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CLINICAL OUTCOMES OF POSTERIOR FOSSA TUMOR SURGERY WITHOUT PREOPERATIVE VENTRICULAR-PERITONEAL SHUNT

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ABSTRACT
The aim of the study was to assess the clinical outcome of surgically treated patients with posterior fossa tumor with hydrocephalus with symptoms and signs of raised intracranial pressure without pre-operative ventriculo-peritoneal shunt by comparing two groups (one group-with pre-operative ventriculo-peritoneal shunt and other group-without preoperative ventriculo-peritoneal shunt) in respect to complications, duration of hospital stay and final outcome at 1 month post-operative follow up. This clinical study was carried out at the department of neurosurgery, BSMMU from November 2008 to April 2010 on patients with posterior fossa tumor with hydrocephalus with symptoms and signs of raised intracranial pressure (ICP) who underwent surgery without preoperative ventriculo-peritoneal shunt. A total of 32 patients were included in this study. Patients were divided into two groups, control group (group-A) underwent ventriculo peritoneal shunt prior to tumor surgery and experimental group (group-B) were not treated with ventriculo-peritoneal shunt prior to tumor surgery. Both groups were followed up during hospital stay and after 1 month of tumor resection. Clinical studies include analysis of the following parameters: i) duration of hospital stay, ii) post-operative complications include cerebrospinal fluid leakage, pseudomeningocele, seizure, meningitis, and shunt blockage and, iii) final outcome at 1 month follow up in modified karnofsky performance scale. We also observed whether or not, use of ventriculo-peritoneal shunt to drain cerebrospinal fluid was useful and safe. The mean duration of hospital stay were 95.1±12.6 days with ranged from 70 to 120 days and 71.5±12.6 days ranged from 36 to 88 days in group-A and group-B respectively. The majority of the patients had no complications in both group, which were 12(70.6%) and 9 (60.0%) in group A and group B respectively. Final outcome at 1 month follow up in modified karnofsky performance scale in both groups were similar.

KEYWORDS: Posterior fossa tumors, pre-operative ventriculo-peritoneal, ventriculostomy.

INTRODUCTION
Posterior fossa tumors are the most frequent primary neoplasms in children. One of the most important problems in their management is the normalization of raised intracranial pressure (ICP).[1] The majority of posterior fossa tumors cause marked intracranial hypertension. Removal of the tumor changes the volume parameters and the cerebrospinal fluid distribution. Tumors of the posterior fossa (PF) occur more commonly in children than adults. Between 54% and 70% of all childhood tumors arise in the posterior fossa, compared with 15%-20% in adults. Children with posterior fossa tumors are predisposed to hydrocephalus. A proportion of patients will require a cerebrospinal fluid (CSF) diversion procedure at some time during the course of their illness.[2] However the management of hydrocephalus in children with resectable posterior fossa tumors is controversial. The insertion of a shunt in the presence of a posterior fossa neoplasm can lead to upward herniation and hemorrhage into the tumor, and to metastases in the peritoneal cavity. Patients with posterior fossa tumors treated by carrying out early surgery, which means direct excision of the tumors, possibly followed by third ventriculostomy or ventriculo-peritoneal (V-P) shunt placement in cases of persistent hydrocephalus.[3] It has been recognized that hydrocephalus and consequent raised intracranial pressure make surgery for this tumors difficult. Initially, ventricular tap was employed to deal with the hydrocephalus prior to the surgery on the tumor.[4] This was then replaced by external ventricular drain and later by shunts. The initial enthusiasm for the routine use of a preoperative shunt procedure has gradually waned with the passage of time. There have been various reports in favour a preoperative shunt and also against its use.[5] A virtual round table discussion in 2004 concluded that

there was still no agreed consensus in the absence of post operative trials and proposals were made at the level of options only. Pre-resectional hydrocephalus can either be managed with an initial cerebrospinal fluid diversion procedure, such as endoscopic third ventriculostomy (ETV), ventriculo-peritoneal (VP) shunting or external ventricular drainage (EVD).[6] This is followed by resectional surgery or by directly addressing the obstructing posterior fossa tumor with primary resectional surgery at the earliest opportunity. An incidence of between 10 and 62% of persistent or progressive hydrocephalus after primary tumor resection without cerebrospinal fluid diversion has been reported.[7] Ventricular decompression may result in sudden decrease in intracranial pressure, and some cases have been reported to develop epidural hematoma which has an ominous consequence. It has been observed that the percentage of preoperative shunting in hydrocephalic posterior fossa tumors has been quite variable in different studies depends on the policy of the center where the study was done: 79%, 10% and 91%. In our country patients with posterior fossa tumors are usually diagnosed in the later stage with features of raised intracranial pressure and rationality in their management can reduce morbidity and mortality.[8] In developing countries, where the disease is usually diagnosed in the later stages and the increase in intracranial pressure is more severe at the time of diagnosis with a very high incidence of hydrocephalus, preoperative shunting is advisable.[9] During the last two decades, our main strategy for the treatment of hydrocephalus caused by a posterior fossa tumor has been primary tumor resection with no routine preoperative or preoperative cerebrospinal fluid diversion procedure. Persistent or progressive hydrocephalus after tumor resection has been treated with a shunt or endoscopic third ventriculostomy.[10]

MATERIALS AND METHODS

This clinical trial was carried out at the department of neurosurgery, BSMMU from November, 2008 to April, 2010 on patients with posterior fossa tumor with hydrocephalus with symptoms and signs of raised intracranial pressure (ICP) who underwent surgery without preoperative ventriculo peritoneal shunt. A total of 32 patients were included in this study. Patients were divided into two groups, control group (group-A) underwent ventriculo-peritoneal shunt prior to tumor surgery and experimental group (group-B) were not treated with ventriculo peritoneal shunt prior to tumor surgery. Both groups were followed up during hospital stay and after 1 month of tumor resection. Clinical studies include analysis of the following parameters: i) duration of hospital stay, ii) post-operative complications include cerebrospinal fluid leakage, pseudo meningocele, seizure, meningitis, and shunt blockage and, iii) final outcome at 1 month follow up in modified karnofsky performance scale. We also observed whether or not, use of ventriculo-peritoneal shunt to drain cerebrospinal fluid was useful and safe. Data was collected with the help of a structured questionnaire. All relevant data were compiled manually in a master data sheet and then organized by scientific calculator. Collected data was analyzed by using statistical package for social science (SPSS) with version-15 software program. Unpaired's' test and c2 test were used for statistical analysis. $p<0.05$ was considered as a minimum level of significance.

RESULTS

A total of 32 patients with post posterior fossa tumor with hydrocephalus with symptoms and signs of raised intracranial pressure underwent surgery with or without preoperative ventriculo-peritoneal shunt were included in this study. Age ranged from 1 to 55 years in group-A with mean age, 17.5±14.2 years. In group-B age ranged from 5 to 51 years with mean age, 29.8±15.2 years. 47% patients were male in group-A, whereas 33.3% were male in Group-B. 52% patients were female in group-A and 66.7% in Group-B.

Male female ratio was almost 1.5:1 in the whole study patients. Common clinical features of the study population of both groups at presentation were headache, nausea, vomiting, altered level of consciousness, papilloedema, abnormal gait, lower cranial nerve palsy which were almost similar in both groups.

Table 1: Duration of Hospital stay (n = 32).

	Number	Minimum	Maximum	Mean±SD	P value
Group -A	17	70	120	95.1±12.6	0.001
Group -B	15	36	88	71.5±12.6	

The mean duration of hospital stay were 95.1±12.6 days with ranged from 70 to 120 days and 71.5±12.6 days ranged from 36 to 88 days in group-A and group-B respectively. The mean duration of hospital stay was significant ($p<0.05$) between two groups. The majority of the patients had no complications in both group, which were 70.6% (12 patients) and 60.0% (9 patients) in group A and group B respectively. Complications were observed in 5 (29.4%) patients in group A and 6 (40.0%) patients in group B. Cerebrospinal fluid leakage, Pseudomeningocele, and Meningitis were prime complications in both groups, however, shunt blockage was found only in group A. Seizure was found in 2 (11.8%) patients and 1 (6.7%) patient in group A and group B respectively. Here no significant difference ($p>0.05$) in respect of complications was found between two groups.

Table 2: Complications of surgery (n=25).

Complication	Group A (n=17)		Group B (n=15)		P value
	n	%	n	%	
No complications	12	70.6	9	60.0	0.529
Complications	5	29.4	6	40.0	
Cerebrospinal fluid leakage	4	23.5	4	26.7	
Pseudomeningocele	4	23.5	4	26.7	
Seizure	2	11.8	1	6.7	
Meningitis	3	17.6	4	26.7	
Shunt blockage	3	17.6	0	0.0	

The majority of the patients had no complications in both group, which were 70.6% (12 patients) and 60.0% (9 patients) in group A and group B respectively. Complications were observed in 5 (29.4%) patients in group A and 6 (40.0%) patients in group B. Cerebrospinal fluid leakage, Pseudomeningocele, and Meningitis were prime complications in both groups, however, shunt blockage was found only in group A. Seizure was found in 2 (11.8%) patients and 1 (6.7%) patient in group A and group B respectively. Here no significant difference ($p>0.05$) in respect of complications was found between two groups.

Table 3: Functional outcome as per modified karnofsky performance status scale (n=32).

Score	Group A (n=17)		Group B (n=15)		P value
	n	%	n	%	
0-40	3	17.6	4	26.7	
50-70	4	23.5	3	20.0	0.825
>70	10	58.8	8	53.3	

The score was classified in to three general categories of karnofsky scale. Most of the patients belonged to >70 score in both groups, which was 10 (58.8%) and 8 (53.3%) in group A and group B respectively. Score between 50 - 70 was found in 4 (23.5%) patients in group A and in 3 (20.0%) patients in group B. Score < 40 was observed in 3 (17.6%) patients in group A and in 4 (26.7%) patients in group B. No statistical significance ($p>0.05$) was found in between two groups regarding the modified Karnofsky performance status scale of the study patients.

DISCUSSION

Posterior fossa tumors are the most frequent primary neoplasms in children. The management of the tumor is the most important with the aim to normalize intracranial pressure (ICP).[11] Intracranial hypertension occurs markedly in most of the posterior fossa tumors.[12] Volume parameters and the cerebrospinal fluid distribution can change after the removal of the tumor. After tumor surgery intracranial pressure can further raises as a result from cerebellar swelling, occlusion of cerebrospinal fluid flow, or bleeding in the tumor bed.[12] The indications for ventricular drainage and shunting as preliminary treatment are still a matter of discussion. We have found the mean age of the patients in group A 17.5 ±14.2 years and in group B 29.8 ±15.2 years, mean age was 23.65 years because of our patients age ranged from 1 year to 51 years which matched with other study 9 where the mean age of patient was 23 years. In this study 19 patients were female and 13 were male in all age groups. The sex distribution of patients matched with other studies10 conducted at the neurosurgical unit of Kenyatta National Hospital and found that 24 were females while 13 were males.[13] In most of the other series11 male were predominant. A number of symptoms were identified in all patients during their admission in hospital. Among those, nausea, vomiting, headache, abnormal gait and coordination were high in both groups of patient were similar to other study. In this study pre-operative shunt was performed in 17 patients and 15 patients who underwent direct tumor surgery without ventriculo-peritoneal shunt.

A number of complications were identified in our study which was 24.4% (5 patients) in group A and 40.0% (6 patients) in group B. Among those no significant difference was found regarding percentage of cerebrospinal fluid leakage, seizure and meningitis in ventriculo-peritoneal shunt group and those didn't

receive ventriculo-peritoneal shunt.[14] But ventriculo-peritoneal shunt group suffered added shunt related complication like shunt blockage that was absent in without shunt group that delay the definitive operative procedure.[15] Prusseit and his colleagues 12 reviewed studies in patients with ventriculo-peritoneal shunt infections such as fever, shunt blockage, local tenderness, vomiting, meningism, cellulitis, abdominal pain and lethargy. It was also observed that mean duration of hospital stay in those patients who received pre-operative shunt was significantly higher than those who didn't receive ventriculo-peritoneal shunt prior to surgery.[16] The present study has shown that the rate of shunt related complications and hospital stay was higher in ventriculo-peritoneal shunt whereas the rate was low in patients who didn't receive ventriculo-peritoneal shunt.[17] Other study 13 also mentioned higher complications in ventriculo -peritoneal shunt performed patients.[18] No significant difference was found in functional outcome in both groups of patients at 1 month follow up after the tumor surgery. In the majority of the patients karnofsky score was more than 70 in group A (58.8%) and group B (53.3%). In group A, 23.5% patients had karnofsky score 50-70 whereas in group B, 20% patients had karnofsky score 50- 70. Karnofsky score between 0-40, we found in 3 (17.6%) patients in group A and 4 (26.7%) patients in group B mentioned in their study that per-operative mortality was 17.9% (17 patients), 8 (47.2%) children dying as a consequence of acute cerebellar edema, 3 (17.6%) from postoperative re-bleeding into the tumor bed, 3 (17.6%) from iatrogenic gastrointestinal bleeding, and 3 (17.6%) of pneumonia.[19]

CONCLUSION

This study has again demonstrated the diversity of management of what at a first glance appears to be a straightforward clinical problem. We could not conclude from this study that one form of treatment has particular benefit over the other. It is important to provide ventriculo-peritoneal shunt before surgery for relieving symptoms of raised intracranial pressure. Several post operative complications were identified in both groups of patients where difference in two groups was not significant but shunt related complications occur only in the shunt used group. Duration of hospital stay was also found significantly higher in ventriculo-peritoneal shunt used group. We also found that no patient needed post operative shunt in the non shunted group at 1 month follow-up. Though outcome of both groups were same, in respect of shunt related complications and duration of hospital stay we can say without preoperative ventriculo-peritoneal shunt posterior fossa tumor surgery gives less morbidity.

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