.74%) were intracranial. Frontal lobe is commonest site comprising of 5 (26.31%) cases. Intraspinal meningioma consist 1 (5.26%) case that was located in thoracic spine.

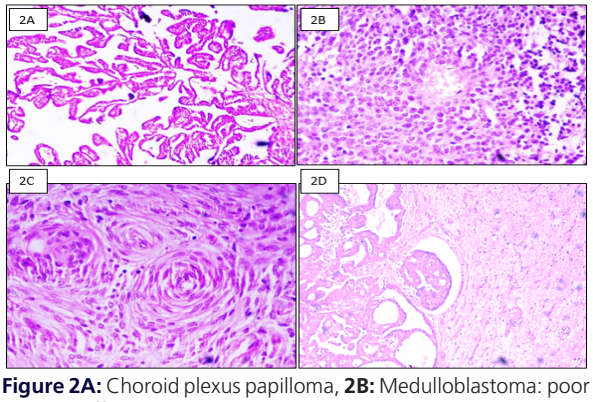

Figure 2A: Choroid plexus papilloma, **2B:** Medulloblastoma: poor cellular differentiation, small, oval or round tumour cells with Homer-Wright rosettes, **2C:** Meningothelial meningioma: Section shows spindly-looking cells with pink cytoplasm run in short fascicles, forming syncytial structures and whorls, **2D:** Metastatic deposite of adenocarcinoma (H&E X 400)

In present study most of the CNS tumours were primary i.e. 90 (88.24%) and only 12 (11.76%) cases were metastatic. Primary and metastatic tumours both are more common in male gender. Most common metastatic tumour type was adenocarcinoma n=7 (58.33%) and most common primary site was from breast carcinoma (n=3).

Out of 102 cases 70 (68.63%) cases clinically and 68 (66.67%) cases radiologically correlated with histopathological diagnosis.

Out of 90 primary CNS tumours, 38 cases were astrocytoma. Most of these cases belonged to grade II and IV tumor (39.47% each). Among grade IV tumours glioblastoma was the most common tumour. Out of 19 cases of meningioma, 18 (94.75%) cases had grade I and only 1 case was grade II.(Table 2)

TABLE NO. 2: DISTRIBUTION OF CNS TUMOURS ACCORDING TO GRADING

	Grading			
Tumours	**Grade I**	**Grade II**	**Grade III**	**Grade IV**
Astrocytoma	2 (5.26%)	**15 (39.47%)**	6 (15.80%)	**15 (39.47%)**
Oligodendroglioma		3 (50%)	3 (50%)	
Mixed glioma/ Oligoastrocytoma		8 (72.73%)	3 (27.27%)	
Ependymoma		1 (100%)		
Choroid plexus Papilloma	2 (100%)			
Medulloblastoma				6 (100%)
Meningioma	**18 (94.74%)**	1 (5.26%)		
Schwannoma	6 (100%)			
Neurofibroma	1 (100%)			
Total	**29 (32.23%)**	28 (31.11%)	12 (13.33%)	21 (23.33%)
Grand total	90 cases			

DISCUSSION

The peak incidence of tumours at our facility occurs at a younger age when compared to studies from developed nations. In the present study the mean age of patients was 38.21 years. This was comparable to that found other studies[5-7]. Maximum numbers of patients were in the 4th decade of life i.e. 23 (22.5%), followed by 5th decade i.e. 21 (20.5%). The findings of our study were similar to Asian studies [5,8,9].

In the present study among 102 cases of CNS tumours, 88 (86.27%) cases were intracranial (brain) in location and 10 (13.73%) were intra spinal (spinal cord) in location. This was comparable to that found by other studies.[5,10,11] In our study, anatomical location of CNS tumours were frontal (41.18%), temporal (25.49%), parietal (24.51%) occipital (12.75%), cerebellum (5.88%), brain stem (5.88%) which was approximately same as described by different studies[11-14].

The most common symptom in our study was headache (48.04%), followed by seizure (**31.37**%) and vomiting (**23.53**%). Headache was the most common symptom in meningioma (n=**12)** and glioblastoma (n=**11)**. Seizures were more common in astrocytic tumours (n=13). This was comparable to that found by Wilne et al[15] and A. Moradi et al[16] .

In the present study among 102 cases of CNS most of the tumours were glial (neuroepithelial) i.e. = 62.75% (n=64) and having a higher male predilection. This was nearly comparable to Kailash Chand Jat et al[11] and Arpit Gohel et al[17].

Out of 64 neuroepithelial tumours diffuse astrocytoma and glioblastoma were the most common i.e. 23.43% each. They constituted 46.86% of all neuroepithelial tumours, followed by mixed glioma/oligoastrocytoma 17.19% (n=11) and medulloblastoma 9.37% (n=6). Tamkeen Masoodi et al[10], Dhar A et al[12] and Zahid hussain et al[6] in their study also found glioblastoma as the most common astrocytic tumour constituting 40.9%,49.5% and 37.0% respectively which is higher compared to the present study. 6 (six) cases of oligodendroglial tumours were reported in the study with a frequency of 5.88%. 3 being grade II and 3 were grade III. There was similar frequency of oligodendroglial tumours in different studies [11,18,19].

Among embryonal tumours, we found only 6 cases of classic medulloblastoma (Figure 2C). The incidence of medulloblastoma in present study was 5.88% (n=6) which was comparable to that found by Chi JG et al[20] and Zubair ahmad et al[21].

The incidence of Tumours of Cranial & Paraspinal nerves in present study was 6.86% (n=7). Our data mirrored the findings in different studies [2,5,22]. In the present study of a total of 102 CNS tumors, meningiomas were 19 (**18.64**%) which was comparable to different studies [5,11,20]. Out of 19 cases of meningioma, 18 (94.75%) cases had grade I and only 1 case was grade II. This was comparable to that found by Zubair ahmad et al[21] and Zahid hussain et al[6]. The meningothelial variant of meningioma (42.11%, n=8) was most common histological type seen in present study which was similar to the studies done by different studies[23-26]. In present study meningiomas were graded into Grade I, Grade II with incidence in a ratio of 94.74%:5.26%, similar to the studies done by Nasrin Samadi et al[24] (86.1%:8%:5.9%) and Konstantinos Violaris et[27] al (89.82%:5.82%:4.36%).

In the present study 90 were graded according to WHO classification 2016. Majority of the lesions belonged to Grade I (32.23%) in comparison to grade II (31.11%), III (13.33%) or IV (23.33%) which was compared to that found by other studies[6,11,19,28].

CONCLUSION

Since CNS tumours tend to present with a common set of clinical symptoms histopathological study is always required to arrive at a correct diagnosis. Further typing of these tumours and grading them according to WHO 2016 classification may result in improved plan to management.

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CONFLICT OF INTEREST: Not declared.

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