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Profile of Posterior Fossa Tumours- A Ten year Hospital Based Study

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Abstract
Background: *Brain tumour is one of the most devastating forms of human illness especially when occurring in the posterior fossa and involving the brain stem. Posterior fossa tumours are critical brain lesions owing to limited space within posterior fossa as well as the potential involvement of vital brain stem nuclei.*
Methods: *It was an ambispective (retrospective as well as prospective), hospital based 10 years observational study. Patients with posterior fossa tumours were included. The various histopathological type, age, sex, clinical presentation and outcome was recorded.*
***Results**: 546 patients of posterior fossa tumours were studied. Out of these 306 were males and 240 were females. The various types of tumours with their respective percentage is High grade Astrocytoma (27), Dermoid(12), Ependymoma (54), Epidermoid (54), Hemangioblastoma (18), Medullobalstoma (57), Meningioma(39), Brainstem Glioma (39), Pilocytic astrocytoma(57), Schwannoma(159), Arachnoid cyst. Hydrocephalus was present in total 327 patients (out of 546).The intra-operative and postoperative mortality was 6.77%.*
Conclusions: *Schwannomas are the commonest posterior fossa brain tumour in our population. Astrocytomas are most common posterior fossa tumours followed by medulloblastoma in pediatric age group.*
Keywords: *Posterior fossa ; Brain Tumours; CNS tumours; Pediatric tumours.*

Introduction

Brain tumour is one of the most devastating forms of human illness especially when occurring in the posterior fossa and involving the brain stem. Posterior fossa tumours are critical brain lesions owing to limited space within posterior fossa as well as the potential involvement of vital brain stem nuclei.[1,2] Among childhood brain tumours 54-70% occur in posterior fossa and about 15-20% of brain tumours in adults occur in posterior fossa.[3] Genetic factors such as dysfunction of some tumour suppressor genes (p 53) and activation of oncogenes are implicated in the development of posterior fossa tumours. [4] Posterior fossa tumours have been associated with hereditary syndromes, cytogenetic abnormalities and toxic exposures. Several specific intracranial neoplasms are also part of the clinical manifestations of neuro-ectodermal syndromes.

Patients have recurrent bouts of headache, nausea or vomiting without focal deficits. These symptoms suggest the presence of increased ICP and are common in posterior fossa tumours, which obstruct the cerebral ventricles producing

hydrocephalus. Standard methods of diagnosis include CT scan and MRI of the brain. [5] Generally initial step is surgery to establish the diagnosis and to reduce the bulk; notable exceptions are certain unresectable tumours as diffuse brain stem gliomas. For deep seated tumours, stereo tactic biopsy can establish the diagnosis.

Material and Methods

It was an ambispective (retrospective as well as prospective), hospital based study. Records of all the patients of posterior fossa tumours in past 8 years were retrieved; and prospectively for next two years the patients having posterior fossa tumours reporting to our hospital were included .A study proforma was used to collect information about the patient. Bio-data, history and examination of all the patients was recorded. Patients were subjected to CT scan head /MRI and basic routine investigations. Patients presenting with features of raised intracranial pressure and CT scan showing hydrocephalus underwent an urgent VP shunt before they were taken for definitive procedure. Posterior fossa tumours were operated in sitting position and intra-operative crush biopsy was taken; final specimen was sent routinely for histopathology examination. The further management of patients depended on the histopathology. In cases of malignant tumours like astrocytomas, medulloblastomas and ependymomas were referred to radiation oncology and medical oncology. Patients were followed up in outpatient weekly for first month; monthly for six months. Imaging was done at six month or as when needed.

Results

We saw 546 patients of posterior fossa tumours. Out of these 306 were males and 240 were females. The detailed demographics is shown in (table 1). Our institute being the only referral neurosurgery institute ; hence this figure can give us an idea of incidence in community .The population of Kashmir is 7 million as per the 2011 census.[6] Therefore approximate annual incidence of various posterior fossa tumours in our study was; schwannoma 2.1/million, pilocytic astrocytoma 0.81/million, ependymoma 0.78/million, medulloblastoma 0.73/million. The type of various posterior fossa tumours as per various age groups is shown in (table 2). And distribution of tumours into two discrete groups viz pediatric and adolescent (age <18 years) and the adult group age (> 18 years) is shown in (table 3). Hydrocephalus was present in total 327 patients (out of 546) .Out of these 144 were in age group < 18 years and 183 in age group > 18 years. The various presenting symptoms in various tumour groups are shown in (table 4). The intra-operative and postoperative mortality was 6.77% .The mortality among various tumour groups is shown in (table 5)

Table 1: Demographic pattern of posterior fossa tumors

Type of tumour	Number of patients	Annual incidence/ 10 0000 population	Male: Female distribution	Average Age	Age range Min-max
Astrocytoma (High grade)	27	0.38	18:9	50.88	26-75
Dermoid	12	0.171	6:6	6.75	1-18
Ependymoma	54	0.77	27:27	15.5	4-36
Epidermoid	30	0.42	20:10	24.9	3-60
Hemangioblastoma	18	0.25	15:3	28.1	16-40
Medullobalstoma	57	0.81	42:15	12.69	1-34
Meningioma	39	0.56	27:12	44	30-60
Brainstem Glioma	39	0.56	14:25	17.72	2-60
Pilocytic asrocytoma	57	0.81	30:27	28.48	6-75
Schwannoma	159	0.214	87:72	40.98	18-70
Arachnoid cyst	15	0.214	12:3	33.2	13-56
Others	39	0.57	20:19	27.2	10-62

Table 2: Age groups and type of posterior fossa tumours

Age group								
Type of tumour	1-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80
Astrocytoma(high grade)	9	15	18	6	12	6	0	6
Medulloblastoma	30	12	12	3	0	0	0	0
Ependymoma	27	15	3	9	0	0	0	0
Schwannoma	0	12	24	51	33	24	12	0
Epidermoid	3	9	12	0	3	3	0	0
Meningioma	0	0	6	15	6	9	3	0
Brain stem Glioma	21	9	0	3	3	3	0	0
Others	15	24	18	15	12	12	3	0
Total	105	96	93	102	69	57	18	6

Table 3: Distribution of posterior fossa tumours between adults and children

Tumour Type	Age < 18 years	Age > 18 years
Astrocytoma	3	24
Medulloblastoma	42	15
Ependymoma	42	12
Schwannoma	3	156
Epidermoid	9	21
Meningioma	0	39
Brain stem Glioma	27	33
Pilocytic astrocytoma	24	33
Miscellaneous	25	38

Table 4: Symptomatology of various posterior fossa tumours

Symptoms of posterior tumors								
Type of tumour	Vomiting	Headache	Vertigo	Hearing loss	Gait disturbance	Visual loss	Lower Cranial palsy	Hydro-cephalus
Astrocytomas (27)	21	21	12	0	21	3	6	9
Medulloblastoma (57)	54	54	6	0	30	12	24	54
Ependymoma (54)	48	48	6	0	21	3	21	42
Schwannoma (159)	42	123	96	144	60	24	93	84
Epidermoid (30)	9	27	6	15	6	6	12	0
Meningioma (39)	12	33	15	3	12	9	3	15
Brainstem Glioma (39)	33	15	9	0	30	0	27	27
Pilocytoma Astrocytoma (57)	36	48	21	3	24	6	6	33
Total=462	255 (55%)	369 (80%)	165 (36%)	165 (36%)	204 (44%)	63 13.6%	192 (41.5%)	264 (57%)

Table 5: Surgical outcome of posterior fossa tumours during hospital stay

Tumour type	Patients operated	Mortality during hospital stay
High grade Astrocytoma	27	14.8 %
Medulloblastoma	57	3.5%
Ependymoma	54	5.55%
Schwannoma	147	8.8%
Epidermoid	30	3.33%
Meningioma	39	7.7%
Brain stem Glioma	6	33.33%
Pilocytic astrocytoma	57	7%

Discussion

With a population of seven million ,Kashmir valley has a different climatic , physical environment , social and dietary habits than rest of India .This study provides an insight into the demographic features of the posterior fossa tumours in this population with distinct genetic and socio-cultural aspects. Total of 546 patients of posterior fossa tumours were seen in our hospital. 306 were males and 240 females .Major differences in male female ratio of the posterior fossa tumours were in hemangioblastoma (M:F 2:1), medulloblastoma (M:F 2.4:1), high grade Astrocytoma (M:F 2:1. On the contrary mengiomas (M:F 1:2.25) and brainstem gliomas (M:F 1:1.75) were more common in females. Similar male dominance has been seen by Abdollazodeh et al and Stulton et al.[7,8]

In our study most of the posterior fossa tumours presented with headache followed by vomiting and gait imbalance, .Headache and vomiting was mostly consistent with medullobalstoma, ependymoma and astrocytoma. Whereas hearing loss and vertigo was usually a feature in CP angle lesions and multiple cranial nerve involvement was seen more in case of brain stem gliomas. Similarly in another study the clinical symptoms of CP angle shwannomas were disturbances of acoustic (95%), vestibular (61%), trigeminal (9%) and facial (6%).[9] Symptom duration was 3.7 years for hearing loss, 1.9 years for facial paresis and 1.3 years for trigeminal disturbances.[9]

The approximate incidence of various posterior fossa tumours in the present study was schwannoma 2.1/million, pilocytic astrocytoma 0.8/ million, ependymomas 0.78/million, medulloblastoma 0.73/million. Posterior fossa tumours are frequently seen in pediatric age groups most of the malignant tumours were seen in first two decades of life , the mean age of medulloblastoma in our study is 12.69 yrs. ependymomas 15.5 yrs, pilocytic astrocytomas 27.8 yrs, schwannomas 40.98 yrs .Most of the patients were seen in the first decade i.e. 105 patients. The results are comparable with most of the studies. [10]

CP angle schwannomas were the most common posterior fossa tumours in adults followed by meningioma (usually benign). While as astrocytoma, medullobalstoma, and ependymoma were the most common posterior tumours in children .This is again consistent with other studies by Davis et al and Bucy et al.[11,12] It is well documented that pediatric brain tumours have predilection to the posterior fossa.[7,8] On the contrary meningiomas are rare in children; Cham et al found that it was present in 1% of childhood brain tumours.[13] In the present study no meningioma was seen in posterior fossa tumours in childhood .The average age of presentation was 44 years.[13] A remarkable difference in incidence of tumour types in children and adults was seen. Tumours more frequent in children were astrocytoma, medulloblastoma, and pilocytic astrocytomas. In contrast adults showed more frequent schwannomas and meningiomas. Similar findings were reported by Helseth et al and Rawland et al.[14,15] Though there is a disagreement in literature about the most common posterior fossa tumour in children between medulloblastoma and astrocytoma. The current study seconds the view that astrocytomas are commonest posterior fossa tumours in children as has been reported by other study wherein astrocytomas comprised of 37% and medullobalstoma of 17%.[16] Similar reports were made by other studies.[17,18] Furthermore they reported that pilocytic astrocytomas are the most frequent grade encountered among the glial tumours.

The most common symptom in our study was headache (76%), followed by vomiting (52%), gait disturbance (44%), cranial nerve palsies (39%), hearing loss (30%) and vision deterioration (14%). CT scan and MRI had sensitivity of 82.16% and 96.34% .This is slightly higher than the findings of chisti et al. [19]

Surgical decompression was done in 501 patients; out of these majority of patients presented with

hydrocephalus (n=327) and needed VP shunt before the patient were taken for taken for the definitive surgery of the lesion. Re-exploration was done in 4 of CP angle tumours, 2 of medulloblastomas and 3 of cerebellar astrocytomas, respectively because of immediate postoperative complication. Nine patients developed postoperative CSF leak which was managed conservatively except for one who needed a LP shunt. Revision surgery was done in 5 patients of posterior fossa tumour. The intraoperative and postoperative mortality was 6.77% which is almost similar to findings of Rorke et al.[20] Forty six of our schwannoma patients (20%) developed post-operative facial nerve palsies most of these recovered after conservative management however 5 patients needed facial reanimation. The postoperative facial palsies were found to be in range of 14 to 16 % by other studies.[21]

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Ethical issues: The study was cleared by hospital ethics committee.

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