ORIGINAL ARTICLE

Frequency of Brain Tumors in Childhood and Adults, a hospital based study

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ABSTRACT

A relatively high frequency of brain tumors are observed in childhood and adults. This study is based on the records from the Department of Pathology, Ittefaq Hospital. All brain tumor biopsies done in all age groups ranging from 2 yrs to 82 years between 2010 and 2014 were included. Common diagnostic pitfalls, morphological criteria and immunohistochemical markers were identified. The cases comprised of 21 children (2-14 years) and adults (14-82 years). High grade tumors comprised 47% of adults and 33.3% of children. The most common tumors in childhood were benign (craniopharyngioma, choroid plexus papilloma) 42%, astrocytoma (23.8%), medulloblastoma (23.8%) ependymoma (9.5%), small round blue cell tumor (16%) and in adults; astrocytoma (20%), meningioma (21%), pituitary adenoma (7%), glioblastoma (23%) and metastatic carcinoma (3%). Other rare tumors were 22% of the total. In conclusion, the commonest tumor is craniopharyngioma in children and glioblastoma in adults. A combination of morphology and immunohistochemistry is helpful in establishing the correct diagnosis.
Keywords: frequency, brain tumors, gliomas, craniophrangiomas, medulloblastoma.

INTRODUCTION

Incidence of brain tumours is related to age, with the highest incidence in older men and women[1]. In childhood brain tumours are the second most common cancers after leukemia, accounting for more than a quarter of all tumours diagnosed in children Although an overwhelming majority of these tumors occur in adults, some specific histological types which are common in childhood are rare in adults[2,3]. More importantly, there are indications that pediatric and adult glial tumors have differences in their molecular biology and behavior. These have important implications for future research, treatment and prognosis[4].

In many parts of the world, they are not only the most common malignant solid tumors seen before the age of 20 years, but also a greatest cause of childhood cancer mortality in the age group0-14[3].

Early detection and improvement in therapeutic modalities have resulted in longer survival. It's unfortunate that therapies have deleterious effects on the brain tissue. Longer survivals are often associated with neurological, cognitive and endocrine disorders and decreased quality of life[5]. Survivors are at an increased risk of developing a second neoplasm later in life[6].

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In literature there are world-wide variations in the pattern of brain tumor with respect to incidence, gender, anatomical location and frequency of specific histological types. Location and histological types, to a large extent, influence treatment options, out- come and risk factors. Data on these parameters are useful for planning of health care delivery system and future research.

Usually morphological criteria are helpful for diagnosing most of these tumors but in cases where tumours are poorly differentiated or specimen provided is limited, immunohistochemistry and radiological evaluation is very helpful in reaching an accurate diagnosis[7,8].

MATERIALS AND METHODS

For this study data was collected from the Pathology department of Ittefaq Hospital Lahore, Pakistan. The histopathology records of all patients with brain tumors were reviewed which were received, diagnosed and operated for brain tumors during January2010 to February 2014. In addition to types and site of the tumor, patient demographics including sex and age were also recorded. To highlight the sex distribution and age frequency amongst each age-group, the age of the patients was divided in two broad groups 1 (0-14 years); and 14 -82 years.

RESULTS

One hundred and nineteen patients with brain tumors, of ages between 2-82 years had underwent surgery during the study period. Out of these, 82(69%) were males and 37(31%) were females. Male to female ratio was 2.4:1. The mean age of patients was 6.73 (±0.21) years. A distinct overall male predominance was noted in all tumor types. It is evident that medulloblastoma (24%) was the most common group of brain tumors in children. Astrocytoma was the second most dominant tumor type in our study (23%).Whereas in adults astrocytomas were the commonest tumors constituting 47% and meningiomas were the second most frequent tumor with 21% (Tables 1 and 2).

Table 1: Childhood brain tumours distribution

Diagnosis	n	%age
Benign	08	38
Small Round Blue Cell Tumor	03	19
Medulloblastoma	05	24
High grade glioma	02	9.5
Low grade glioma	02	9.5
Glioblastoma multiforme	01	4.25
Total	21	100

Table 2: Adult brain tumours distribution

Diagnosis	n	%age
GBM	23	23.4
Meningioma	21	21.4
Benign	21	21.4
Low grade glioma	20	20.4
Metastatic carcinoma	03	03
High grade glioma	02	02
DLBCL	01	01
Mesenchymal chondrosarcoma	01	01
Non diagnostic	06	06
Total	98	100

DISCUSSION

The present study was designed to determine the frequency of Brain Tumors from January 2010 to February 2014. Our study revealed male preponderance with overall male to female ratio of 2.4:1, which is in line with previous studies[9-12]. As it is a hospital based study, it is not possible to calculate tumor incidence. In previous studies a relatively lower frequency was reported. Grover and Hardas reported a frequency of 8.2% in Bombay Cancer Registry[13]. Khan et al reported 9% frequency of childhood brain tumors[14]. Present study revealed most of the patients in age group 6-8 which is nearly in accordance with a previous study done by Ahmed et al[10] who reported most cases in age group 5-9. However Velema and Percy; and Memon et al reported most cases in lower age group[10,15]. In our study mean age for tumor incidence was 6.73. The mean age was 6 years in a previous study reported by Farwell et al[16] while Ahmed et al[10] and Mehrzin et al[17] reported mean age as 8.8 and 8.7 years respectively which is higher than our study. Medulloblastoma was the most frequent tumor in children according to our study constituting 24% of total cases and is comparable to study by Young et al and Ahmed et al, where it was also the leading tumor type[10,18]. Some other studies have reported astrocytoma as the most common childhood tumor unlike our study[11,19]. Our study contradicts with studies done by Mehrazine et al, Rehman et al and Khan et al who reported meningioma, neuroma and gliomas as the most dominating types of childhood tumors[12,14,19]. Most of the studies[10,11,19] showed approximately the similar %age of ependymoma as reported in the present study (9.5%). In some studies[14,17] lower percentages of ependymoma is shown. The current study is a single institution study and needs cautious interpretation.

Morphology is the key to the diagnosis and subtyping of these biopsies; however, this should be combined with clinical history, radiological correlation, and appropriate sampling. Classical morphological features in most cases allow for correct diagnosis. Difficulties may arise when tumor show unusual morphology, are, poorly differentiated or mixed type. Metastatic tumors from other sites can be of diagnostic challenges. In such cases immunohistochemistry is quite helpful in establishing correct diagnosis[20].

Changes adopted regarding diagnostic and treatment since mid-1970s have resulted in improved survival rates for patients diagnosed as medulloblastoma, oligodendroglioma, and astrocytoma, especially controlling for age at diagnosis. Glioblastoma multiforme continues to be the most intractable primary brain tumor[21].

In adults the astrocytomas were the commonest tumors constituting 47% and meningioma was the second most frequent tumor 21%. This is comparable to international statistics[22].

Morphology alone was able to diagnose most of the brain tumors. In children for cases of medulloblastoma and small round blue cell tumor immunohistochemistry was needed for the confirmation of the diagnosis. In adults immunohistochemistry was needed in cases of metastatic carcinomas and lymphomas. So in order to get a confirmatory diagnosis a panel of immunohistochemical stains comprising CK, S100, GFAP, EMA, LCA, CD20, CD56, chromogranin and synaptophysin was used[23].

CONCLUSION

Population-based studies are required to determine the cancer burden due to pediatric malignancies of the brain in this population and for the morphological categorization of brain tumors in Pakistan. Conventional hematoxylin-eosin staining is the mainstay for pathological diagnosis in most of the cases, however IHC has a major role in differential diagnosis and improving diagnostic accuracy in difficult cases not only in general surgical pathology but also in neurooncologic pathology.

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