Morphological Pattern of Posterior Cranial Fossa Tumors

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Background: Posterior cranial fossa tumors are potentially fatal tumors since they can result in brainstem compression. These tumors constitute 54-70% 0f childhood brain tumors and 15-20% of adult brain tumors.

Objective: To analyze the histological types and to determine the frequency of posterior cranial fossa tumors in children and adults at INMOL hospital Lahore.

Method: It was a retrospective study in which 62 consecutive cases of posterior cranial fossa tumors were studied from Feb'2008 to Nov'2008. In this period, files of patients presenting with posterior cranial fossa tumors were retrieved from hospital record. The data of patients along with histopathological reports were studied.

Results: Among 62 patients, 43 (69.35%) were male and 38 (61.29%) patients were adult. The morphological distribution of the posterior cranial fossa tumors was as follows: Meningioma – 7 cases (11.2%), Schwannoma – 12 cases (19.3%), Acoustic Neuroma – 20 cases (32.25%), Medulloblastoma – 9 cases (14.5%), Pilocytic Astrocytoma – 2 cases (3.22%), high grade Astrocytoma – 3 cases (4.83%), Metastatic carcinoma – 5 cases (8.06%) and malignant round blue cell neoplasm – 4 cases (6.45%).

Conclusion: Acoustic neuroma was the commonest benign tumor and medulloblastoma was found to be the predominant malignant tumor in this study. Medulloblastoma was also seen the commonest posterior cranial fossa tumor in children.

Key Words: Meningioma, Acoustic Neuroma, Medulloblastoma, Astrocytoma.

Introduction

Posterior cranial fossa tumors can cause brainstem compression, herniation and death. With the advent of new diagnostic techniques like CT scan and MRI, posterior cranial fossa tumors are commonly diagnosed nowadays. These tumors constitute 54-70% of childhood brain tumors and 15-20% of adult brain tumors.[1] A good percentage of posterior cranial fossa tumors show a high morbidity and mortality in these patients. The factors contributing to high morbidity and mortality include late presentation when the tumor has locally infiltrated and metastasized outside the cranial cavity and tumor morphology (high grade astrocytoma and metastatic carcinoma).

Posterior cranial fossa tumors in children differ from adults in their clinical presentation, behavior, management and prognosis. Astrocytoma and PNET of same histological grade show a relatively better prognosis in children than in adults[2]. The overall prognosis of patients with medulloblastoma has relatively improved due to radiation and chemotherapy. Five year survival rate is seen in 80% of patients when tumor is localized to posterior cranial fossa at time of diagnosis[3]. In cases of pilocytic astrocytoma, complete resection is possible when the tumor is of small size and related to optic nerve. When these tumors acquire a bigger size and involve the deeper brain tissue, prognosis is less favorable[4].

The benign lesions like acoustic neuroma and schwannoma at cerebellopontine angle can also be life threatening due to their location adjacent to vital structures. The advancement in neuroradiological diagnostic techniques has resulted in detection of very small sizes lesions which when managed effectively benefit the patient[5]. However, recurrences of benign lesions like meningiomas increases the morbidity and mortality anyways[6].

This study is designed to determine the frequency and histological types of posterior cranial fossa tumors in children and adults.

Materials and Methods

Most of the cases were received from various tertiary care teaching hospitals and few from private clinics. The data including age, sex, tumor site and histological diagnosis were collected. This study comprises of 62 consecutive cases of posterior cranial fossa tumors in all age groups. Patients more than 12 years were listed as adults. Neurosurgical intervention was carried out in all these cases. Following surgery, specimens were sent for histopathological evaluation and microscopic diagnosis was made. Non-operated children and adults were excluded from this study. The files of patients presenting with posterior fossa tumors were retrieved from hospital record from Feb'2008 to Nov' 2008. These patients were diagnosed and treated at INMOL, Lahore. The data of patients along with histopathological reports were collected from record and studied.

Results

The gender distribution was 43 (69.35%) male and 19 (30.65%) female patients. Among these patients, 38

(61.29%) were adults and 24 (38.71%) were children. On histological examination, the following posterior cranial fossa tumors were identified (Table 1). Meningioma: 7 cases (11.2%), Schwannoma 12 cases (19.3%), Acoustic Neuroma 20 cases (32.25%), Medulloblastoma 9 cases (14.5%), Pilocytic Astrocytoma 2 cases (3.22%), high grade Astrocytoma 3 cases (4.83%), Metastatic carcinoma 5 cases (8.06%) and malignant round blue cell neoplasm 4 cases (6.45%). The male to female ratio for each tumor is presented in Table 2 and the distribution with respect to age groups is discussed in Table 3.

Table 1: *Distribution of Posterior Cranial Fossa Tumors by Morphological Types.*

Morphological Type	No. of cases	Percentage
Meningioma	7	11.2%
Schwannoma	12	19.3%
Acoustic Neuroma	20	32.25%
Medulloblastoma	9	14.5%
Pilocytic Astrocytoma	2	3.22%
High Grade Astrocytoma	3	4.83%
Metastatic Carcinoma	5	8.06%
Malignant Round Blue Cell Neoplasm	4	6.45%
Total	**62**	**100%**

Table 2: *Morphological Distribution of Posterior Cranial Fossa Tumors by Gender*

Morphological Type	Male	Female	M:F
Meningioma	5	2	2.1:1
Schwannoma	8	4	2:1
Acoustic Neuroma	13	7	1.85:1
Medulloblastoma	7	2	3.5:1
Pilocytic Astrocytoma	2	0	2:0
High Grade Astrocytoma	2	1	2:1
Metastatic Carcinoma	3	2	1.5:1
Malignant Round Blue Cell Neoplasm	3	1	3:1

Complete excision was possible in 5 cases of Meningioma, 11 cases of schwannoma, 18 cases of acoustic neuromanad in 2 cases of pilocytic astrocytoma. The patients with medulloblastoma, high grade astrocytoma and undifferentiated malignant neoplasm received course of radiotherapy and chemotherapy. 4 cases were diagnosed malignant round blue cell neoplasms.

Table 3: *Morphological Distribution of Posterior Cranial Fossa Tumors by Age Group*

Morphological Type	Age Group	
	Peadiatric (%)	Adult (%)
Meningioma	2 (28.57%)	5 (71.43%)
Schwannoma	5 (41.67%)	7 (58.33%)
Acoustic Neuroma	5 (25%)	15 (75%)
Medulloblastoma	6 (66.67%)	3 (33.33%)
Pilocytic Astrocytoma	2 (100%)	0
High Grade Astrocytoma	1 (33.33%)	2 (66.67%)
Metastatic Carcinoma	0	5 (100%)
Malignant Round Blue Cell Neoplasm	3 (75%)	1 (25%)

Discussion

WHO guidelines were followed for histological classification of posterior cranial fossa tumors[7]. Acoustic neuroma was the commonest tumor (20/62=32.25%) in our study. Although acoustic neuroma are seen in all age groups, but mostly these tumors occur in age ranging from 40-60 years. In our series, 15/20 cases (75%) were present in adults. This finding is similar to study conducted by J.P.P.M. Van Leeuwen et al[8]. After development of modern imaging techniques, small acoustic tumors can be identified and it has greatly reduced morbidity and mortality. Acoustic neuromas acquire a large size and at times are difficult to excise because a part of tumor is firmly adherent to the brain stem. Treatment of acoustic neuroma has been a major feature of neurosurgical practice[9]. 12 out of 62 cases (19.35%) were of schwannoma, which is contrary to stated incidence of this tumor, that schwannoma comprise 8% of all intracranial neoplasms.[10]

Meningioma was seen in 7/62 cases (11.62%). Meningiomas are uncommon in infancy and childhood as it was also observed in this study where 2/7 cases (28.57%) were seen in this age group. In this series, no case of atypical or malignant meningioma was identified. In our study, complete resection of meningioma was carried out in 5 out of 7 cases. The meningiomas in the posterior cranial fossa are difficult to excise completely even by skilled surgeons.

Medulloblastoma was found to be the predominant malignant brain tumor (9/23=39.13%) in our study and it can be compared with most other published studies.[11] Intracranial neoplasms account for 20-25% of all pediatric malignancies[12] of which medulloblastoma are most frequently encountered. It was also found to be the commonest posterior cranial fossa tumor in children included in our study accounting for 25% (6/24) of all pediatric cases.

Certain tumors present in particular age group as it was also observed in this study. The difference being the all 5

cases of metastatic carcinoma and 2 out of 3 cases of high grade astrocytoma were seen in adults than in children. The study included 5 cases of metastatic carcinoma. The overall incidence of brain metastasis is not affected by the patient's gender. The incidence of brain metastasis varies with patient's age.[13] Brain metastasis is more common in old age.

Two completely resectable cases (3.22%) of pilocytic astrocytoma were encountered in children. High grade astrocytomas were seen in 3 cases (4.83%), two among adults and one in pediatric age group. The great variations are seen in the frequency of astrocytomas as reported by one srudy.[14] We separated 2 cases of pilocytic astrocytoma from 3 cases of high grade astrocytoma because of their difference in clinical behaviour and prognosis. It is essential to recognize these unusual gliomas with different clinical course from common gliomas. Small number of cases of astrocytoma (5/62) seen in our study can be due to the reason that this is a hospital base study and may not reveal the incidence of this neoplasm.

Four cases were diagnosed malignant round blue cell neoplasms and could not be further classified because of non-availability of immunohistochemical stains. Early investigations and diagnosis is necessary to improve the overall prognosis of the patients with posterior cranial fossa tumors. The patients should seek advice from neurosurgical units when having the neurological symptoms. Neurosurgical centers must have the ability to provide all treatment options if to achieve optimal results for patients. Timely referral of the patient to specialized neurosurgical unit and oncological centers is recommended.

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