ORIGINAL RESEARCH

Analysis of paediatric patients with posterior fossa tumor- observational retrospective and prospective study

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ABSTRACT

Background: Brain tumor is quite common in paediatric age group and is one of the most common solid tumor in this age group, mainly in the posterior fossa. The present study was analysis of paediatric patients with posterior fossa tumor. **Materials & Methods:** 37 paediatric patients presented to the emergency department or outpatient department with posterior fossa tumor were selected. Parameters such as presenting symptoms and durations, clinical findings, pre-operative imaging like CT scan and MRI, details of surgical intervention performed, HPE reports, post-operative complications. **Results:** Out of 37 patients, males were 21 and females were 16. The common signs &symptoms were raised ICP in 37, cerebellar signs in 36, papilledema in 29, IX & X cranial nerve palsy in 21 and other cranial nerve palsy in 8 cases. The difference was significant (P< 0.05).Gross hydrocephalus was present in 73% (N= 27). Major site of involvement was 4th ventricle, followed by cerebellar vermis and then brain stem. Medulloblastoma tends to push 4th ventricle anteriorly while cerebellar astrocytoma and tuberculoma push it anterolateral and backwardly in brainstem glioma. Tumor bleed was seen in 13.5 % (N=5).The difference was significant (P< 0.05). Outcomewas recurrence/ residual in 16, cerebellar mutism in 12, meningitis in 7, shunt revision in 12, tracheostomy in 12, post-op chemo radiation in18, hemi/quadriplegia in 6, loss of vision in 2 and mortality in 21 cases. The difference was non- significant (P< 0.05). **Conclusion:** Paediatric brain tumor is one of the most common solid tumor in this age group with incidence as high as 2-3.5 per 10,000. Approximately 60-70 % of these tumors are located in posterior fossa. There is more male preponderance and majority of the patients are under 10 years of age. The most common tumors of paediatrics posterior fossa tumor reported in literatures are Medulloblastoma, followed by Pilocytic astrocytoma, brain stem glioma and ependymoma. Other less common types are choroid plexus papilloma, tuberculoma, dermoid and epidermoid. The most common sites are cerebellar hemisphere, cerebellar vermis, brain stem and 4th ventricle.

Keywords: brain tumor, medulloblastoma, posterior fossa tumor

INTRODUCTION

Brain tumor is quite common in paediatric age group and is one of the most common solid tumor in this age group, mainly in the posterior fossa.[1] It comprises approximately 40%– 50% of all tumors, of which 60-70% are in the posterior fossa.[2] The estimated incidence of brain tumors in children is 2–3.5 per 100,000. In India, it is around 14.8 % of the total intracranial tumor.[3] The common types are juvenile pilocytic astrocytoma, medulloblastoma, ependymoma, and brainstem glioma. Rarely, atypical rhabdoid/teratoid tumor, hemangioblastoma, dermoids, schwannoma of the VIIIth cranial nerve, cerebellar gangliocytoma, meningioma, high-grade glioma, and metastatic lesions are seen. The presentation can be dramatic due to the limited space here and the potential for involvement of the vital brainstem nuclei.[4]

When a child presented with features of acute hydrocephalus, immediate surgical intervention is usually required. Cushing was the first to publish a large series of posterior fossa tumors, about 61 patients with cerebellar medullablastoma, which were mostly fatal. Due to the advancement in anaesthesia, aseptic technique, early and more accurate diagnosis due to improved radiology along with improvement in

surgical technique, the outcome has improved.[5] The aim of this study was to analyze the time from symptoms onset to diagnosis, the diagnostic modalities and treatment option available and correlate with the various histological types so that more understanding and protocol for management can be evolved.

MATERIALS & METHODS

The study was conducted in the Department of Neurosurgery, All India Institute of Medical Sciences (AIIMS), Bhubaneshwar. The study period was of 03 years from Jan 2017 to Dec 2019. All the paediatric patients presented to the emergency department or outpatient department with posterior fossa tumorwere selected. All gave their written consent to participate in the study.

Data such as name, age, gender etc. was recorded. Parameters such as presenting symptoms and durations, clinical findings, pre-operative imaging like CT scan and MRI, details of surgical intervention performed, HPE reports, post-operative complications, postoperative imaging like CT scan and MRI and details adjuvant radiotherapy and chemotherapy received were recorded. For retrospective data, MRD files, OPD files, discharge summaries and radiology stored in the department was used. Patients meeting the inclusion criteria were followed prospectively. Follow up was done on OPD basis, telephonic conversation and through postal services for a minimum period of 6 months. CEMRI Brain was done at 3 months to look for residual or recurrent tumor and was treated accordingly.Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 37		
Gender	**Male**	**Female**
Number	21	16

Table I shows that out of 37 patients, males were 21 and females were 16.

Table II Presenting symptoms and signs of the study participants

Signs & Symptoms	Number	P value
Raised ICP	37	0.82
Cerebellar signs	36	
Papilledema	29	
IX & X Cranial nerve palsy	21	
Other cranial nerve palsy	8	

Table II, graph I shows that common signs &symptoms were raised ICP in 37, cerebellar signs in 36, papilledema in 29, IX & X cranial nerve palsy in 21 and other cranial nerve palsy in 8 cases. The difference was significant ($P< 0.05$).

Graph I Presenting symptoms and signs of the study participants

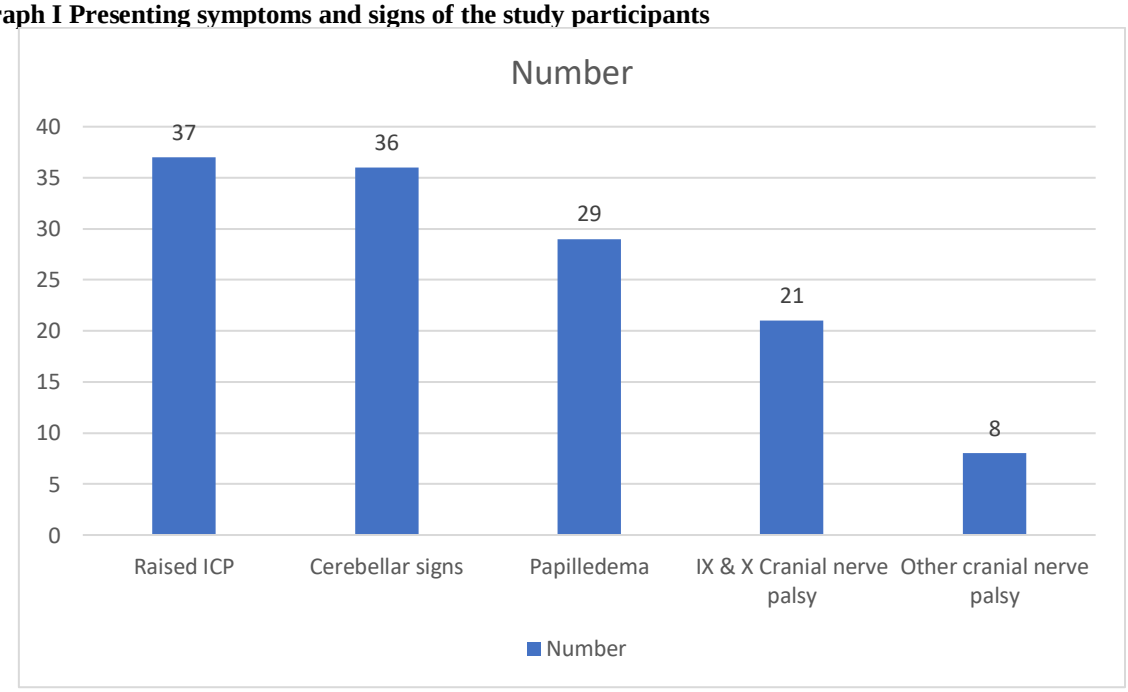

Table III Imaging characteristics of the study participants

Parameters	Variables	Number	P value
Location	Brain stem	3	0.05
	4th Ventricle	21	
	Cerebellar vermis	6	
	Cerebellarhemisphere	5	
	Posterior fossa	2	
Tumor bleed	Yes	5	0.01
	No	32	
Hydrocephalus	Yes	27	0.03
	No	10	

Table III shows that Gross hydrocephalus was present in 73% (N= 27). Major site of involvement was 4th ventricle, followed by cerebellar vermis and then brain stem. Medulloblastoma tends to push 4th ventricle anteriorly while cerebellar astrocytoma and tuberculoma push it anterolateral and backwardly in brainstem glioma. Tumor bleed was seen in 13.5 %(N=5).The difference was significant (P< 0.05).

Table IV Treatment outcome and complications among the study participants

Outcome	Number	P value
Recurrence/ Residual	16	0.64
Cerebellar mutism	12	
Meningitis	7	
Shunt revision	12	
Tracheostomy	12	
Post-op chemo radiation	18	
Hemi/quadriplegia	6	
Loss of vision	2	
Mortality	21	

Table III shows that outcome was recurrence/ residual in 16, cerebellar mutism in 12, meningitis in 7, shunt revision in 12, tracheostomy in 12, post-op chemo radiation in18,hemi/quadriplegia in 6, loss of vision in 2 and mortality in 21 cases. The difference was non- significant (P< 0.05).

DISCUSSION

Developing countries like India have lack of complete registration of cancer cases integrating local cancer cases.[6] Therefore, the true incidence of paediatric posterior fossa tumor may be under-estimated and there is incomplete information on the clinical profile and long- term prognosis.[7,8] In 2011 study of incidence of paediatric brain tumor in India was estimated to comprise approximately 14.8 % of the total intracranial tumor in India, and the number is rising due to more diagnostic facilities and tertiary medical center.[9,10] Due to this high incidence and mortality, better understanding of paediatric posterior fossa tumor is needed to plug the lacunae in our understanding of the disease demographic profile, clinical features, diagnostic modalities, treatment protocols and outcomes.[11,12] In our study, we compared the demographic profile, clinical features, treatments of paediatric posterior fossa tumor and surgical outcomes in term of morbidity and mortality.

We found that out of 37 patients, males were 21 and females were 16.We found that common signs & symptoms were raised ICP in 37, cerebellar signs in 36, papilledema in 29, IX & X cranial nerve palsy in 21 and other cranial nerve palsy in 8 cases. Prasad et al[13]analyzed the incidence, clinical features, surgical outcome, complications, and prognosis in a series of 37 pediatric patients with posterior fossa tumors. The most common presenting symptoms are raised intracranial pressure with headache and vomiting. Majority of the tumors are medulloblastomas, ependymomas, and cerebellar astrocytomas. The most common location is the cerebellar vermis, followed by the cerebellar hemispheres, followed by the fourth ventricle and then the brainstem.

We found that gross hydrocephalus was present in 73% (N= 27). Major site of involvement was 4th ventricle, followed by cerebellar vermis and then brain stem. Medulloblastoma tends to push 4th ventricle anteriorly while cerebellar astrocytoma and tuberculoma push it anterolateral and backwardly in brainstem glioma. Tumor bleed was seen in 13.5 % (N=5). We observed that outcomewas recurrence/ residual in 16, cerebellar mutism in 12, meningitis in 7, shunt revision in 12, tracheostomy in 12, post-op chemo radiationin 18, hemi/quadriplegia in 6, loss of visionin 2 and mortality in 21 cases. Moussalem et al[14] in their study, the patient sample consisted of 64 patients having a mean age of 6.19 ± 4.42 years and 59.37 % of whom were males. The most common tumor pathology was pilocytic astrocytoma (40.62 %) followed by medulloblastoma (35.93 %) and ependymoma. The most common type of tumor that was seen in patients that developed mutism postoperatively (n = 6, 9.37 %) was medulloblastoma (n = 4, 66.66 %). In this patient sample, 12.28 %

(n = 7) of the patients developed hydrocephalus post-operatively.Midline tumors were more associated with the development of mutismand hydrocephalus postoperatively, albeit not statistically significantly.The presence of a preoperative shunt was shown to be protective against the development of CSF leak, as none of the patients that came in with CSF diversion developed a CSF leak after their surgery.

The limitation of the study is the small sample size.

CONCLUSION

Authors found that paediatric brain tumor is one of the most common solid tumor in this age group with incidence as high as 2-3.5 per 10,000. Approximately 60-70 % of these tumors are located in posterior fossa. There is more male preponderance and majority of the patients are under 10 years of age. The most common tumors of paediatrics posterior fossa tumor reported in literatures are Medulloblastoma, followed by Pilocytic astrocytoma, brain stem glioma and ependymoma. Other less common types are choroid plexus papilloma, tuberculoma, dermoid and epidermoid. The most common sites are cerebellar hemisphere, cerebellar vermis, brain stem and 4th ventricle.

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