**Surgical outcome of supratentorial surgery for gliomas in terms of improvement in seizures**

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**ABSTRACT**
**Objective:** To know about the surgical outcome of supratentorial gliomas in terms of improvement in seizures

**Material & Methods**: This Prospective hospital-based study was conducted in Department of Neurosurgery, Lady Reading Hospital, Peshawar, from Dec 2011 to Nov 2013. Patients with supratentorial gliomas were included and were selected on the basis of clinical features and MRI findings, and histopathological findings while patients unfit and non willing for surgery, infratentorial gliomas and other brain tumors were excluded from the study. We made a proforma for collection of data, which included information about patient identity, clinical features and MRI findings and histopathology report .All the patients were followed postoperatively uptill 6 months for relief of seizures.

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**Results**. We studied 100 patients with supratentorial gliomas. Their ages ranged from 10 years to 80 years, with mean age of 45 years ±5 SD. 56 (56%) were male and 44(44%) were females. Frontal lobe was involved in 40(40%) cases, temporal lobe in 35(35%) cases, while Parieto occipital lobe in 20(20%) patients And Intraventricular in 5(5%) patients. Gross total resection was done in 55 (55%) patients and Subtotal resection in 45(45%). post operatively seizure outcome was measured using Engel classification for seizures control. 56% patients had no seizures postoperatively uptill 6 months follow up. Regarding morbidity and mortality of surgery 7 patients had neuro deficit, in 4 patients there was hematoma in the tumor bed and 1 patient developed superficial wound infection. 6 patients expired uptill 6 months follow up.

**Conclusion.** Seizures are most common presenting feature of supratentorial gliomas .Gross total resection is the treatment of choice for relief of seizures after surgery. Seizure control with medication preoperatively is important predictor of seizure outcome postoperatively.
**Key Words:** Surgical outcome, Supratentorial gliomas; ,Seizures.

**Introduction**

Tumors of the central nervous system (CNS) are classified according to their cell of origin and are graded based on standard histopathology features. Gliomas consist of a heterogeneous group of neuroectodermal tumors from the glia, the supporting cells of the CNS. Astrocytes, oligodendrocytes, and ependymal cells are types of glial cells that may give rise to astrocytomas, oligodendrogliomas, and ependymomas, respectively 1. Of the estimated 17,000 primary brain tumors diagnosed in the US each year, approximately 60% are gliomas 2 . Gliomas are divided into low grade which includes ependymomas, pilocytic astrocytomas, pleomorphic xanthoastrocytomas, diffuse astrocytomas, oligodendrogliomas, and high grade gliomas which include anaplastic astrocytoma,and glioblastoma multiform which is grade IV Astrocytoma, the most aggressive malignant tumors of the brain for which no cure is available 3 .High grade gliomas are more common than low grade gliomas. The incidence of glioblastoma and anaplastic Astrocytoma has increased in the older patients, the low-grade tumors are more common in the younger population 4 . Most patients with LGG present between the second and fourth decades of life, while glioblastoma in 5th to 6 th decade of life and a seizure is the presenting symptom in 72%–89% of patients 5,6 . Mental status changes are present in 3%–30% of patients at the time of presentation 7 . 10 to 44 % have signs of raised ICP like headache and vomiting 8. Incidence of seizure is 25 to 50% in glioblastoma multiform patients 9. Preoperative seizures show intrinsic gliomas properties and are the most important factor associated with continued seizures after tumor surgery 10,11. A number of studies have shown that patients having epileptic seizures have favorable prognosis. so management of seizures is very important part in the management of gliomas. Tumor location influences the risk for epilepsy 12 because Tumors involving the frontal, temporal, and parietal lobes are more commonly associated with seizures than other lobe lesions13. keeping importance of seizure as most common presenting feature we conducted this study to know improvement of seizure after surgery in patients with supra tentorial gliomas.

**Material and Methods**

This prospective study was conducted in department of neurosurgery lady reading hospital Peshawar from dec 2011 to Nov 2013. Approval was taken from hospital Ethical committee. Out of 100 patients admitted as diagnosed cases of supra tentorial gliomas (diagnosed on neuro imaging like CT brain , MRI brain with MRS and other sequences confirmed on histopathology) were operated in the Neurosurgery Department, PGMI, Lady Reading Hospital Peshawar . Patients of both genders irrespective of their age who had supratentorial gliomas with seizures were included in the study and those with co-morbid conditions like, CHD,HTN,DM or coagulopathy , those unfit for GA , those not willing for surgery and those patients with not confirmed on histopathology as gliomas were excluded from the Study. patients were admitted through OPD or through casualty in case of severe seizures. After admission all patients were subjected to detailed history, neurological examination, Hematologic tests like FBC,Urea,Sugar Serologic tests like HBS,HCV and other Base line investigations were done. All the patient’s were operated after establishing a neuroradiological diagnosis. Neuroradiological investigations included CT scan brain and MRI brain with and without contrast,with FLAIR images, DWI, ADC map, and MRS were done for all patients to diagnose as gliomas. Preoperative work up was done. For proper localization operative microscope was used. All the patients underwent craniotomy , Cytoreduction, Biopsy, microsurgical resection of tumor was done. Gross total resection was done in 55 cases. In 45 cases subtotal removal and biopsy was done. For tissue diagnosis, biopsy was taken and preserved in 10% formaline and sent to laboratory on the same day. All cases were reported by Senior Pathologist. (Fellow of College of Physicians and Surgeons Pakistan). All patients were kept in ICU for 24hours and then shifted to ward. patients were observed for seizures postoperatively. Seizure outcome was measured using Engel,s classification .All patients with supratentorial glioma having tumor related epilepsy preoperatively had follow up of 6 months postoperatively for seizure control at 2 weeks, 1 month, 3rd and 6th month. On 5th post op day all patients were discharged.

**RESULTS**

We studied 100 patients with supratentorial gliomas. Their ages ranged from 10 years to 80 years, with mean age of 45 years. 56 (56%)were male and 44(44%) were females ( Fig no 1) . Duration of illness ranged from 1 year to 9 years mean; 5 years. All patients were on Anti epileptic drugs pre operatively.80 (80%) patients used valproic acid, and 20(20%) on levetiracetam. Frontal lobe was involved in 35(35%) cases, temporal lobe in 35(35%) cases, while parietal ,Parieto occipital and fronto parietal lobes in 10 (10%) cases for each and Intraventricular in 5(5%) patients ( Table no 1). Histopathology showed Glioblastoma multiform grade IV in 40(40%), Astrocytoma grade II 20(20%), Pilocytic astrycytoma Grade I 10(10%), Anaplastic Astricytoma Grade III 10(10%), Oligodendroglioma and Oligoastrocytoma Grade II 10(10) Ependymoma 4 (4%), and Ganglioganglioma & DNT 6(6%) (Table no 2) . Gross total resection was done in 55 (55%) patients. Sub total resection in 45(45%) . post operatively seizure outcome was measured using Engel classification for seizures control . In patients with gross total resection the seizures control was 59 % in first post operative month , then uptill 6 months it was 37 %. then in patients of subtotal resection only 30 % patients gained engel class 1 seizures control which reduced to 19 % uptill 6 months follow up so total 56 % patients had no seizures after 6 months of follow (Fig no 3 ) . After the 6 months follow up 22 patients gained Engel class 1 , 17 had class 4 and 11 patients had class 2 and 3 Engel score ( Fig no 4 ) . Regarding morbidity and mortality 4 patients developed motor weakness, 3 patients had language deficit, 4 patients developed hematoma in the tumor bed and 1 patient developed superficial wound infection and 6 patients expired uptill 6 months follow up ( Table no 3) . We had follow up of 6 months with follow up visit after every 2 weeks, 1 month, 3 months and 6 months.

**Fig no 1; Gender wise distribution N=100**

**Table no 1;- :Location of tumors based on MRI brain findings N=100**

|  |  |  |
| --- | --- | --- |
| Location of brain tumors | Number of patients | Percentage of patients |
| Frontal lobe | 35 | 35% |
| Front parietal | 10 | 10% |
| Temporal | 35 | 35% |
| Parietal | 10 | 10% |
| Parieto occipital | 10 | 10% |
| Intra ventricular | 5 | 5% |

**Fig no 2 ;- MRI of low grade gliomas N=100**



**Table no 2;- Histopathological findings of tumors N=100**

|  |  |  |  |
| --- | --- | --- | --- |
| WHO Grades of tumors | Type of tumors | Number of patients | Percentage of patients |
| Grade i | Pilocytic Astrocytoma, Ganglioganlioma | 16 | 16% |
| Grade ii | Astrocytoma, oligodendroglioma and oligoastrocytoma, Ependymoma | 34 | 34% |
| Grade iii | Anaplastic Astrocytoma | 10 | 10% |
| Grade iv | GBM | 40 | 40% |

**Fig no 3;- post operative outcome of brain supratentorial gliomas surgery in terms of seizures control N=100**

**Fig no 4;- Seizures outcome in terms of Engel classification N=100**

**Table no 3; Total post operative morbidity and mortality N=100**

|  |  |  |
| --- | --- | --- |
| Morbidity and mortality  | Number of patients  | Percentage of patients  |
| motor weakness |  4 | 4% |
| language deficit | 3 | 3% |
| hematoma in the tumor bed | 4 | 4% |
| superficial wound infection |  1 | 1% |
| Total expires |  6 | 6% |

**Discussion**

Seizures are more commonly associated with primary brain tumors as compared to metastasis 14. Many studies have shown the effect of seizures on quality of life in patients with supratentorial gliomas15,16,17,18. Clinically, tumor-related seizures are shown as simple or complex partial seizures with or without secondary generalization and, in more than 50% of cases, are resistant to anti epileptic drugs. Tumors involving the frontal, temporal, and parietal
lobes are more commonly associated with seizures than are occipital lesions. Severe epilepsy is particularly frequent in tumors that involve the mesiotemporal lobe and insular (paralimbic) structures19,20.In our study Frontal and temporal lobe were commonly involved 40% and 35%, followed by frontoparital, and parietal lobe.

Study conducted by Toshishiko Etal in japan had frontal lobe involvement in 50% and temporal lobe in 26% patients. Tumors located near to cerebral cortex or arising from cortex have high incidence of seizures than non cortical deeply located gliomas21,22. In our study 100% patients had seizures preoperatively. It is because seizures are most common presenting symptoms specially in low grade gliomas23,24,25,26.Supratentorial gliomas are diagnosed by neuroimaging as MRI brain with contrast, Diffusion weighted, FLAIR, and MRS. In MRS glial lesion show cholin peak and reduced level of NAA.

 While gliomas are confirmed on histopathology. In our study MRI brain with all sequences and histopathology were done for all 100% cases. Seizure outcome was 56% after 6 months follow up. it was more in patients with gross total removal (37%) of tumor as compared to subtotal removal(19%).We did gross total removal in 55(55%) patients. which is comparable with study by Cynthia A etal in hanover united states had Gross total removal of 56% 27. Study conducted by Chang EF et al in 2008 showed 67% seizure free (engel class 1) after supratentorial surgery for gliomas, and 17% engel classII 28. we had 56% which is lower than international study, and it may be because we have no intra operative monitoring and electrocorticography facilities. However our results are comparable with some international studies cause there is variation in seizure outcome after gliomas surgery which ranges from 36 to 100%29.

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