CENTRAL NERVOUS SYSTEM TUMORS: A HOSPITAL BASED ANALYSIS

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Abstract

Objective: To assess the spectrum of CNS tumors and provide benchmark data for future studies assessing data in continuum.
Study Design: Descriptive study.
Place and duration of study: This study was carried out from Jan 2003 till Jan 2009 at Pakistan Naval Ship Shifa (Naval Hospital) Karachi, Pakistan.
Patients and Methods: One hundred cases fulfilling the inclusion criteria were included between the ages of 1-85 years belonging to both genders.
Results: Majority of the cases were seen in the year 2008 with the most commonly encountered lesion being the glial tumors followed by the meningiothelial neoplasms. Our findings were similar to previous similar studies in our setup with little change in trends.
Conclusion: Glial tumors appear to be more common in our setup whereas the popularly believed Meningiothelial tumors though common came next. Our study can form the benchmark data upon which future studies can be conducted.

Keywords : Central Nervous System, Glial Neoplasms, Hemangioblastoma, Meningiothelial Tumors, Medulloblastoma, Metastatic Brain Tumours.

Article

INTRODUCTION

Central nervous system (CNS) tumors have always been a cause of concern among histopathologists due to the wide variety in their appearances. Diagnosing a CNS tumor poses a significant challenge, many a times requiring special diagnostic techniques such as immunohistochemical staining1. Early diagnosis and management of brain tumors is important to reduce morbidity and mortality. Incidence and Mortality Rate Trends in the United States in 2007 showed over 50,000 new cases of CNS tumors with 7.4% cases from childhood group2. Whereas in the United Kingdom the estimated lifetime risk of developing CNS cancer was found to be 1 in 133 for men and 1 in 185 for women3. Most centers in Pakistan have a cross-sectional data regarding CNS tumors due to the fact that this facet of pathology is relatively rare as compared to tumors of other sites with CNS tumors occurring at less than 2% of all primary tumors4,5. However they appear to be common in children6. Glial neoplasms have been regarded as common CNS tumors in many studies7-12. Spinal cord tumors form about 15% of central nervous system tumors. Most common types include neurofibromas and meningiomas13.

Although data about the spectrum of CNS tumors in our population is available from centers across our country4,5,8,10-12, each one has its own limitations in terms of diseased population, therefore a single set of results cannot be applied uniformly across the board. In our center previous studies focused on malignancies as a whole and not particularly upon CNS tumors therefore an assessment of this area is undoubtedly warranted. Since close monitoring of the shifts in trends are vital to not only assess the disease burden but also to administer vitally needed improvements in the clinical care practices. The purpose of this study was to assess the spectrum of CNS tumors and provide benchmark data for future studies assessing data in continuum.

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PATIENTS AND METHODS

This descriptive study was conducted at Pakistan Navy Hospital at Karachi. Computerized

Histopathology laboratory report's records were retrieved from the laboratory database using Hospital Information and Laboratory Management Software (HILMS) from Jan 2003 till Jan 2009. Consecutive non-probability sampling procedure was employed. Samples labeled as CNS tumors were included; both benign and malignant, from patients belonging to both genders between the ages of 1-85 years. All improperly transported and / or autolyzed samples were excluded. A total of one hundred cases of CNS tumors fulfilled the inclusion criteria. The histopathological reports of all included cases were reviewed in detail whereas Hematoxylin & Eosin (H & E) slides of random cases were also reviewed from the slides record. Microscopic diagnoses, patient's age, gender were noted down in Microsoft Excel database file. The data was analyzed on Statistical Package for Social Sciences (SPSS) Version 12.0. Descriptive statistics were used to describe the data.

RESULTS

Of the one hundred included cases, 27 % were from the year 2008 followed by the year 2004 which contributed 19 % of cases.

Patient's ages ranged from 2 years to 85 years with a mean age of 39.7 years. Adult population accounted for 91% cases whereas 9 % patients belonged to the pediatric age group. Most patients belonged to 5th decade followed by the second highest group in the 4th decade of life whereas patients in their 3rd decade of life came next. (Fig.1).

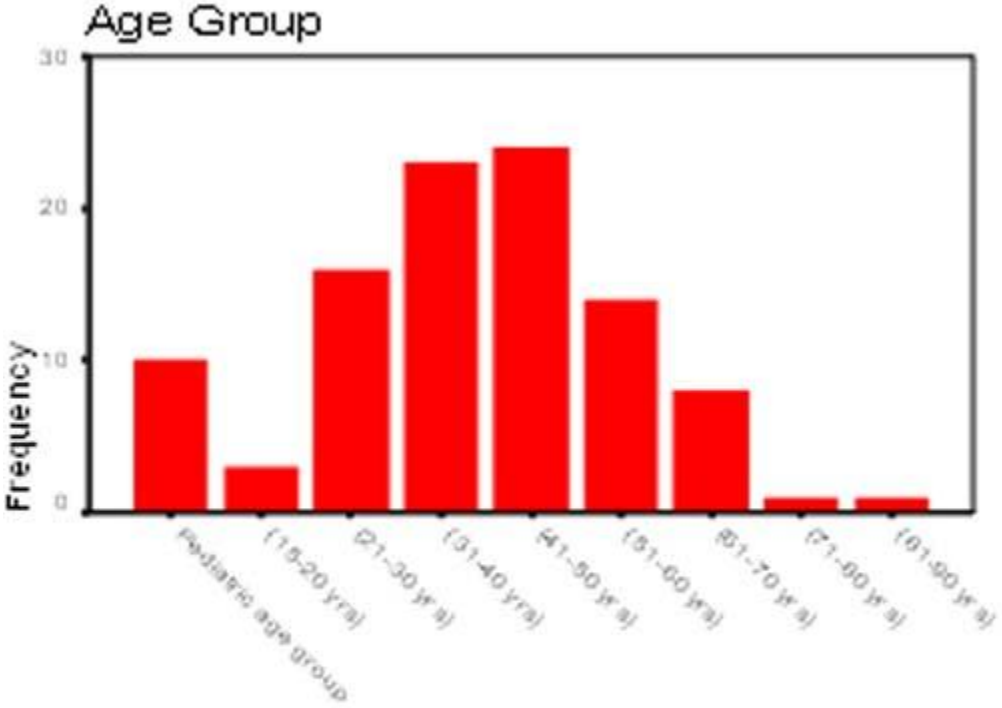

Fig.1: Distribution of CNS tumors according to various age groups in our study

There was a male predominance in our study with male patient's forming 73 % of the included cases.

Our results also showed a predominance of Glial tumors at 58 % followed by 18% Meningiothelial neoplasms out of which five were atypical meningiomas. The detailed spectrum of histological lesions encountered in our study cases is given in Table 1.

Table: Showing histological distribution of cases (n=100).

Tumor Type(s)	Histological Diagnosis	Number of Cases	Percentage
Glial Tumors 58 (58%)	Astrocytoma, WHO Grade-IV (Ghioblastoma Multiforme)	23	23 %
	Astrocytoma, WHO Grade-III	10	10 %
	Astrocytoma, WHO Grade-II	11	11%
	Oligodendroglioma, WHO Grade-II	8	8 %
	Astrocytoma, WHO Grade-I (Pilocytic Astrocytoma)	4	4 %
	Mixed Oligo-Astro Neoplasm	2	2 %
Meningothelial Tumors 18 (18%)	Meningioma, WHO Grade-I	13	13 %
	Meningioma, WHO Grade-II (Atypical Meningioma)	5	5 %
Metastatic 7 (7%)	Metastatic Carcinoma	7	7 %
Others 17 (17%)	Medulloblastoma	4	4 %
	Hemangioblastoma	4	4 %
	Ependymoma, WHO Grade-II	6	6 %
	Schwannoma	1	1%
	Non Hodgkin's Lymphoma – Diffuse Large Cell	1	1%
	Completely Necrotic Tumor	1	1 %

Photomicrograph of an Astrocytoma WHO Grade-II from our study group is shown in (Fig.2).

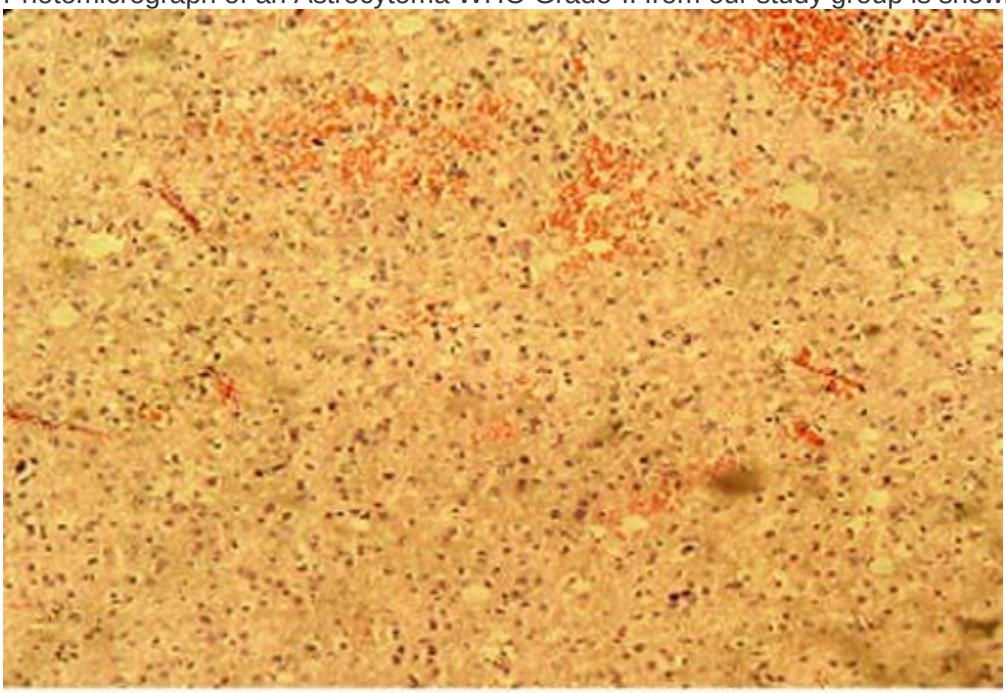

Fig. 2: Astrocytoma WHO Grade-II H&E.

DISCUSSION

Our results are in agreement with other studies across the country4,5,8,10-12 which show the predominance of Glial tumors especially in patients presenting in their 4th to 6th decade of life. Astrocytomas often show high rates of local invasion that lead to local recurrence of the disease which is a major cause of morbidity and mortality. It has been shown that proliferation and migration are mutually exclusive behaviors. A symphony of these enables these tumors to invade and recur. As already mentioned the disease burden of these tumors is further augmented by the complex management often required to help these patients which includes surgical resection, radiotherapy and chemotherapy14-16. Prognosis seems to be good for low grade completely resected tumors17. It is argued that, the incidence and mortality rates for CNS tumors have changed very little over the decade, with men having higher incidence and mortality rates than women. Four and a half thousand new cases of CNS cancers were diagnosed in Europe in the year 2006 alone3,18. In studies conducted at our center as well as at Armed Forces Institute of Pathology (AFIP) Rawalpindi which focused on ten commonest malignant tumors showed low frequency of the CNS tumors as compared to other sites4,5.

Gliomas and meningiomas have been often regarded as the most common CNS tumors followed by craniopharyangiomas, pineal region tumors, acoustic neuromas and choroid plexus papilloma8,10 whereas in childhood age group also, the pattern is similar6,7. Other centers across Pakistan also share the similar results4,5,8,10-12.

CNS lymphomas comprise 4.6% of all CNS neoplasms and comprise about 2.2% of the non-Hodgkin's lymphomas19. Other rarities regarding CNS include acute myeloid leukemia (AML) infiltrate .

Meningiothelial tumors formed the second largest group of tumors in our study comprising 18% of the cases which translates into the huge problem of tumor recurrence faced by the patients as well as the treating physicians of meningiothelial tumors. The estimated recurrence rate is in the range of 10%–15% at 5 years and 25%–37% at an interval of 10-years following a curative surgery20. The importance of H & E morphology cannot be over emphasized as the tumor morphology has been largely accepted as a strong and reliable prognostic factor in predicting chances of disease recurrence. This argument is supported by the fact that only few World Health Organization (WHO) Grade I meningiomas recur whereas higher grade meningiothelial tumors such as atypical (WHO Grade-II) and anaplastic meningiomas (WHO Grade-III) do indeed recur in the first years following complete surgical removal of the primary lesion21. This seemingly innocent lesion as compared to the glial tumors causes significant morbidity if not mortality owing to the pressure symptoms especially in spinal locations. As compared to other studies metastatic tumors were more i.e. 7% in number in our study, perhaps due to the reason of referrals of patients from peripheral hospitals and rural setups where chances of early detection of malignancies are grim.

Medulloblastoma is thought to be the commonest malignant CNS tumor of childhood, of which 4 cases were reported in this study, similarly four cases of Hemangioblastoma were also reported. Schwannoma and Non Hodgkin's Lymphoma – Diffuse Large Cell Type were relatively rare entities at 1 % each. Tumor morphology could not be ascertained in one case where the entire tumor tissue was completely necrotic.

CONCLUSION

Glial tumors appear to be more common in our setup whereas the popularly believed meningiothelial tumors though common formed the second largest group of neoplasms.

Furthermore, evaluation of CNS tumors' morphology and frequency can help in monitoring of disease trends and changing patterns. Our study forms the benchmark data upon which future studies can be conducted to form data in continuum for effectively administering any improvements which come to light during the diagnostic processes.

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