The Spectrum of Central Nervous System Tumours at the Tertiary Care Hospital: A Three Year Study

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Abstract

Objective: To study the spectrum of central nervous system in our local population in a tertiary care hospital.

Method: This study was set in King Edward Medical University Pathology laboratory for a period of three years. All the CNS tumors sent to the histopathology department and reported were included in this study after following a strict criterion of inclusion and exclusion. A total of 110 cases were included in this study. All the cases were reviewed by 2 separate histopathologists. Data was collected using pre-designed proforma used in the laboratory which covers various aspects of the processes involved from specimen requisition till dispatch of final report. Data collected was entered by using Statistical package for social sciences (SPSS version 21).

Results: Majority of cases were categorized in the benign category and Meningioma was seen as the most common tumour. The age group most commonly observed was 40-60years of age and there was no difference in incidence between the gender. Glioblastoma was the most common malignant tumor noted.

Conclusion: This study gives a good overall picture of the spectrum of CNS tumors in local population. Their incidence needs to be investigated and documented so that a proper idea of their prevalence can be made in order to benefit the patients and clinicians alike.

Keywords: Central nervous system, tumours, Meningioma, Brain.

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Introduction

Tumours of the central nervous system are cause of a significant amount of morbidity and mortality worldwide. Their incidence is much higher in continents like Europe, Australia and North America as compared to Asia, South East Asia and India.[1] Although these tumours are rare, the extent of morbidity and mortality caused is not in proportion to their incidence. According to cancer statistic 2016 in United States CNS tumours accounted to 1.4 percent of new cancers reported and 2.7 percent of deaths resulting from cancer.[2] In the UK approximately 9000 people are diagnosed with primary CNS tumours each year[3] and estimated death toll is 3 percent of the total cancer deaths. There has been a sharp rise in their incidence up to 39% from early 1990s to 2018.[4] Unfortunately, there have been only a handful of studies done in Pakistan regarding the incidence of brain tumours and more research is needed to find out the ongoing trend of these tumours. Cancer in general is on the rise in our country and looking into the occurrence of various tumours in our general population gives us a good idea to establish better guidelines regarding their management. The incidence of CNS tumours according to a 10year study in Pakistan is 1.2 percent.[5] In order to have a more updated data, in this study 3 years of data from a tertiary care hospital in Punjab has been compiled to get a fresh look at the spectrum of CNS tumours in local population.

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Material and Methods

This cross sectional study was done at Histopathology laboratory of King Edward Medical University. The 3 years data of total 110 patients both males and females was categorized according to age into the following categories: less than 10 years(yrs),10-20 yrs,20-40 yrs, 40-60 yrs and greater than 60 yrs. The site of origin of the tumour was specified as following: brain, spinal cord, orbit and extradural. The tumours were then divided into 2 categories of benign and malignant. All the histopathology reports of the cases from 1st January 2016 - 31st December 2018 were reviewed in the study. Histopathological diagnosis, tumour site, age and gender of the patients were noted. Histological examination was carried out by a consultant histopathologist under light microscope. Data was collected using pre-designed proforma used in the laboratory which covers various aspects of the processes involved from specimen requisition till dispatch of final report. Reports of patients with autolyzed, unremarkable diagnosis and differential diagnosis were excluded from this study. Only cases with agreed upon single diagnosis were included to avoid discrepancy. Data collected was entered by using Statistical package for social sciences (SPSS version 21). Pearson Chi Square test was performed to see association between different variables and p value less than 0.05 was taken as significant.

Results

A total of 114 cases were studied. Out of these cases, 1 was reported as unremarkable brain parenchyma, 2 reported with a list of differential diagnosis with no agreed upon diagnosis and one specimen was reported as autolyzed. These were excluded from the count. Finally, 110 cases were included in the study. There was a wide age range in the cases received at the pathology department, ranging from less than 10 year to 60 years and greater. Most affected age group seen was 40-60 years. The least affected group was less than 10 years of age. The incidence in males and females was the same. The male to female ratio was 1:1. The number of benign CNS tumours was 65(59%) and that of malignant tumours was 45 (41%) in total. The frequency of benign tumours was more in females (61%) as compared to malignant, which were more common in males (60% of all the malignant tumours). The distribution of benign and malignant tumours in different age groups is given in Figure 1. Most common age group for malignancy and benign tumours was 40-60 years. However, no association between age groups and nature of tumour i.e. benign and malignant was observed after application of Pearson Chi Square (p value=1.0). The least amount of malignancy was seen in less than 10 years of age (n=0). The most common tumour overall regardless of age and gender was found to be Grade I Meningioma (46 cases) followed by Grade II Astrocytoma and Glioblastoma (12 and 11 cases respectively). According to the nature of origin, the number of primary CNS tumours was 102 and of metastatic tumours including atypical lymphoproliferative tumours and others for example plasmacytoma, pleomorphic adenoma and hemangioma was 8. The incidence according to the originating site, tumours originating from brain parenchyma (n=85) was the most common site of primary CNS tumours, followed by the spinal cord (n=20), extradural (n=3) and orbit (n=2). The detailed spectrum of the most common tumours in this study (meningeal origin) is given in Table1. Comprehensive range of all tumours is given in Table 2.

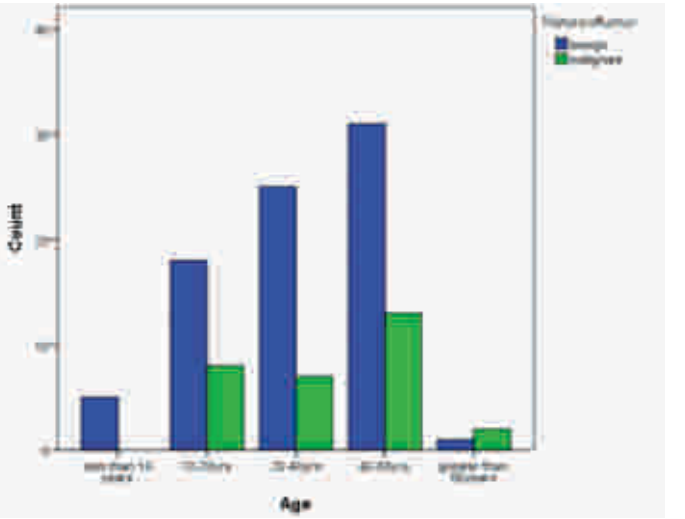

Fig-1. *Graph representing the various age groups of benign and malignant CNS tumours.*

Table 1: *Spectrum of Meningioma, the most common tumour found in this study (n=54).*

Tumour Type	Tumours Grade	Number	Percentage	Age Range(yrs) (most common)	Male	Female	Ratio M;F
Meningioma	I	46	85.3%	40-60	15	31	1:2
Atypical Meningioma	II	5	9.2%	20-40	4	1	4:1
Anaplastic meningioma	III	3	5.5%	40-60	1	2	1:2

Table 2: *Comprehensive details of all the tumours found in this study (n=110).*

Tumour Type	Tumour grade	Number	Percentage (%)	Age range < 18 yrs	Age range >18 yrs	Male	Female	Commonest Location
Meningioma	I	46	41.8	14	32	15	31	Brain and spinal cord
Atypical meningioma	II	5	4.5	1	3	4	1	Brain
Anaplastic meningioma	III	3	2.7	1	2	1	2	Brain
Glioblastoma	IV	11	10	0	11	6	5	Brain cerebral
Atypical Astrocytoma	II	12	10.9	3	9	10	2	Brain cerebral
Anaplastic Astrocytoma	III	4	3.6	2	2	3	1	Brain cerebral
Pilocytic Astrocytoma	I	3	2.7	3	0	1	2	Third ventricle
Diffuse Glioma	I	1	0.9	0	1	1	0	Brain cerebral
Oligodendroglioma	II	3	2.7	0	1	2	1	Brain cerebral
Ependymoma	I	2	1.8	1	1	2	0	Spinal cord
Shwanoma	-	3	2.7	2	1	2	1	Spinal cord, orbit
Pituitary adenoma	-	4	3.6	0	4	3	1	suprasellar
Encephalocoel	-	1	0.9	1	0	0	1	Spinal cord
Round blue cell tumour	-	1	0.9	1	0	1	0	Spinal cord
Hemangioma	-	1	0.9	0	1	1	0	Spinal cord
Atypical Lymphoproliferative	-	2	0.9	0	2	0	2	Spinal cord
Pleomorphic adenoma	-	1	0.9	0	1	0	1	orbit
Dermoid cyst	-	1	0.9	0	1	1	0	Posterior fossa
Craniopharyngioma	I	2	1.8	1	1	0	2	Suprasellar
Plasmacytoma		1	0.9	0	1	0	1	Extra dural
Metastatic tumour	-	3	2.7	0	3	2	1	Brain cerebral and extra dural

Discussion

Cancer data on brain and nervous system tumours reported in Pakistan is not widely studied and the variety of tumours found in our local population has not been reported in detail. There are a handful of studies conducted in this area and this study is an attempt to add to the collective data for future research and generate comprehensive information so these patients can be effectively treated and required resources can be made available to this category of neoplasms.

In this study, the most common CNS tumour encountered was Meningioma followed by Astrocytoma and then Glioblastoma which is similar to a study in Bangladesh.[6,7] While in a study in India Astrocytoma was the most common tumour found which coincides with incidence in England as well.[8,9] There was a no difference in incidence seen between males and females, however a slight male predominance has been reported in other studies.[6-8]

In this study the most common age group was 40-60, which is in accordance to an age standardized related incidence study of cancer done in Pakistan[(10)], the incidence of brain and nervous system tumours was found predominant in males than females which has not been validated by our study. Ependymoma was the most common tumour seen in a study conducted on pediatric population however our observation shows that Meningioma was most common in the pedia-tric (less than 18 yrs) population.[11] Studies performed on pediatric population in other parts of the world also showed a varied picture where some found astrocytoma as the most common tumour while others found medulloblastoma.[6-8] A study done in Pakistan showed that most brain surgeries are performed in private setup and not in Government owned facilities like the hospital where this study was conducted so there is a factor of population understudy that might cause the variation in the data and might not show a full picture of the prevalence of these tumors.[12] Which may explain why another study done in a private Hospital in Karachi, Pakistan showed diffuse glioma as the most common but age range and location was similar to our data.[13] Our findings, however match a Chinese study which reports meningioma is

the most common tumour observed as well.[14] A Korean study also mirrors our results with meningioma being the most common tumour reported out of a large number of cases studied. However, they noted a female predo-minance in their observations. Similar to our data Glio-blastoma was reported as the most common malignant tumour.[15]

By examining a wide variety of studies on CNS tumours, it seems that there is still a need to explore their spectrum in our population to reach a definite conclusion. This study is an attempt in this direction.

Conclusion

Central nervous system tumors impose a long-lasting influence on the health of the patients and also inflict burden on the health care system. In our setup benign tumours are found to be most common. Meningioma (grade I) is the most widely encountered tumour, followed by Atrocytoma (grade II) and Glioblastoma. Interestingly Meningioma (grade I) was also the commonest among patients aged less than 18 years. This study has evaluated the prevalence of CNS tumours in local population in order to help health care professionals and authorities get a better idea of its spectrum and help devise further action plans for future.

Conflict of Interest. None

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Authors Contribution

MA: Conceptualization of Project
SS: Data Collection
SA: Literature Search
MK: Drafting, Revision
MK: Writing of Manuscript