Clinico-morphological Pattern of Inhacranial Tumors in Children

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Abstract

Objective: The objective of present study was to observe the histopatological pattern of intracranial tumors in children (<15yrs) and to correlate the site of lesion along with the histological diagnosis.
Setting: The study included consecutive cases of intracranial tumors diagnosed in children (<15 vrs.) in the section of histopathology at the Aga Khan University Hospital, Karachi during the period of three years.
Methods: The initial histological evaluation of these lesions was performed on H and E stained section of paraffin embedded tissue. Special stains and immunhistochemical analysis was done whenever indicated.
Results: During the study period, fifty-four cases of intracranial tumors were diagnosed in children. The age ranged from 1-1/2 years to 4 years with male to female ratio of 1.1:1. Astrocytoma comprised 39% of all intracranial tumors of childhood. Medulloblastoma (18.6%) ranked the second most prevalent brain tumor followed by empendymoma (13%), oligodendroglioma 7.5% while non-Hodgkn's lymphoma, primitive neuroblastoma 3.7% and ganlioglioma 3.7% while non-Hodgkin's lymphoma, primitive neuroectodermal tumors, mixed germ cell tumor, pineoblastoma, choroid plexus carcinoma and malignant meningioma constituted 1.8% each.
Conclusion: Astrocytoma was the most common pediatric brain tumor. Medulloblastoma was more common in males while pilocytic astrocytoma was more frequent in females. Posterior cranial fossa was the most common site (43.5%) of pediatric brain tumors. Low grade astrocytoma was more prevalent in posterior cranial fossa as compared to high grade astrocytoma which was more frequent in the supratentorial region (JPMA 49:63, 1999).

Introduction

Malignant tumors are more prevalent in adults, but these are not uncommon in children. Childhood malignant neoplastic lesions constitute about 4.38 % to 12.6% of all malignant tumors[1-5]. After leukemia and lymphoma, the intracranial tumors are the most common neoplastic lesions encountered in children[3]. About one third of pediatric neoplasms comprise of brain tumors, and these significantly account for the morbidity and mortality in the younger age group[6]. In adults, the brain tumors are more common in supratentorial region while the pediatric brain tumors occur more frequently in the posterior cranial fossa[7].
The present study is carried out to observe the histopathological pattern of intracranial tumors in children below the age of fifteen years and to correlate the site of lesion along with the histological diagnosis.

Patients and Methods

The present study included all consecutive cases of intracranial tumors diagnosed in children under the age of fifteen years in the section of histopathology at The Aga Khan University Hospital, Karachi

during the three years period of 1995-1997. Clinical informations like site of lesion, sex and age of the patient were also recorded.
The initial histological evaluation of these lesions was performed on H and E stained section of paraffin embedded tissue. Special stains like Periodic Acid Schiff (PAS) and Periodic acid Schiff with diastase (PA SD) were done whenever indicated. The immuno-histochemical evaluation was performed by using peroxidase antiperoxidase (PAP) technique whenever it was required. The antibodies used in immunohistochemical staining included Glial fibrillary acidic protein (GFAP), S-100 protein, Leucocyte common antigen (LCA), Neuron specific enolase (NSE), Neurofilament, Epithelial membrane antigen (EMA), Cytokeratins and Alpha fetoprotein depending upon the nature of lesion.

Results

A total of 54 cases of intracranial tumors were diagnosed in children under the age of fifteen years in the section of histopathology during the three year period of 1995-1997. The age ranged from 1 ‘/2 years to 14 years with male to female ratio of 1 .1:1. In the present study, astrocytoma was the most common tumor, which comprised 39% of all pediatric intracranial tumors, followed by medulloblastoma 18.6% and ependymoma 13%. The less common tumors included oligodendroglioma 7.5%, mixed glial tumors 3.7%, neuroblastoma 3.7% and ganglioglioma 3.7% while non-Hodgkin’s lymphoma, primitive neuroectodermal tumors, mixed germ cell tumor, pineoblastoma, choroid plexus carcinoma and malignant meningioma constituted 1 .8% each of all pediatric intracranial tumors. The results are depicted in Table I.

Table 1. Histopathological pattern of pediatric intracranial tumors.

Histological type	Number of cases	(%)
Astrocytoma	21	(39)
Pilocytic astrocytoma	13	(62)
Astrocytoma Grade III	4	(19)
Astrocytoma Grade IV	4	(19)
Medulloblastoma	10	(18.6)
Ependymoma	7	(13)
Oligodendroglioma	4	(7.5)
Mixed glial tumor	2	(3.7)
Ganglioglioma	2	(3.7)
Neuroblastoma	2	(3.7)
Primitive neuroectodermal tumor (PNET)	1	(1.8)
Mixed germ cell tumor	1	(1.8)
Pineoblastoma	1	(1.8)
Malignant meningioma	1	(1.8)
Non-Hodgkin's lymphoma	1	(1.8)
Choroid plexus carcinoma	1	(1.8)
Total	54	(100)

Medulloblastoma was more prevalent in male patients with male to female ratio of 9:1 while pilocytic astrocytoma was more common in females with male to female ratio of 1:2. Posterior cranial fossa was the most common site for neoplastic lesions and it was involved in 43.5% of cases, followed by cerebral hemisphere 39.1% and the other less frequent sites 17.4%. The site distribution of intracranial tumors is shown in Table 2.

Table-2. Site distribution of intracranial tumors.

Tumor site	Percentage of cases
Posterior cranial fossa	43.5
Cerebral hemisphere	39.1
Other sites	17.4

Pilocytic astrocytoma was thç most common (62%) among the astrocytomas. Pilocytic astrocytoma occurred more frequently in the posterior cranial fossa as compared to high grade astrocytoma that was more common in cerebral hemisphere (Table 3).

Table 3. Site distribution of astrocytoma in children.

Histological type of tumor	Posterior cranial fossa	Cerebral hemisphere	other sites
Pilocytic astrocytoma	50 %	17 %	33 %
High grade Astrocytoma	14 %	57%	29 %

Discussion

Morbidity and mortality caused by the malignant tumors is becoming an increasingly serious problem all over the world, in developing countries, the prevalence rate of pediatric tumors has been reported from 4.38% to 12.6%[1-5] while in developed countries, the prevalence rate of childhood tumors is 2%[8]. This high frequency of pediatric tumors in developing countries could be attributed to the increased percentage (39% of total population) of children in the overall population[9].

Intracranial tumors constitute about one third of all pediatric malignant neoplastic lesions[3]. A local published series of intracranial tumor revealed the highest prevalence rate of intracranial neoplastic lesions in second and third decade of life[10].

In the present study, astrocytoma was the most common intracranial tumor (39%) followed by

Medulloblastoma (18.4%) and ependymoma (13%). These findings are in accordance with the published series of pediatric tumors by Young et at[8]. Haneef and Ashraf reported a relatively higher frequency of medulloblastoma as compared to astrocytoma in children[11].

In the Western literature, medulloblastoma is more common in male with male to female ratio of 2:1[12]. In the present study, a much higher frequency of medulloblastoma was noted in males as compared to females with male to female ratio of 9:1.

Posterior cranial fossa was involved in 43.5% of cases which is relatively lower than the figure of 70% reported in the Western literature[13]. Infratentorial tumors are more frequent in children while supratentorial neplasms are more common in adults[7]. Pilocytic astrocytoma (low grade) was more prevalent in posterior cranial fossa as compared to high grade astrocytoma which was more frequent in the supratentorial area. The other series also state that pilocytic astrocytoma occurs more commonly in children and pilocytic astrocytoma comprises about 85% cases of astrocytomas arising in the cerebellum[14,15].

The present study has got the limitation of hospital laboratory based statistics. There is a need for national tumor registry, which is required to have more accurate and precise calculation of prevalence rate, incidence and pattern of malignant pediatric intracranial tumors in our population.

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