Original article

Clinicopathological study of posterior fossa intracranial lesions

Dukkipati Kalyani, S. Rajyalakshmi, O. Sravan Kumar

Department of Pathology, Gandhi Medical College, Secunderabad-500 044, Telangana, India.

Article history

Received 10 February 2014
Accepted 26 July 2014
Online 31 July 2014
Print 31 July 2014

Abstract

Tumors of the posterior fossa of brain leads to complications like brain stem compression, herniation and death because of its critical location, limited space and involvement of vital brain stem nuclei. This study has been conducted in the department of Pathology and Neurosurgery, Gandhi Medical College, Secunderabad from December 2008 to December 2010. The aim and objectives of this study were to analyze the histological types and to determine the frequency of posterior cranial fossa tumors in children and adults at Gandhi Hospital, Hyderabad and to study the different clinical presentations of posterior fossa space occupying lesion (SOL) and its correlation with radiological and pathological findings. Each tumor type has a different mode of presentation according to the site. With advent of modern diagnostic modalities early diagnosis and treatment is possible.

Key words: brain tumor, posterior intracranial fossa, Squash cytology

Tumors in the posterior fossa are considered critical brain lesions, due to the risks involved like brain stem compression, herniation and death. They constitute 54-70% of childhood brain tumors and 15-20% of adult brain tumors. The factors contributing to high morbidity and mortality of these tumors include late presentation when the tumor has locally infiltrated and metastasized outside the cranial cavity and the tumor morphology. Advancement in neuroradiological diagnostic techniques now helps in the detection of very small sized lesions which can be managed effectively. However, recurrences of benign lesions like Meningiomas increase the morbidity and mortality.

The purpose of this study was to analyze the histological types and to determine the frequency of posterior cranial fossa tumors in children and adults. Also we wanted to study the different clinical presentations of posterior fossa space occupying lesion (SOL) and its correlation with radiological and operative findings.

Materials and methods

This study has been conducted in the department of Pathology and Neurosurgery, Gandhi Medical College & Hospital, Secunderabad from December 2008 to November 2010.

The data including age, sex, tumor site, operative findings, radiological and histological diagnosis were collected. This study comprised of 52 cases of posterior cranial fossa tumors in all age groups out of 127 cases of intra cranial space occupying lesions (ICSOL) admitted in the department of Neurosurgery, Gandhi Medical College & Hospital.
Secunderabad during the study period. Patients who died before any therapeutic measure could not be taken, patients who left the hospital against medical advice were excluded, vascular and trauma cases were also excluded from our study.

Neurosurgical intervention was carried out in all these cases. Following surgery, specimens were sent for squash cytology and histopathological evaluation. After analyzing those findings, immunohistochemistry was done for few cases wherever necessary.

Results

Out of 127 cases of ICSOL, there were 52 cases of posterior fossa SOL (Fig 1).

On histological examination, the various types of posterior cranial fossa tumors were identified (Fig 2-18).

The commonest tumor is Schwannoma (23%), while the second most common tumor is Medulloblastoma (17%).
Clinicopathological study of posterior fossa lesions

Fig 5. Squash cytology of Pilocytic Astrocytoma, Touluidine Blue 10X.

Fig 6. High grade Astrocytoma with more malignant features and vascular proliferation, H&E 40X.

Fig 7. Psammomatous Meningioma, H&E 40X.

Fig 8. Atypical Meningioma, H&E 40X.

Fig 9. Metastatic papillary Adenocarcinoma H&E 10X.

Fig 10. Metastatic poorly differentiated Adenocarcinoma, H&E 10X.

Fig 11. Epidermoid cyst with flakes of lamellated keratin, H&E 10X.

Fig 12. Ependymoma, H&E 10X.
The gender distribution was (69.3%) male and (30.76%) female patients (Fig 19). Male predominance (2.1:1).

Children are more commonly effected (55.76%) than in adults (44.24%). Schwannoma is the commonest tumor in adults whereas Medulloblastoma is the commonest tumor in children (Fig 20).

Most of the patients presented with cerebellar signs (89.2%). Headache with vomiting was the most common symptom (70.3%). Multiple cranial nerve palsies were seen in 56.8% of patients. Third, sixth & seventh cranial nerves were frequently involved. Pyramidal tract signs were seen in 10.8% of cases. CT scan revealed the presence of hydrocephalus in 56.8% of cases (Fig 21).

The management of all 52 cases is presented in table 1. The patients with Medulloblastoma, high grade Astrocytoma and undifferentiated malignant neoplasm received courses of radiotherapy and chemotherapy.

**Discussion**

With the advent of new diagnostic techniques, early diagnosis and treatment of posterior cranial fossa tumors are possible.
Clinicopathological study of posterior fossa lesions

Fig 19. Morphological distribution of posterior cranial fossa tumors by gender

Fig 20. Morphological distribution of posterior cranial fossa tumors by age group

Fig 21. Clinical features
Table 1: Treatment and result

<table>
<thead>
<tr>
<th>Type of Treatment</th>
<th>No. of Patients</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shunting + Definitive operation</td>
<td>11</td>
<td>Two deaths</td>
</tr>
<tr>
<td>Shunting + Definitive operation + Radiotherapy</td>
<td>25</td>
<td>Two deaths</td>
</tr>
<tr>
<td>Shunting + Radiotherapy</td>
<td>4</td>
<td>One death</td>
</tr>
<tr>
<td>Definitive operation + Radiotherapy</td>
<td>4</td>
<td>One death</td>
</tr>
<tr>
<td>Definitive operation without shunt</td>
<td>8</td>
<td>All Cured</td>
</tr>
</tbody>
</table>

These tumors vary in their clinical behavior in different age groups and also among various histological types. But they are critical and may cause complications like brainstem compression, herniation and death.

A total of 52 cases of posterior fossa ICSOL were studied. Out of these 69.3% were seen in males. Children are more commonly affected (55.76%) than adults (44.24%). Most of the patients presented with cerebellar signs (89.2%).

Among various morphological types, Schwannoma (23.07%) was the commonest tumor and mostly seen in adults (66.67%). Medulloblastoma (17.3%) was the second most common tumor exclusively seen in children.

Posterior cranial fossa tumors in children differ from adults in their clinical presentation, behavior, management and prognosis. The benign lesions like Schwannoma at cerebello-pontine angle can also be life-threatening due to their location adjacent to vital structures. But they can be diagnosed and managed effectively due to the advancement in neuroradiological diagnostic techniques by which very small lesions can be detected.

In our study the frequency of posterior fossa SOL is 69.3% with male predominance and most of the patients (89.2%) presented with cerebellar symptoms, both features being similar to other studies.

WHO guidelines were followed for histological classification of posterior cranial fossa tumors. 23.07% were Schwannoma, which varies from the stated incidence of this tumor in literature which is about 8% of all intracranial neoplasms. Medulloblastoma was found to be the second predominant malignant brain tumor (17.3%) in our study and this incidence is comparable with most other published studies. Intracranial neoplasms account for 20-25% of all pediatric malignancies, of which Medulloblastomas are most frequently encountered. This was also found to be the commonest posterior cranial fossa tumor in children in our study.

Certain tumors are common in particular age groups, as it was also observed in this study. All 3 cases of metastatic carcinoma and 2 out of 5 cases of high grade Astrocytoma were seen in adults than in children. The incidence of brain metastasis varies with patient's age and is more common in old age.

Meningiomas are uncommon in infancy and childhood (9.6% incidence). In this study, 28.57% were seen in this age group. In this study, 1 case of atypical or malignant Meningioma was identified.

In our study, complete resection of Meningioma was carried out in 3 out of 5 cases. The Meningiomas in the posterior cranial fossa are difficult to excise completely even by skilled surgeons. Two completely resectable cases of pilocytic Astrocytoma were encountered in children.

Great variations are seen in the frequency of Astrocytomas as reported by one study. Small number of cases of Astrocytoma (5 out of 52) seen in our study can be due to the reason that this is a hospital-based study and may not reveal the true incidence of this neoplasm. 2 cases were diagnosed malignant round blue cell neoplasms and were further classified by immunohistochemical stains.

Early investigation and diagnosis are necessary to improve the overall prognosis of the patients with posterior cranial fossa tumors. A total number of 6 deaths were recorded in our series with a follow-up of 2 years. The 5-year survival rates exceed 60% for all patients and 80% for certain good-risk individuals with posterior fossa tumors.

Conclusion

Posterior fossa tumors are considered critical brain lesions because of the limited space and involvement of vital brain stem nuclei and fourth ventricle.
Brain stem compression, herniation, hydrocephalus and death are all risks in this location. Even though the situation was gloomy previously, now with advent of modern diagnostic and therapeutic modalities early diagnosis and treatment is possible and thereby mortality rate has been much reduced.

Acknowledgments: None

Conflict of interest: None

References