

Analysis of Most Prevalent Clinical Features Associated with Posterior Fossa Tumors

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How to cite this article: Srinivasarao. S. Gummadidala, B. Jyothi. Analysis of most prevalent clinical features associated with posterior fossa tumors International Journal of Contemporary Medicine Surgery and Radiology. 2018;3(1):115-120.

A B S T R A C T

Introduction: Tumors of the brain are regarded as one of the most devastating group of neurological diseases which are associated with significant neurological morbidity, they lead to progressive physical, cognitive and emotional dysfunction and are frequently fatal. Clinical evaluation, radiology and pathology play big role in deciding the long term prognosis. The present study was undertaken to analyze the most prevalent clinical features of various posterior fossa tumours.

Material and methods: The present study was carried out among 30 patients who underwent MRI at our institute, diagnosed to have posterior fossa tumours and underwent surgery from April 2009 to March 2010 were included in the present study. All the patients were evaluated clinically before undergoing MRI evaluation. Findings on histopathological examination were noted. All the data will be expressed in percentages.

Results: Commonest age group in schwannoma and meningiomas was 5th decade, cerebellar astrocytomas was 4th decade, ependymoma and medulloblastomas was 1st decade. Extra axial tumours constitute 56.67% ahead of intra axial tumours accounting 43.33% of the total posterior fossa tumours. Commonest symptom in posterior fossa tumours was headache (26/30), followed by swaying (19/30), vomiting (15/30), Hearing loss (11/30) and tinnitus (9/30). Altered sensorium was noted in 2 cases.

Conclusion: The present study concludes that among 30 cases of posterior fossa tumours, schwannomas was found to be the most common tumour encountered. Others include Meningioma, Haemangiopericytoma, epidermoid, cerebellar astrocytoma, ependymoma, medulloblastoma, haemangioblastoma and metastasis. Hearing loss, swaying and headache are the commonest presenting symptoms. Vomiting, giddiness, seizures and visual disturbances are the other common symptoms.

Keywords: Posterior Fossa Tumours; Schwannomas; Seizures; Visual Disturbances

INTRODUCTION

Tumors of the brain are regarded as one of the most devastating group of neurological diseases—they are associated with significant neurological morbidity, they lead to progressive physical, cognitive and emotional dysfunction and are frequently fatal. The term brain tumor is used to describe both primary tumors that originate from the brain, cranial nerves, pituitary gland or meninges and secondary tumors (metastases) that arise from organs outside the nervous system.¹ Posterior fossa tumours often present with clinical manifestations of hydrocephalus and raised intracranial pressure. More aggressive tumours present with a shorter history. The most prevalent symptoms include headache, nausea and vomiting.²

No specific causes for posterior fossa tumours exist. However, genetic factors, such as dysfunction of some tumour suppressor genes (*p53* gene) and activation of some oncogenes, may play a role in their development.³ Majority of these tumours present with nonspecific complaints such as headache, stroke like syndromes, or seizures. Often a

diagnosis is made or suggested initially by the findings on imaging studies. About 20% of all intracranial metastases occur in the posterior fossa. Multiple lesions are the hallmark, but in the posterior fossa there is high incidence of solitary lesions (25%-50%).⁴

These tumours are often difficult to treat and are considered as most devastating forms of human illness which causes brainstem compression, herniation and death. However prognosis of these patients has improved considerably due to recent advances in diagnostic techniques, microsurgery and radiotherapy. Clinical evaluation, radiology and pathology play big role in deciding the long term prognosis.⁵ The present study was undertaken to analyze the most prevalent clinical features of various posterior fossa tumours.

MATERIAL AND METHODS

The present study was carried out among 30 patients who reported to Department of Radiology, Sri Venkateswara Institute of Medical Sciences (SVIMS), Tirupati, with clinical suspicion of posterior fossa tumours and who underwent MRI. All patients who underwent MRI at our institute, diagnosed

S.No	Posterior fossa tumour	0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	Total
1.	Schwannoma	-	-	03	01	05	01	02	-	-	12
2.	Meningioma	-	01	-	-	02	-	-	-	-	03
3.	Haemangio pericytoma	-	-	-	-	01	-	-	-	-	01
4.	Epidermoid	-	-	-	01	-	-	-	-	-	01
5.	Cerebellar astrocytoma	-	-	-	03	01	-	-	-	-	04
6.	Ependymoma	02	-	-	-	-	-	-	-	-	02
7.	Medulloblastoma	02	-	-	-	-	-	-	-	-	02
8.	Haemangio blastoma	-	-	01	01	01	-	-	-	-	03
9.	Metastasis	-	-	-	01	01	-	-	-	-	02

Table-1: Age incidence of posterior fossa tumours

Sl. No.	Tumour	No. of cases	Male	Female
1.	Schwannoma	12	06 (50.00%)	06 (50.00%)
2.	Meningioma	03	01(33.33%)	02(66.67%)
3.	Haemangio pericytoma	01	01 (100%)	-
4.	Epidermoid	01	01 (100%)	-
5.	Cerebellar astrocytoma	04	02 (50.00%)	02 (50.00%)
6.	Ependymoma	02	02 (100%)	-
7.	Medulloblastoma	02	01 (50.00%)	01 (50.00%)
8.	Haemangioblastoma	03	01 (33.33%)	02 (66.67%)
9.	Metastasis	02	02 (100%)	-
	Total	30	17(56.67%)	13(43.33%)

Table-2: Sex incidence of posterior fossa tumours

Sl. No.	Tumour	No. of cases	Percentage
Extra axial			
1.	Schwannoma	12	40.00%
2.	Meningioma	03	10.00%
3.	Haemangiopericytoma	01	3.33%
4.	Epidermoid	01	3.33%
Intra axial			
5.	Cerebellar astrocytoma	04	13.33%
6.	Ependymoma	02	6.67%
7.	Medulloblastoma	02	6.67%
8.	Haemangioblastoma	03	10.00%
9.	Metastasis	02	6.67%

Table-3: Incidence of posterior fossa tumours

to have posterior fossa tumours and underwent surgery from April 2009 to March 2010 were included in the present study.

All the patients were evaluated clinically before undergoing MRI evaluation. The information was recorded in detail in a predesigned data collection sheet. MAGNETOM Symphony, 1.5 tesla MRI, SIEMENS machine was used for MRI. Contrast material used was 10ml Gadolinium – DTPA and technique used was T₁W, T₂W, flair, post contrast T₁W sequences and MR spectroscopy.

The procedure was briefly explained to the patients and consent was obtained. Findings on histopathological examination were noted.

STATISTICAL ANALYSIS

Microsoft office 2007 was used for the analysis. All the data was expressed in percentages and mean.

RESULTS

Commonest age group in schwannoma and meningiomas is 5th decade, cerebellar astrocytomas is 4th decade, ependymoma and medulloblastomas is 1st decade (table 1).

Out of 30 cases 17 (56.6%) were males and 13 are females (43.3%), thus there was male predominance (table 2). Out of 12 cases of acoustic schwannoma, 06 cases (50.00%) were found in males and 06 cases (50.00%) in the females. Out of 03 cases of meningiomas, 01 (33.33%) case was found in males and 02 cases (66.67%) in females. Single case of Haemangiopericytoma and epidermoid were found in the males. Cerebellar astrocytoma account for 04 cases, out of which 2 cases (50%) were males and 02 cases (50%) were females. Ependymoma also showed male preponderance and both the cases were found in males. Medulloblastoma showed equal occurrence in both males and females. Out of 03 cases of Haemangioblastoma, 02 cases (66.67%) were found in females and 01 case in male (33.33%).

The commonest posterior fossa tumour was acoustic schwannoma with 12 cases (40.00%). This was followed by meningioma in 3 cases (10%), haemangioblastoma in 3 cases (10%) (table 3).

Commonest symptom in posterior fossa tumours was headache (26/30), followed by swaying (19/30), vomiting (15/30), Hearing loss (11/30) and tinnitus (9/30). Altered sensorium was noted in 2 cases (table 4 and Figure 1,2).

DISCUSSION

In our study of 30 cases of posterior fossa tumours, schwannomas was the most common tumour encountered. Others included Meningioma, Haemangiopericytoma, epidermoid, cerebellar astrocytoma, ependymoma,

Sl. No	Posterior Fossa Tumour	Clinical features						
		Hearing loss	Head ache	Swaying	Tinnitus	Vomiting	Seizures	Altered sensorium
1	Schwannoma (12 cases)	10 cases	10 cases	08 cases	09 cases	03 cases	02 cases	01 cases
2	Meningioma (03 cases)	-	03	02	-	03	-	-
3	Haemangio pericytoma (01 case)	01	01	01	-	-	01	-
4	Epidermoid (01 cases)	-	-	01	-	-	-	-
5	Cerebellar astrocytoma (04 cases)	-	04	04	-	-	02	-
6	Ependymoma (02 cases)	-	01	01	-	02	-	-
7	Medulloblastoma (02 cases)	-	02	01	-	02	-	-
8	Haemangio blastoma (03 cases)	-	03	-	-	03	01	01
9	Metastasis (02 cases)	-	02	01	-	02	-	-
	Total	11	26	19	9	15	06	02

Table-4: Clinical features as observed in various posterior fossa tumours

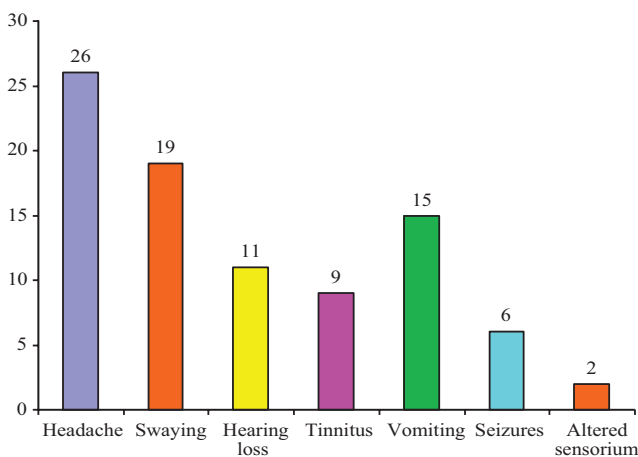


Figure-1: Clinical features

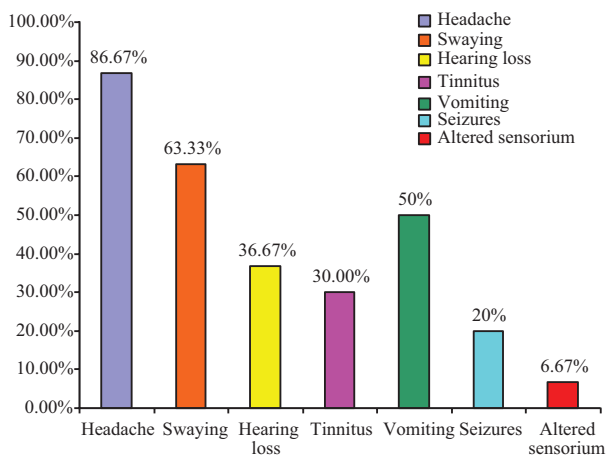


Figure-2: Clinical features in posterior fossa tumours

medulloblastoma, haemangioblastoma and metastasis. Both children and adults were included in our study group. The age ranged from 6 years to 68 years. Peak incidence of neoplasm was seen in the 4th and 5th decades.

Acoustic schwannoma was the most common posterior fossa lesion in adults followed by cerebellar astrocytoma, meningioma and haemangioblastoma. Our study had 04 patients in pediatric age group i.e., below the age of 12 years. The different tumours encountered in this age group were medulloblastoma and ependymoma. There was male preponderance in this study. 56.6% cases of posterior fossa

mass lesions were found in male patients while remaining 43.33% were seen in the female population. This observation is in concordance with the study conducted by Naidich TP et al⁶ where male preponderance was noted.

Extra axial tumours constitute 56.67% ahead of intra axial tumours accounting 43.33% of the total posterior fossa tumours. This is in correlation with the study done Lizak PF.⁷ In our study all the patients commonly presented with posterior fossa signs and symptoms. Hearing loss, swaying and headache are the commonest presenting symptoms. Vomiting, giddiness, seizures and visual disturbances are the other common symptoms. A study by Baker HL et al⁸ reported headache, altered consciousness, personality changes, seizures, visual and gait disturbance as the common presenting complaints of patients.

In our study there are 12 cases of schwannoma constituting 40% of all the posterior fossa tumours. Of the 12 cases of acoustic schwannoma, 5 cases are in the age group of 41-50, 3 cases between 21 and 30 years, 2 cases between 61 and 70 years and 1 case each in the age group of 31-40 and 51-60 years. This is in correlation with the study by Alcutt DA et al,⁹ where they observed that most schwannomas were prevalent in older age groups i.e., 5th and 6th decades. When they occur with NF-2, schwannomas appear earlier, usually by 3rd decade. They also observed that the schwannomas are rare in children accounting for approximately 0.1% of paediatric intracranial tumours. In a series of 500 cases reported by the house group constituting Han S et al,¹⁰ stated that approximately 50% of the patients were the their fifth decades and only 15% of the tumours were present in patients under the age of 30 years. These observations correlate with the present study.

Out of 12 cases of schwannomas, 06 cases were seen in males and 06 cases were seen in the females. This is not in concordance with the study done by Mc Cormick PC et al¹¹ and Lizak PF⁷ where they observed slight female predominance (1.5-2:1). Hearing loss, swaying, headache are the most common symptoms encountered in our study followed by tinnitus, vertigo and vomiting. This is in correlation with the study by Bilaniuk LT.¹²

In our study there were 03 cases of meningioma constituting 10% of all posterior fossa tumours. Out of 03 cases, 02 cases (66.67%) were seen in the age group of 41-50 years and the other case in the age group of 11-20 years. There was female

preponderance with 02 cases seen in females and 01 in males. This is also observed in their study by Buetow MP et al,¹³ where they found that peak occurrence of the meningiomas is between 40 and 60 years of age and incidence in woman out numbers that in men - 2:1 to 4:1. The commonest presenting symptoms are Headache and Vomiting. One case presented with tinnitus and swaying. Rohinger M.¹⁴ in a population based study of 193 patients with meningioma found headache and vomiting to be the common symptoms occurring in 36%, 30% of the patients respectively. All the three cases are noted arising from the posterior surface of the petrous temporal bone.

In our study we encountered only one case of Haemangiopericytomas. A study done by Guthrie BL et al¹⁵ found the incidence of Haemangiopericytomas accounting for less than 1% of all primary CNS neoplasms. This is also observed by Kim JH et al,¹⁶ where they stated that Haemangiopericytoma accounts for < 1% of all central nervous systems tumours. The only case of Haemangiopericytomas is found in the age group of 41-50 years and in the male patient. This is in correlation with the study done by Kim JH et al,¹⁶ Guthrie BL et al¹⁵ where they stated that meningeal Haemangiopericytoma is a rare vascular tumour which is most commonly diagnosed in the early 5th decade of life. This is also stated by Guthrie BL et al¹⁵ where they observed that the average age of onset is 42 years and there is a slight male preponderance. Hearing loss, swaying, headache and diplopia are the presenting symptoms in this case.

In our study we encountered one case of epidermoid constituting 3.33% of posterior fossa tumours which is in correlation with the observations done by Russel DS et al¹⁷ where they stated that epidermoid tumours represent 0.2 to 1% of all primary intracranial tumours. This is also observed by Bran IF, et al^{7b}, where they stated that peak incidence is in the fourth decade. This is seen in the age group of 31-40 years. In our study, this is seen in male patient. There is no gender predilection. Swaying while walking is the main complaint. Epidermoid constitute 5% of total CP angle tumours. A study by Braun IF et al¹⁸ and Russel DS et¹⁷ revealed that between 40% to 50% of epidermoids are found in the cerebello - pontine angle cistern, making epidermoid the 3rd most common CPA mass after acoustic schwannoma and meningioma.

In our study there are 04 cases of cerebellar astrocytomas constituting 13.33% of posterior fossa tumours. Out of 04 cases of cerebellar astrocytomas, 03 cases are found in the age group of 31-40 and 01 case in 41-50 years. This is in contradiction to the study by HD Segall et al¹⁹, where it was around 5 years. The cerebellar astrocytoma is the second most common posterior fossa tumour in children. This finding was observed in a study done by Matson D.²⁰ The above observation is not correlating with our study. This may be because of lack of separate paediatric neuro surgery department in this institution. Out of 04 cases of cerebellar astrocytomas, 02 cases were in males and 02 cases are in females. This is in concordance with the study by Segall HD et al,¹⁹ which reported equal sex incidence. Two cases are presented with history of headache, swaying and vomiting, one case with ataxia and the other case presented

with tinnitus and blurring of vision. All the four cases of astrocytomas are noted in the cerebellar hemispheres.

In our study, 02 cases of ependymoma were diagnosed constituting about 6.67% of the total posterior fossa tumours. This is in concordance with the study done by Nazar GB et al,²¹ in which they stated that ependymomas represent from 2% to 8% of all primary intracranial brain tumours. These 02 cases are seen in the age group of 0 to 10 years. Gado M et al²² individually stated that ependymoma although more common in children than adults, comprises only 9% to 10% of cases of posterior fossa tumours in childhood. Our study shows slightly less than the above mentioned observations. In another study by Nazar GB et al²¹ concluded that they constitute 15% of posterior fossa neoplasms in childhood and are the 3rd most common pediatric brain tumour. Both the cases are noted in male children. Hendrich et al²³ evaluated 67 patients and found male to female ratio was 1.3:1. This is in correlation with our study. They are presented with headache, swaying and vomiting. These findings are also observed by Lyons MK et al²⁴ where they stated that the common presenting symptoms are disequilibrium, nausea, vomiting and headache. These two cases are noted arising from the 4th ventricle, which is the most common location among the infratentorial tumours. This finding is also observed by Ikezaki K et al.²⁵

In our study, we came across 02 (6.67%) cases of medulloblastoma out of 30 cases of posterior fossa tumours. Both the cases of medulloblastomas are found in the age group of 0 -10 years. This is in correlation with the study by Okazaki H,²⁶ where they observed nearly 3 quarters occur before the age of 15 years and 50% of cases occur in the first decade. Of the two cases, one is seen in female child (50%) and the other in the male child (50%). Okazaki H,²⁶ observed slight male predominance in children in the ratio of 1.5 to 3:1. Headache, nausea, vomiting and altered sensorium are the chief complaints in these cases. This is also observed in a study by Smirniotopoulos JG et al.²⁷ Both the cases of medulloblastomas are noted arising from the vermis.

In our study, 03 cases of haemangioblastoma constituting 10% of cases of posterior fossa tumours were observed. Joachin F Seeger MD et al,²⁸ in their study found that haemangioblastomas comprise 7%-12% of posterior fossa tumours. This observation is in correlation with the present study. Lee SR et al,²⁹ in their study concluded that they constitute approximately 7% a primary posterior fossa tumours. Of the 03 cases, 02 cases are found in the age group of 30-50 years and one case in the age group of 21-30 years. Female predominance is noted in our study. 02 out of 03 cases are found in the females (66.67%) and 01 case in the male (33.3%). Common presenting symptoms include headache, vomiting and vertigo, which is also shown in the study done by Ho VB et al³⁰ observed that headache, disequilibrium, nausea, vomiting and dizziness/ vertigo are the common presenting symptoms which correlates with our study. All the 03 cases of haemangioblastomas are found in the cerebellar hemisphere which correlates with the study conducted by Ho VB et al³⁰ which concludes that between 80%-85% of haemangioblastomas are found in the cerebellum. Other locations include the spinal cord (3% to 13%) and medulla

(2% to 3%). Supratentorial haemangioblastomas occur but are uncommon (1.5%).

In our study we encountered 02 cases of metastasis which accounts for 6.67% of the total posterior fossa tumours. Pott DG et al,³¹ reported metastasis as the most common posterior fossa tumour, which is not in correlation with our study, as our study group is small. Both the cases are noted in the age group 31-50 years. This is in concordance with the findings observed in their study by Egelhoff JC et al,³² and Davis PC et al,³³ which stated that parenchymal metastasis are uncommon in children. Intra cerebral metastases in adults are common, representing between one quarter and one third of all brain tumours. Both the cases of metastasis are found in males. Headache, vomiting and swaying are the main presenting symptoms. Cerebellum is predominantly affected in all the 02 cases, a finding also reported by Enzmann DR et al.³⁴ The commonest primary found was bronchogenic carcinoma followed by carcinoma breast and carcinoma colon. Potts DG et al,³¹ reported the most common primary tumours producing metastasis as carcinoma of lung, breast, malignant melanoma, lymphoma and leukemia. Multiplicity was noted in both the cases. This multiplicity is a typical feature of metastasis as stated by RE Latchaw.³⁵

CONCLUSION

The present study concludes that among 30 cases of posterior fossa tumours, schwannomas was found to be the most common tumour encountered. Others include Meningioma, Haemangiopericytoma, epidermoid, cerebellar astrocytoma, ependymoma, medulloblastoma, haemangioblastoma and metastasis. Extra axial tumours constitute 56.67% ahead of intra axial tumours accounting 43.33% of the total posterior fossa tumours. Hearing loss, swaying and headache are the commonest presenting symptoms. Vomiting, giddiness, seizures and visual disturbances are the other common symptoms.

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Source of Support: Nil; **Conflict of Interest:** None

Submitted: 21-02-2018; **Published online:** 24-03-2018