

## Case Reports &amp; Case Series

## Brainstem glioma: Clinical significance and prognostic evaluation

Ravindra Pramod Deshpande<sup>a,1</sup>, Chandrasekhar Y.B.V.K.<sup>b,1</sup>, Deepak Babu<sup>a</sup>, I. Satish Rao<sup>c</sup>,  
Manas Panigrahi<sup>b</sup>, Phanithi Prakash Babu<sup>a,\*</sup>

<sup>a</sup> Department of Biotechnology and Bioinformatics, School of Life Sciences, University of Hyderabad, Hyderabad, Telangana State, India

<sup>b</sup> Department of Neurosurgery, Krishna Institute of Medical Sciences, Secunderabad, Telangana State, India

<sup>c</sup> Department of Pathology, Krishna Institute of Medical Sciences, Secunderabad, Telangana State, India



## ARTICLE INFO

**Keywords:**  
Brainstem  
Glioma  
Surgery

## ABSTRACT

In the present study, we have determined the prognostic value and observed the clinicopathological features of brainstem glioma. Overall, we found more number of male patients with brainstem glioma (male:female ratio: 1:6). All patients were subjected to surgery followed by chemotherapy. The tumor was mainly located at brainstem and thalamus. We have recorded the symptoms associated with onset of lesions and predominated by headache, vomiting and limb weakness. We observed the overall survival pattern in brain stem glioma cases and further among low and high grade subgroups. Patients with high grade brainstem glioma were recorded with the median survival of 15 months. There was a statistically significant difference in the survival pattern of low grade vs high grade group ( $p = 0.015$ , hazard ratio: 0.29, 95% CI of ratio: 0.058 to 0.71) Taken together, the clinical presentation provides valuable information to enhance the therapeutic measures for the brainstem glioma cases.

## 1. Introduction

In the present study, we describe the clinical features and pathology of 34 brainstem glioma and perform the prognostic evaluation in light of practiced therapeutic measures. The clinical information can provide the guidelines to update the existing therapeutic measurements for brainstem glioma. We have retrospectively collected the patient details from Krishna Institute of Medical Sciences (KIMS) between 2009 and 2018. Among these, we sorted out the glioma cases with brainstem involvement. The location of the tumor was determined by the MRI imaging. In all cases the tumor was surgically resected. The type of surgery in nearly all cases was craniotomy. In some cases, patients were subjected to retromastoid suboccipital craniectomy (RmSOC). The surgically resected tumor tissue sample was then analyzed for histopathological diagnosis into WHO designated grades. All the patients in the study were completely anonymized. The survival details of the patients were analyzed by Kaplan-Meier survival test. The significance of the results was designated by the  $p < 0.05$ .

## 2. Discussion

In the present study, we show the clinicopathological details and

survival characteristics of glioma patients. The clinicopathological features includes age, gender of patients, type of surgery location of tumor. The MIB1 was used to designate the proliferation index. Overall and progression free survival was estimated and the details were used to plot the survival curves. Kaplan- Meier statistical analysis was applied to determine the significance. Further, the most commonly associated symptoms in patients were recorded. Patient's clinical history was checked to see the previous history of tumors.

The location of tumors was determined by MRI imaging. Overall, male population was found to be dominating (male:female ratio: 1:6). Brainstem location was observed predominantly in low grade tumors. Among the total observed cases, 38.2%, were pilocytic astrocytoma, 32.3% were diffuse astrocytoma, 5.8% were of anaplastic astrocytoma and 23.5% were of glioblastoma. Collectively, we observed around 70% cases of low grade tumors while only 30% of high grade ones. Brainstem glioma cases are viewed to be difficult for the surgical resection, however, the extent of surgical removal is found to have better prognostic value in midbrain or medullary tumor [1] but not with the pontine gliomas [2].

Among the symptoms, we observed headache and vomiting most frequently followed by motor weakness and hearing impairment. These observations were supported by previous reports where headache was

\* Corresponding author at: Department of Biotechnology and Bioinformatics, School of Life Sciences, University of Hyderabad, Hyderabad 500046, Telangana State, India.

E-mail address: [prakash@uohyd.ac.in](mailto:prakash@uohyd.ac.in) (P.P. Babu).

<sup>1</sup> Both authors contributed equally.

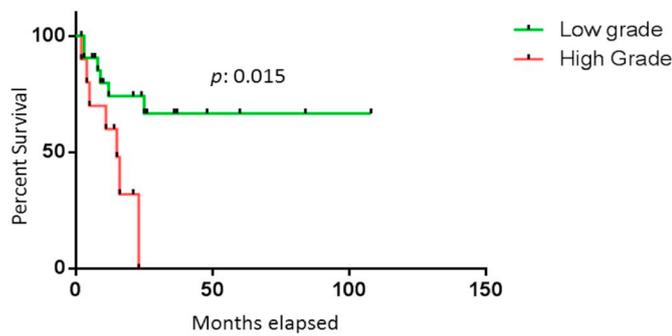


Fig. 1. Kaplan-Meier survival curve for the patients with brain stem glioma in low and high grades. There was statistically significant difference in the survival pattern of two groups (p = 0.015).

observed most commonly with prolonged duration (> 3 months) and found with less favorable clinical outcome [3]. We found headache to be most common however with less severity (< 1.5 months). All the patients were operated by surgical resection followed by chemotherapy. We observed significant difference in the survival pattern between low and high grade groups as evidenced by the statistical analysis. The Log-rank (Mantel-Cox) test have given Chi square value of 5.85 while the p = 0.015. The hazard ratio was observed to be 3.4 while the 95% CI of ratio as 1.4–17.0. (Fig. 1) The median survival was observed to be 15 months in high grade patients while the median survival was not reached in low grade ones. In a previous study, there was no significant difference observed in the survival of low and high grade groups [3].

All patients were subjected to surgical resection followed by chemotherapy (Table 1). The extent of survival may be influenced by the surgical resection followed by the chemotherapy. A report advocates better prognostic value in brainstem glioma patients followed with intense radio and chemotherapy as compared with the radiation therapy alone [4] while other study attributes no clear benefits to the use of

Table 1

Clinico-pathological details of patients diagnosed with the brainstem glioma. Table represents the information as age/sex of patients, type of surgery performed, location and type of the tumor. Nearly all samples were checked with the MIB1 proliferation index. These staining details were not available in once case. Symptoms associated with the patients were also studied.

PA: pilocytic astrocytoma, DA: diffuse astrocytoma, AA: anaplastic astrocytoma, GB: glioblastoma.

Patient ID	Age	Sex	Recurrence	Location	Side	Surgery type	Tumor type	MIB index (%)	Diagnosis	PFS	Symptoms
1	20	F	No	Thalamic	Right	Craniotomy	I	5	PA	–	Headache
2	21	M	No	Thalamic	Right	Craniotomy	II	1	DA	–	Headache
3	33	M	No	Thalamic	Left	Craniotomy	II	6	DA	2Y	Headache, seizures
4	4	F	No	Cervico medullary	Middle	Sub occipital craniotomy	II	3	DA	–	No neck control
5	46	M	No	Brainstem	Left	Far lateral	I	1	PA	–	Limb weakness
6	12	M	No	Brainstem	Right	Craniotomy	I	1	PA	–	Left side weakness
7	12	F	No	Brainstem	Right	Craniotomy	I	1	PA	5Y	Right hearing impairment, headache
8	68	M	No	Thalamic	Right	Endoscopy	I	1	PA	–	Headache, vomiting
9	21	M	Yes	Brainstem	Middle	Sub occipital craniotomy	I	1	PA	7y	Headache
10	41	M	Yes	Brainstem	Right	Craniotomy	II	–	DA	9Y	Headache
11	4	M	Yes	Brainstem	Middle	Sub occipital craniotomy	IV	15	GB	–	Headache, vomiting
12	46	F	No	Brainstem	Right	Combined approach	II	8	DA	–	Speech disturbance
13	4	M	No	Brainstem	Left	Craniotomy	IV	50	GB	–	Headache, vomiting
14	26	M	No	Thalamic	Left	Craniotomy	IV	8	GB	1M	Headache
15	22	F	No	Brainstem	Right	Sub occipital craniotomy	II	13	DA	–	Headache, vomiting
16	23	M	No	Brainstem	Right	Combined approach	IV	2	GB	–	Headache
17	32	M	No	Brainstem	Right	RMSOC	III	5	AA	–	Headache
18	14	F	No	Brainstem	Right	Combined approach	I	9	PA	14M	Vomiting
19	6	M	No	Brainstem	Midline	Sub occipital craniotomy	II	1	DA	–	Headache, vomiting
20	24	F	No	Thalamic	Right	Craniotomy	I	2	PA	–	Headache, vomiting
21	44	F	No	Brainstem	Midline	Sub occipital craniotomy	I	20	PA	–	Speech impairment
22	6	M	No	Thalamic	Right	Craniotomy	III	5	AA	–	Facial weakness
23	13	F	No	Brainstem	Right	Craniotomy	II	12	DA	–	Headache
24	26	M	No	Brainstem	Right	RMSOC	I	7	PA	1M	Walking impairment
25	8	M	No	Brainstem	Left	Combined approach	IV	2	GB	–	Hearing impairment
26	5	F	No	Brainstem	Midline	Sub occipital craniotomy	IV	20	GB	–	Headache, vomiting
27	40	M	No	Brainstem	Midline	Sub occipital craniotomy	I	25	PA	7M	Headache, vomiting
28	58	F	No	Brainstem	Right	Combined approach	II	1	DA	–	Headache
29	14	F	No	Thalamic	Left	Craniotomy	II	1	DA	–	–
30	12	F	No	Brainstem	Midline	Sub occipital craniotomy	I	1	PA	–	Hearing impairment, headache
31	45	M	No	Brainstem	Midline	Sub occipital craniotomy	II	1	DA	3M	Headache, vomiting
32	16	M	No	Thalamic	Right	Craniotomy	IV	35	GB	–	Limb weakness
33	7	M	No	Brainstem	Left	Craniotomy	I	15	PA	–	–
34	49	M	No	Brainstem	Right	Sub occipital craniotomy	IV	50	GB	–	Walking difficulty

chemotherapy when combined with radiotherapy [2].

In summary, we describe the clinicopathological characteristics of glioma patients with brainstem location. The observations shows that brainstem glioma patients when subjected to the maximum surgical resection followed by the chemotherapy, accounted for the better survival outcome, particularly in high grade tumors. The patients were observed mostly with headache with less frequency (< 1.5 months). As there is very limited information available, present study may help to improve the existing remedial measures for brainstem glioma cases.

#### Conflict of interest

The authors have no competing interests to declare.

#### Funding

Authors thank financial assistance from Department of Science and Technology (DST-India) (Grant no: SB/EMEQ-257/2013, SR/CSRI/196/2016), Department of Biotechnology (DBT-India) (Grant No. BT/

PR18168/MED/29/1064/2016, BT/PR13111/MED/29/149/2009) and University with Potential for Excellence (UPE-India) (Grant no: UH/UGC/UPE-2/Interface studies/Research Projects/B1.4, UH/UPE-2/28/2015) for lab funding. RDP thankful to Department of Biotechnology (DBT-India) (Award no: DBT JRF/2011-12/95) for student fellowship.

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