ORIGINAL ARTICLE

Surgical Outcome of Posterior Fossa Brain Tumors

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ABSTRACT

Objective — *To determine the surgical outcome of posterior fossa brain tumors.*

Study design — *Descriptive case series.*

Place & Duration of study — *Department of Neurosurgery, Jinnah Postgraduate Medical Center Karachi, from April 2012 to October 2012.*

Methodology — *The data of 66 patients managed during the study period was analyzed. Patients were divided into extra and intra-axial groups. All patients underwent surgery. The outcome was measured as good and poor two months after discharge from the hospital.*

Results — *Out of 66 patients, 41(62%) were males and 25 (38%) females. The mean age of the patients was 31.21 ± 18.49 year. With respect to age groups, good surgical outcome was observed in 11 to 30 year and 41 to 50 year of age. Good surgical outcome was similar in both the genders. Vestibular schwanoma was the commonest tumor (72.2%) in extra-axial variety of tumors. Good functional outcome (80%) was observed following surgery in extra-axial group of patients. No mortality occurred in extra-axial group while two patients died in intra-axial group.*

Medulloblastoma (29.26%) and pilocytic astrocytoma (29.26%) were the commonest tumors in intra-axial group. Mortality occurred only in 2 (4.87%), recurrence in 2 (4.87%) and unresolved hydrocephalus in 3 (7.31%) patients. Improvement in morbidity was noticed in 31(75.6%) patients after surgery.

Conclusion — *Factors associated with good outcome was age > 10 years and type of tumor.*

Key words — *Surgical outcome, Posterior fossa brain tumors, Mortality.*

INTRODUCTION:

Posterior fossa brain tumor (PFT) is one of the most devastating forms of human illnesses which is more common in children. Brainstem compression, herniation and death are the risks with tumors in this critical location. Almost 54% and 70% of all childhood brain tumors originate in the posterior fossa (PF) compared with 15-20% in adults with male predominance. Certain types of PFT, such as medulloblastoma, ependymomas and pilocytic astrocytomas occur more frequently in children. Tumors including metastatic lesions, hemangioblastoma and lymphomas more commonly affect adults than children.[1]

In patients with PFT surgery achieves decompression of PF, provides information about type of tumor based upon histopathology and helps in determining further plan of treatment. Cushing probably was the first to report a large series of PFT as he published information on 61 patients with cerebellar medulloblastoma with mostly fatal outcome. Gross total resection is appropriate surgical treatment in all PFT.[2-4] The 5-year survival rates exceed 60% for all patients and 80% for certain good-risk individuals with PFT. In cases of pilocytic cerebellar astrocytoma, the 25-year survival rate exceeds 94%. In medulloblastoma, the 5-year progression-free

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survival is from <20% to >70%.[1,5]

In patients with ependymomas, the 5-year overall survival rate is 67% to 80%. Choroid plexus carcinoma has poor prognosis.[6, 7] The rationale of this study was to provide data regarding the surgical outcome of PFT and to compare it other reported series.

METHODOLOGY:

This prospective case series was conducted in the Department of Neurosurgery, Jinnah Postgraduate Medical Center Karachi, from April 2012 to October 2012. It included patients of all ages and both genders who presented with signs and symptoms suggestive of PFT. They were further confirmed on computed tomography/ magnetic resonance imaging and histopathology. Those who were previously operated and had recurrence of tumor, and tumors arising from brain stem, were excluded.

After preoperative assessment, informed and written consent was taken. All patients underwent surgery and specimen sent for histopathological examination. Final outcome was assessed as good and poor 2 months after discharge. Confounding variable like age and gender were controlled by stratification. Data was entered and analyzed in statistical software (SPSS-14). Frequency and percentages were computed for categorical variables like age groups, gender, diagnosis and surgical outcome. Mean, standard deviation, 95% confidence interval were computed for quantitative measurement like age.

RESULTS:

A total of 66 patients were managed. The mean age of the patients was 31.21 ± 18.49 year (95%CI: 26.66 to 35.75). Minimum age of the patient was 11 months and maximum 75 year. There were 41(62%) males and 25 (38%) females. Vestibular schwanoma was the commonest tumor found in 27.3% cases followed by medulloblastoma (18.2%) pilocytic astrocytoma (18.2%).

Good surgical outcome was observed in the age group of 11 to 30 and 41 to 50 years. Good surgical outcome was similar in male and female patients (table I). Vestibular schwanoma was the commonest tumor (72.2%) in extra- axial variety of tumors in this series. Other tumors were meningioma (24%) and trigeminal neuroma (1%). Good functional outcome (80%) was observed following surgery in this group of patients. No mortality occurred in this group (table II).

Table I: Surgical Outcome of Posterior Fossa Tumors With Respect To Gender (n=66)

Gender	Number	Surgical Outcome	
		Good	Poor
Male	41	32 (78%)	9 (22%)
Female	25	19 (76%)	6 (24%)

Medulloblastoma (29.26%) and pilocytic astrocytoma (29.26%) were the commonest tumors in intra-axial group (table III). Two (4.87%) patients died. Recurrence was noted in two patients of medulloblastoma. Hydrocephalus was present in all the patients. Three (7.31%) patients showed no improvement despite surgery. Improvement in morbidity was noted in 31(75.6%) patients after surgery.

DISCUSSION:

Brain tumors when occurring in the posterior fossa have stormy course. In this anatomical location brainstem compression occurs and it also results in herniation leading o death if not treated in time. The PFT can be broadly divided into intra and extra axial locations. Common tumors include cerebellar astrocytoma, primary neuroectodermal tumors, medulloblastoma, ependymoma etc. PFT are more common in children than adults.[8, 9] The 5-year survival rates exceed 60% for all patients. For good risk individuals it is nearly 80%. However, the survival rate and morbidity are dependent on factors like age and type of the tumor in addition to skilled surgeon and facilities available.

Table II: Surgical Outcome of Extra-axial Posterior Fossa Brain Tumors (n=25)

Diagnosis	n (%)	Functional Outcome		Mortality
		Good	Poor	
Vestibular Schwanoma	18 (72%)	13 (72.2%)	5 (27.8%)	0 (0%)
Meningioma	6 (24%)	6 (100%)	0 (0%)	0 (0%)
Trigeminal Neuroma	1 (4%)	1 (100%)	0 (0%)	0 (0%)
Total	25 (100%)	20 (80%)	5 (20%)	0 (0%)

Table III: Surgical Outcome of Intra-axial Posterior Fossa Brain Tumors (n=25)						
Diagnosis	**n**	**Recurrence**	**Mortality**	**Unresolved Hydrocephalus**	**Change In Morbidity**	
					Good	**Poor**
Hemangioblastoma	5(12.9%)	0 (0%)	0 (0%)	0 (0%)	4 (80%)	1 (20%)
Medulloblastoma	12 (29.26%)	2 (8.33%)	1 (8.33%)	2 (16.6%)	8 (66.7%)	4 (33.3%)
Metastastatic Tumors	2 (4.875)	0 (0%)	1 (50%)	0 (0%)	0 (0%)	2 (100%)
P. Astrocytoma	12 (29.26%)	0 (0%)	0 (0%)	1 (8.33%)	11 (91.7%)	1 (8.3%)
Ependymomas	3 (7.31%)	0 (0%)	0 (0%)	0 (0%)	3 (100%)	0 (0%)
A. Astrocytoma	7 (17%)	0 (0%)	0 (0%)	0 (0%)	5 (71.4%)	2 (28.6%)
Total	41 (100%)	2 (4.87%)	2 (4.87%)	3 (7.31%)	31 (75.6%)	10 (24.4%)

As the PF is a limited space, the tumors presenting in this region cause early symptoms and require prompt treatment to avoid potential morbidity and mortality. Surgery is the mainstay of treatment.[10] A gross total resection should be attempted in order to achieve a better clinical outcome.[11] Various lesions occur in deep locations or at the skull base in pediatric patients. These require skull base approaches for resection. Skull base surgery confers the advantages of improved line of sight, a wider operative corridor and reduced brain retraction. Other approaches are selected based upon tumor location and can be combined thus giving the surgeon a wide array of access routes to the lesion.[12] Same was practiced in this group of patients.

In index study vestibular schwanoma was the commonest tumor followed by meduloblastoma. A study conducted on sixty- two patients, showed acoustic neuroma to be the commonest tumor followed by meningioma.[13] Another study done in pediatric age group showed medulloblastoma and astrocytomas as the most common tumors.

This study showed that good surgical outcome was observed in 77% while poor outcome (moderately disable, not to perform daily activities independently or have neurological deficit) was observed in 23% cases. Factors of age > 10 years and presence of tumors such as pilocytic astrocytoma, meningioma, ependymomas and trigeminal neuroma were associated with good outcome, but gender had no effect.

The study by Charles and Morgan focused on a series of patients of brain and spinal cord tumors, considered inoperable by specialized multidisciplinary teams, operated in a single setting.[14] The results showed that there was a single case of surgical mortality. We in this study had 23% patients with poor outcomes. They had moderate disability similar to the above study where some 12.5% patients suffered permanent neurological sequel. Thus, dramatic and favorable potential long-term outcomes may be achieved with surgery of so-called inoperable lesions.

Another study results also found that 38/121 (31%) patients had an uneventful postoperative period and only 23 (19%) had neurological complications at long-term which is in-line with the results of our study.[15] Another study also reported high morbidity following gross resection of tumor.[16] Although, we did not measure pre / post surgical symptoms; the strong predictors of good outcomes in our study were age > 10 years and morphological type of tumors. Staging parameters expected to predict for poor prognosis do not significantly influence the outcome.[17]

One of the complications of PFT resection is the PF syndrome that consisted of transient cerebellar mutism, cognitive symptoms and neurobehavioral abnormalities.[18,19] Although the pathophysiological substrate of the syndrome remains unclear, studies have shown that more than 50% of the patients with this syndrome develop a variety of clinically relevant non-motor language symptoms associated with cognitive and behavioral disturbances after PFT resection. Fortunately this syndrome is not common and thus the poor outcome after PFT resection is low as also reflected in our series of patients.

Our study results showed that medulloblastoma has poor outcome as compared to other tumors. This is in contrast to the literature that has shown that in the past three decades, the survival for these patients has improved remarkably. Children with macroscopic metastatic disease (M2/M3) at presentation continue

to fare poorly, with the best reports only attaining PFS rates up to 40%. Furthermore, despite intensive multimodal therapy, some patients have disease progression or recurrence, which for most remains incurable.[20]

CONCLUSION:

Good outcome was observed in patients with PFT after surgery.

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