



Surgical outcome of posterior fossa tumours in tertiary care hospital

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Introduction

Posterior fossa brain tumours are usually more common in children. They account for 54% to 70% of all brain tumours in children, but 15%-20% in adults [1]. Brainstem compression, herniation and death are the associated risks with tumours in this location.

Cushing had reported first time a large series of posterior fossa brain tumours. He published information on his 61 patients with mostly fatal outcomes of cerebellar medulloblastoma [2].

Medulloblastoma, ependymomas and pilocytic astrocytoma occur more commonly in children, while tumours like metastatic lesions, lymphomas and hemangioblastoma are more common in adults [3].

The clinical presentation varies according to the tumour site, its biological behaviour and aggressiveness, and its growth rate. Symptoms may be due to focal compression on the cerebellum or brain stem, or from increased intracranial tension [3].

Computed tomography CT delineates the presence of posterior fossa tumours in more than 95% of cases, but magnetic resonance imaging MRI becomes the procedure of choice in their diagnosis.

Objective

The objective of this study is to evaluate our results, complications and outcome of posterior fossa tumour surgery in tertiary care hospital.

Material and methods

A retrospective study was conducted in the Department of Neurosurgery, Government Mohan Kumara Mangalam, Salem, India from January 2021 to December 2022 for a period of 2 years. Case sheets and Records of the patient who underwent surgery in the study period for posterior fossa tumor were collected from Medical Records Department after getting permission from the institutional Ethics Committee. Ref. No. GMKMC&H/114/IEC/2023-5

Inclusion and exclusion criteria

All the patients who had operated for posterior fossa tumours in the Department of Neurosurgery, Government Mohan Kumara Mangalam medical college, Salem, India from January 2021 to December 2022 were included in this study. Cases without recording of preoperative and postoperative clinical findings and investigations were excluded from the study.

Preoperative clinical examination and results of imaging investigations like Computed Tomography (CT) scan, Magnetic Resonance Imaging (MRI) were recorded from

the case sheet. Postoperative clinical examination findings till discharge were noted. A histopathology report of the tumour was obtained from the register maintained in the department. Surgical outcome was assessed as excellent, good, acceptable or poor according to the clinical examination findings and radiological assessment at the time of discharge.

Complete total and near total excision of the tumour without neurological deficit or complications was considered an excellent outcome. Decompression of the tumour with reversible neurological deficit was considered as good outcome. Decompression of the tumour with pre-existing neurological deficit was considered an acceptable outcome. Patients with irreversible neurological deficit, poor Glasgow coma scale (GCS), bedridden patients, comatose patients and death was taken as poor outcome.

Statistical Analysis

Statistical software statistical package for the social sciences (SPSS) version 20.0 was used to analyze data. Frequency and percentage computed for categorical variables like age, gender, age group, diagnosis, surgical outcome, complications and histopathology were noted. Mean, median and standard deviation at a 95% confidence interval was computed for quantitative measurement.

Results

A total of 59 patients were operated during the study period. There were 15(25.42%) pediatric and 44 (74.58%) adult patients who were operated on. Of the total 59 patients, 26 (44.1%) were males and 33 (55.9%) were females.

Table 1: Age group of posterior fossa tumour

Age group {years}	Number	Percentage %
0-10	8	13.55
11-20	3	5.08
21-30	4	6.78
31-40	6	10.16
41-50	4	6.78
51-60	13	22.03
61-70	12	20.33
71-80	9	15.25

Table 2: SEX distribution of posterior fossa tumours

Sex	Number	Percentage%
Male	26	44.1
Female	33	55.9
Total	59	100.0

It was observed that 34 (57.62%) patients had pre-operative hydrocephalus of which 22 (37.2%) patients underwent pre-operative ventriculoperitoneal shunt (VP shunt). Pre-operative motor deficits were found in 13(22.08%) patients. The motor deficit noted was hemiparesis or unilateral lower limb weakness. Pre-operative cerebellar dysfunction was noted in 36 (61.01%) patients. A total of 28 (47.45%) patients had preoperative cranial nerve involvement and five of them had more than two cranial nerve involvement before surgery.

Table 3: Preoperative findings.

Preoperative status	Finding	Number	%
Hydrocephalus	Present	34	57.62
	Absent	25	42.37
Ventriculoperitoneal shunt	Present	22	37.28
	Absent	37	62.71
Cerebellar dysfunction	Present	36	61.01
	Absent	23	38.98
Motor deficit	Present	13	22.03
	Absent	46	77.96

The most common complication was CSF leak with or without pseudo meningocele. Postoperative cerebrospinal fluid (CSF) leak was found in ten (16.94%) patients. Seven patients (11.86%) had pseudo meningocele without CSF leak. Hydrocephalus was observed in 14 patients following surgery who needed intervention. Six of them were managed with external ventricular drainage and eight patients needed fresh VP shunt or revision of shunt. New postoperative cranial nerve deficit was observed in 8 (13.55%) patients. Of which 6 patients had new onset facial nerve palsy and 2 had lower cranial nerve palsy. Forty-three patients had a GCS of 14 or 15 at the time of discharge. Eleven patients had GCS of 8 to 13 and 5 patients had scores less than 8. Complete to near total excision of the tumour was noted in fifteen patients in postoperative CT. Decompression of the tumour with relief in brainstem compression and hydrocephalus was noted in 28 patients.

Table 4: Complications

Complications	Number (Percentage)
Cerebrospinal Fluid (CSF) leak and pseudo meningocele	17(27.11%)
Postoperative hematoma	11(18.64%)
New onset cranial nerve palsy	8(13.55%)
Wound infection	4(6.77%)
Meningitis	5(8.47%)
Shunt obstruction	3(5.08%)
None	11(18.64%)

Of the 59 patients, 19 (32.20%) had vestibular schwannoma, and 5 patients (8.47%) had pilocytic astrocytoma, of which four of them were paediatric patients. Four patients (6.77%) had ependymoma of which two were paediatric patients. Metastasis was reported in 5 patients (8.47%). Two from carcinoma breast and three from carcinoma lungs. Three patients from had medulloblastomas, of which two were paediatric patients.

Graph 1

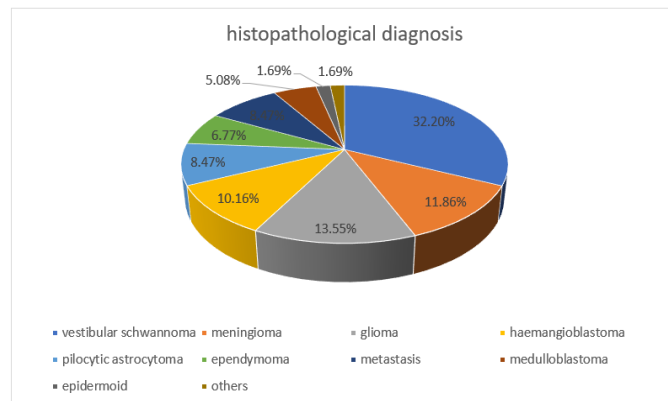


Table 5: type of tumour histopathology.

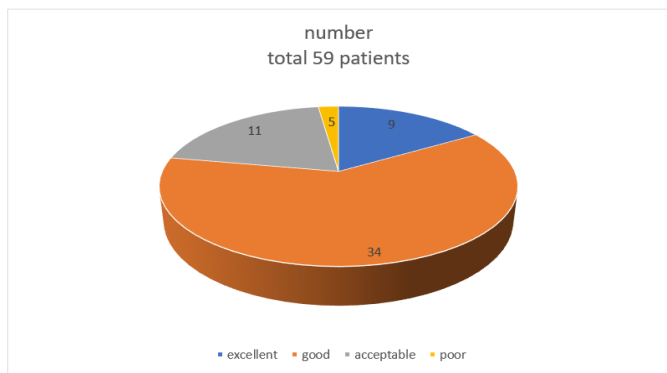
Histopathological diagnosis	Number (%)
Vestibular schwannoma	19(32.20%)
Meningioma	7 (11.86%)
Glioma	8 (13.55%)
Hemangioblastoma	6 (10.16%)
Pilocytic astrocytoma	5 (8.47%)
Ependymoma	4 (6.77%)
Metastasis	5 (8.47%)
Medulloblastoma	3 (5.08%)
Epidermoid	1 (1.69%)
Another schwannoma	1 (1.69%)

Excellent to good outcome was seen in 43 patients. Eleven patients had acceptable outcomes while 5 patients had poor outcomes. It was observed that 26 extra-axial tumours had excellent to good outcomes while only 17 intra-axial tumours had excellent to good outcomes. Among intra-axial tumours, pilocytic astrocytoma had the best outcome. All 5 patients (100%) with pilocytic astrocytoma had excellent to good outcomes.

Table 6: Surgical Outcome

Outcome	Number (%)
Excellent	9 (15.25%)
Good	34 (57.62%)
Acceptable	11 (18.64%)
Poor	5 (8.47%)

Graph 2



Graph 3: surgical outcome in intra-axial and extra-axial tumours

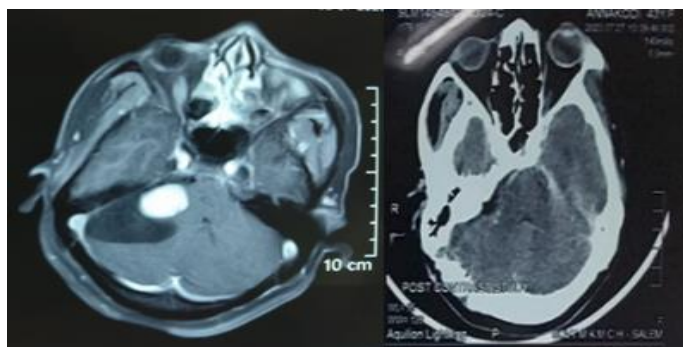
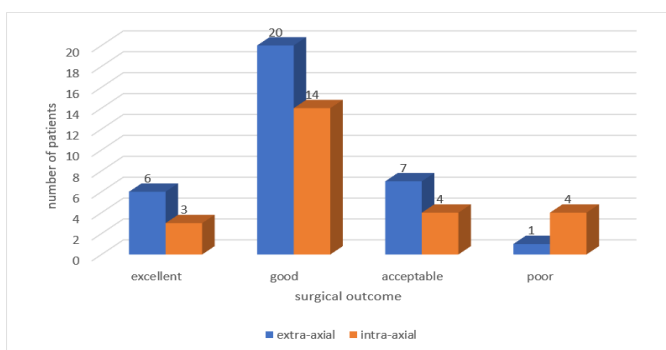


Fig. 1: Preoperative MRI brain post-contrast and postoperative CT brain post-contrast-vestibular schwannoma.

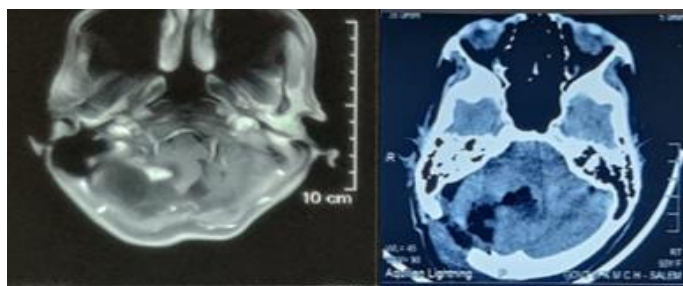


Fig. 2: Preoperative MRI axial image and postoperative CT axial image-pilocytic astrocytoma.

Discussion

Posterior fossa tumours are the most frequent primary neoplasm in the paediatric age group. Brainstem compression, cranial nerve involvement and hydrocephalus occur in most of the posterior fossa tumours. Reduction of intracranial pressure by tumour excision and CSF diversion thereby relieving brainstem compression is the main goal of the treatment. Some require adjuvant treatment [4].

Of the 59 patients, 33 were females while 26 were males. Sex distribution of patients matched with studies conducted at the Neurosurgical unit of Kenyatta National Hospital [5]. In most other series, males were predominant. In a study by Ahmed KB et al., out of 546 patients 306 were males and 240 were females [6]. Similar results were observed in another study by Vara Prasad KS et al., where 61.11% (22 out of 36) patients were females [7].

In the present study, 22 out of 34 patients who had pre-operative hydrocephalus underwent VP shunt. Robert YS and James GS found that permanent CSF diversion was needed in 33% of patients [8]. In another study by Bartlett F et al., VP shunt was inserted in 53% of patients [9].

In the present study, CSF leakage was the most common complication. Seventeen (27.11%) patients had CSF leakage either direct CSF leak or in the form of pseudo meningocele. In a study by Islam MR et al., CSF leak was the most common complication which occurred in 26.7% of patients [10]. In another study conducted by Dubey A et al., CSF leak was the most frequently encountered complication [11]. Other common complications noted were postoperative haematoma in 11 out of 59 (18.64%), of which only one needed surgical evacuation. In a study by Emara M et al., at Benha

University, EGYPT, haematoma was noted in 13.6% of patients [12].

Excellent to good prognosis was observed in 43 out of 59 patients (72.88%). Acceptable outcome was noted in 11 out of 59 (18.64%) and poor outcome was noted in 5 patients (8.47%). In a study by Emara M et al., Benha University, Egypt they had excellent to good outcome in 77.3% (34 out of 44), and poor outcome was observed in 22.7% (10 out of 44) [12]. In another study by Shaikh HA et al., at Jinnah Postgraduate University Karachi, they had good outcomes in 75.6% (31 out of 41) and poor outcomes in 24.4% [13].

Regarding histopathology, vestibular schwannoma was the most common posterior fossa tumour operated. Vestibular schwannoma accounted for 32.20% of cases (19 out of 59 followed by glioma (13.55%) and meningioma (11.86%) and haemangioblastoma (10.16%). These findings correspond to observations in the study conducted by Rehman A et al., at King Edward Medical University in 2009[14]. In another study by Shaikh HA et al., at Jinnah Postgraduate Center, Karachi, vestibular schwannoma was the most common tumour operated, 27% (18 out of 66) followed by 9 glioma (10.6%), 8 meningioma (9.1%) and 7 haemangioblastoma (7.6%).

In another study by Bhat R et al., at Sher-i-Kashmir Institute of medical sciences, Srinagar again vestibular schwannoma was the most common 23.9% (98/410) posterior fossa tumour [15].

Limitation(s)

The present study has the drawback of being a retrospective single-center study with a limited number of patients. Many operated cases were excluded from the study due to inadequate documentation of clinical and radiological findings in the library records.

Conclusion

Posterior fossa tumour surgery still remains a challenge despite of surgical and technical advances. With early presentation, selection of approach and types of equipment better results can be obtained. Extra-axial tumours like vestibular schwannoma and meningioma have a better surgical outcome. The CSF leak and hematoma are the most common complications encountered in posterior fossa tumour surgeries.

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