SURGICAL OUTCOME OF PAEDIATRIC POSTERIOR FOSSA TUMOUR AFTER GROSS TOTAL REMOVAL AND SUBTOTAL REMOVAL

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Abstract:

This prospective study was done in Neurosurgery department, Dhaka Medical College Hospital. It was conducted from January 2003 to December 2005. During this period 40 paediatric posterior fossa tumour patients were admitted. The mean age of the patients was 8.31+3.1 years ranging from 3.5 to 15 years. The main complaints were headache with vomiting (100%), Dimness of vision (70%), Ataxia (52.5%), Blindness (25%). All cases had a definite diagnostic investigation at the time of admission. Plain x-ray skull was done in all patients followed by MRI scan (42.5%), CT scan (37.5) and both CT and MRI scan (20%). In all cases CSF diversion (VP shunt) were instituted. All patients were operated by suboccipital craniectomy followed by gross total removal of tumour in (62.5%) and subtotal removal in (37.5%). In all cases diagnosis was confirmed by histopathological examination. In cases of subtotal resection, symptoms (Headache, vomiting) appeared during 7-9 months follow up period in (7.5%) and subsequent follow up in (12.5%). But in gross total removal symptoms appeared in one case (2.5%) in 13-15 months follow up period.

Key Words: *Gross total removal, subtotal removal, paediatric, posterior fossa tumour*

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Introduction:

Childhood (0-15 years) brain tumour differ from those of adults, particularly in regarding their histological types and intracranial distribution. In pediatric patients medulloblastoma, astrocytoma, ependymoma and brain stem glioma are more in posterior fossa tumours. About 70% of childhood tumours are infratentorial in compare to adult are only 30%.[1]

Brain tumour are the 2nd most common malignancy next to leukemias in case of children. Primary brain tumour are responsible for 20% of malignant tumours diagnosed before the age of 15 years.[2]

Medulloblastoma or posterior fossa primitive neuroectodermal tumours are aggressive tumours characterized histologically by small dark cells with scanty cytoplasm. They constitute 20-25% of all pediatric brain tumours but are rare in adults.[3]

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Medulloblastoma is the most common type of childhood brain tumour. Tumour dissemination is associated with a marked reductions in 5 years survival rates to approximately 25%.[4]

Most histologically benign forms of astrocytomas occur in childhood. The most potentially curable form is the pilocystic cerebellar astrocytoma in children; this accounts for up to 55% of low grade astrocytomas in childhood and usually presents with clinical features related to hydrocephalus or posterior fossa cyst formation. Typically there is a large cyst with a single enhancing mural nodule, although these tumors can have multiple cysts or be completely solid.[5]

Ependymomas arise from the ventricular lining and are characterized by ciliary bodies on electron microscopy or ependymal rosettes histologically. They account for approximately 1-5% of primary brain tumours. About 70% of ependymomas occur in the fourth ventricle and often extend through the foramen of Luschka into the cerebellopontine angle cisterns.[6]

The surgical management of masses in the posterior fossa depends on the patients general condition and an evaluation of the imaging studies. An assessment

of patients presented with tumour associated hydrocephalus needs attention and several management decisions will need to be made. Symptomatic associated hydrocephalus should be managed immediately and effectively.[7]

The goals of postrior fossa tumour surgery are definition of the extent of tumour, resection of as much of the tumour as can be achieved without causing significant neurological deficit and correction of secondary hydrocephalus with re establishment of CSF pathway.[8]

Surgery is the primary treatment for the majority of children with brain tumours and a surgical resection that is as complete as possible is important for the best long term outcome of the most tumors.[9]

Surgical debulking of medulloblastoma is the 1st line of therapy and a radical resection increases the chance for cure in patients with no metastasis at diagnosis adjuvant therapy is needed for all patients. Surgical resection is the treatment of choice for cerebellar astrocytomas. It is said to be the most readily resected tumour. Ten year progression free survival rates among patients who undergo a gross total resection without other adjuvant therapy.[10]

Ependymomas are the fourth most common tumour of the posterior fossa in children but the third most common after medulloblastoma and cerebellar astrocytomas to presented by obstructing the 4th ventricle, causing hydrocephalus and signs symptoms of increased intracranial pressure. They usually arise in the midline from the floor of the 4th ventricle near the area prostrema in the vomiting centre of the brain.[11]

Clinical Materials & Methods:

This prospective study was carried out in the department of Neurosurgery, Dhaka Medical College Hospital, Dhaka. It was conducted from January 2003 to December 2005. The sample size was 40. Patients with posterior fossa tumour and Patients having associated obstructive hydrocephalus was included in this study.

Data collection procedures- A printed research instrument (proforma) was prepared and the data were entered into the proforma. Information were history of illness, clinical examination of the patients, appropriate investigation (CT and / or MRI), response to VP shunt, definitive surgical procedure and operative findings and operative outcome at discharge and subsequent follow up (3 months to 15 months). 40 paediatric patients with posterior fossa tumour associated with hydrocephalus were admitted in the study period.

The collected data were edited, compiled and statistical analysis was down by using computer based software SPSS (statistical package for social science) 7.5 program. The data were presented in table. Patients were managed by surgical procedure, histopathology, radiotherapy and follow up.

Results:

In this study 40 cases of paediatric posterior fossa tumour have been evaluated.

The mean age of the patients was 8.31±3.1 years ranging from 3.5 to 15 years. More than two fifths (62.5%) of the patients were in the age range of 6 to 10 years followed by 22.5% in the age range of 11-15 years. However, 15.0% of the patients were in the age group less than six years (Table-I).

Table-I

Age distribution of the patients (n=40)

Age in years	No.	%
0-5	6	15.0
6-10	25	62.5
11-15	9	22.5
Total	40	100.0

The mean duration of illness was 8.1±4.0 months. The highest percentage of patients had duration of illness ranging from 6-10 months followed by 11-15 months and the lowest in the range of 0 to 5 months.

The most common presenting features were headache and vomiting almost 100%, difficulty in walking and sitting about 53%. More than twothird majority of the patients presented with dimness of vision and loss of vision. Out of 40 patient 10 (25%) cases had loss of vision (Table-II).

Table-II

Distribution of patients by clinical presentation (n=40)

Clinical presentation	No.	%
Headache with vomiting	40	100.0
Dimness of vision	28	70.0
Ataxia	21	52.5
Blindness	10	25.0

All cases had a definitive diagnostic investigation (CT or MRI) at the time of admission in the Neurosurgery unit. All cases had significant trivanticulomegally with a marked periventricular lucency.

All patients were operated by suboccipital craniectomy. Removal of C1 arch was perform in 18 cases. In no case dura was found to be involved by the tumour. The cerebellum was found relaxed with normal brain pulsation in 37 cases and with three cases intracranial pressure was found high. Tumours were found moderately vascular in 27 cases, less vascular in 13 cases. Gross total removal of the tumour was performed in 25 cases (62.5%) and subtotal removal was done in 15 cases (37.5%). Dural graft was required in 14 cases. Dura was repaired water tight (Table-III).

Table-III

Removal of tumours by definitive surgery (n=40)

Definitive surgery	No.	%
Gross total removal	25	62.5
Subtotal removal	15	37.5
Total	40	100.0

Among the studied 40 patients, 82.5% had good recovery from the diseases following definitive surgery. However, 3(7.5%) had moderately disability, one (2.5% patient had severe disability and 3(7.5%) patients succumbed to death during postoperative period.

All cases had confirmed diagnosis by histopathological examination. Patient having no postoperative complication was discharged within 10 days of postoperative period (Table-IV).

Table-IV

Histopathological diagnosis of the patient (n=40)

Histopathological class	No.	%
Medulloblastoma	17	42.5
Astrocytoma	13	32.5
Ependymoma	8	20.0
CPP (choroid plexus papilloma)	2	5.0
Total	40	100.0

The follow up period was upto15 months. All patients attended in first 3 months. In cases of subtotal resection, symptoms (headache, vomiting) appeared during 7-9 months follow up period in 3 cases (7.5%) and subsequent follow up in 5 cases (12.5%). But in gross total removal symptom appeared in one case (2.5%) in 13-15 months follow up period (Table-V).

Analysis of the outcome of treatment indicated that the proportion of complication was higher among the patients treated by subtotal resection compared to gross total resection and the difference was statistically significant ($p<0.01$) (Table-VI).

Table-V

Duration of follow up (n=37)

Follow up in months	No. of patients	Gross total removal	Subtotal removal
0-3	37	No symptom	No symptom
4-6	28	No symptom	No symptom
7-9	21	No symptom	Headache, vomiting- 3 cases
10-12	12	No symptom	Headache, vomiting, visual disturbances- 5 cases
13-15	8	Headache, vomiting- 1 case	Headache, vomiting, visual disturbances- 5 cases

Table-VI

Distribution of the patient by type of operative treatment and outcome

Outcome of treatment	Pattern of treatment				p value		
	Gross Total		Subtotal		Total		
	No.	%	No.	%	No.	%	
No complication	23	92.0	8	53.3	31	77.5	0.007
With complication	1	4.0	5	33.3	6	15.0	
Death	1	4.0	2	13.3	3	7.5	
Total	25	100.0	15	100.0	40	100.0	

Discussion:

The incidence of brain tumours in the pediatric age group is approximately 2.1 – 2.5 cases per 100,000 population per year. Approximately 60 – 70% of childhood intracranial tumours arise in the posterior fossa. The cerebellum is the commonest site for pediatric brain tumours

The association of posterior fossa tumours with hydrocephalus, each a potentially lethal condition necessitates urgent surgical treatment in these seriously ill patients.

As almost all patients presented at a very late stage with a poor clinical state, definitive surgery cannot be performed at that instance. Immediate CSF diversion may at this stage is life saving. Moreover preoperative CSF diversion may prevent development of permanent morbidity e.g. blindness from raised ICP.

After shunting the patients definitive surgery was done. Gross total removal of tumour was done in 25 cases (62.5%) and subtotal removal was done in 15 cases (37.5%). In postoperative follow up period symptoms (headache, vomiting) was appeared during in 8 cases (20%) in subtotal removal of tumour but in gross total removal symptom appeared in one cases (2.5%). Analysis of the outcome of the treatment indicated that the proportion of complication was more in subtotal removal them gross total removal.

Conclusion:

Among fourty (40) posterior fossa childhood tumours most of them had obstructive hydrocephalus treated over a period of 3 years were studied. Most of the patients presented in late stage of the disease and had a worse hydrocephalus at diagnosis. Before removal of tumour CSF diversion like VP shunt was inserted in all cases. Definitive surgery was performed after elimention of signs and symptoms of raised intracranial pressure and improvement of the general condition of the patients. In post operative follow up period better outcome was found in gross total removal than subtotal removal. Post operative recovery was good. By analyzing the results of our study we can conclude that gross total removal of paediatric posterior fossa tumour has better long term outcome.

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