

SURGICAL OUTCOME OF SUPRATENTORIAL GLIOMAS IN TERMS OF IMPROVEMENT IN SEIZURES DURING SIX MONTHS FOLLOW UP

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Date Submitted: June 30, 2015
Date Revised: November 06, 2016
Date Accepted: November 09, 2016

ABSTRACT

OBJECTIVE: To find out the surgical outcome of supratentorial gliomas in terms of improvement in seizures.

METHODS: This prospective hospital-based study was conducted on patients with supratentorial gliomas, at Department of Neurosurgery, Lady Reading Hospital, Peshawar, from Dec 2011 to Nov 2013. Patients unfit for general anesthesia, not willing for surgery, infratentorial gliomas and other brain tumors were excluded from the study. Information about demographic details, clinical features, magnetic resonance imaging findings and histopathology report were recorded in a proforma. All the patients were followed postoperatively for 6 months for relief of seizures.

RESULTS: Out of 100 patients with supratentorial gliomas, 56 were male. Their ages ranged from 10-80 years, with mean age of 45 ± 5 years. Frontal lobe was involved in 40 cases and temporal lobe in 35 cases. In patients with gross total resection ($n=55$), the seizures control was reduced from 59% in first postoperative month to 37% until 6 months. In patients of subtotal resection ($n=45$), seizures control was reduced from 30% patients to 19% until 6 months follow-up, so total 56% patients had no seizures till 6 months of follow-up. After 6 months follow up 22 patients gained Engel class-I, 17 had class-IV and 11 patients had class-II and III Engel score. Seven (7%) patients had neuro-deficit and six (6%) patients expired within 6 months of follow up.

CONCLUSION: The most common site for supratentorial gliomas is frontal lobe. Significant number of patients improved in terms of seizures control post-operatively. Mortality during six months was 6%.

KEY WORDS: Surgical outcome (Non-MeSH), Glioma (MeSH), Seizures (MeSH).

THIS ARTICLE MAY BE CITED AS: Haq NU, Khattak MI, Khan BZ, Rehman ZU, Ali M. Surgical outcome of supratentorial gliomas in terms of improvement in seizures during six months follow up. *Khyber Med Univ J* 2016; 8(4): 181-184.

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 are tumors which arise from the glial cells, the supporting cells of the CNS. These are astrocytes, oligodendrocytes, and ependymal cells which 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, pilocyticastrocytomas, diffuse astrocytomas, oligodendrogliomas, and high grade gliomas which include anaplastic astrocytoma and

glioblastoma multiforme. These high grade gliomas are malignant tumors of the brain for which cure is difficult.³ High grade gliomas are more common than low grade gliomas. The glioblastoma and anaplastic astrocytoma are more common in the elderly patients, while the low-grade gliomas are more common in the younger population.⁴ Most patients with low grade glioma present between the second and fourth decades of life, while high grade glioma in 5th to 6th decade of life.

Seizure is the presenting complaint in 72-89% of patients of gliomas.^{5,6} Mental status changes are present in 3-30% of patients at the time of presentation.⁷ 10-40% of patients have signs and symptoms of raised intracranial pressure like headache and vomiting.⁸ Incidence of seizure is present in 25-50% glioblastoma multiform patients.⁹ Preoperative seizures are the most important symptoms, which reflect internal features of the tumors and sometimes are associated with tumors after surgery.^{10,11} Despite the fact that surgical resection removes the tumor and reduces irritating effect on the cortex. A number of studies have shown that patients having epileptic seizures have favorable prognosis. This is because of the fact that after seizures patients are subjected to investigations like neuro-imaging (computerized tomography (CT) scan & MRI brain) to diagnose the tumors at early stages. So management of seizures is very important part in the management of gliomas.

Location of tumor inside supratentorial compartment of brain influences the risk for epilepsy¹² because tumors

involving the frontal, temporal and parietal lobes have more chances of seizures as compared to lesions in other lobes of the brain.¹³

Keeping importance of seizure as most common presenting feature and good prognostic factor for patients with gliomas, we conducted this study to know improvement of seizure after surgery in patients with supratentorial gliomas. As we have no local data available regarding this important symptom of gliomas, so it will help us to develop local statistics regarding improvement of seizures postoperatively in patients with supratentorial gliomas.

METHODS

This prospective study was conducted in Department of Neurosurgery, Lady Reading Hospital, Peshawar from December, 2011 to November, 2013. Approval was taken from hospital ethical committee and written informed was obtained from the study subjects. Patients were admitted through outpatient department (OPD) or through casualty in case of severe seizures. Patients of both genders irrespective of their age who had supratentorial gliomas with seizures were included in the study and those unfit for general anesthesia (GA), not willing for surgery and patients with disease not confirmed on histopathology as gliomas were excluded from the study.

Supratentorial gliomas are diagnosed by neuro-imaging as MRI brain with contrast, diffusion weighted, Fluid-attenuated inversion recovery (FLAIR) and magnetic resonance spectroscopy (MRS). Gliomas are confirmed on histopathology.² Neuro-radiological investigations in our study included CT scan brain and MRI brain (Figure 1) with and without contrast (with different sequences), were done for all patients to diagnose as gliomas. Histopathology was done for all cases to confirm the diagnosis. Other necessary preoperative work up was also done including detailed history, neurologic examination and hematologic and serologic investigations.

All the patients included in the study were operated after establishing diagnosis by two different surgeons. Operative microscope was used for proper localization of the tumor. In all patients, 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. Senior qualified pathologist reported all cases. All patients were kept in ICU for 24 hours and then shifted to ward. Patients were observed for seizures postoperatively. Seizure outcome was measured using Engel’s classification (Table I). All patients with supratentorial glioma having tumor related epilepsy preoperatively were followed up of 6 months postoperatively for seizure control at 2 weeks, 1 month, 3rd and 6th month.

RESULTS

We studied 100 patients with supratentorial gliomas. Their ages ranged

from 10 to 80 years, with mean age of 45±5years. Fifty six (56) were males and 44 were females. Duration of illness ranged from 1 to 9 years. All patients were on anti-epileptic drugs preoperatively. Eighty (80) patients used valproic acid while 20 were on levetiracetam. Frontal lobe was involved in 35 cases, temporal lobe in 35 cases, while parietal, parieto-occipital and fronto-parietal lobes in 10 cases each and intraventricular extension in 5 patients.

Histopathology showed glioblastoma multiforme grade IV in 40, astrocytoma grade II in 20, pilocytic astrocytoma grade I in 10, anaplastic astrocytoma grade III in 10, oligodendroglioma and oligoastrocytoma grade II in 10, ependymoma in 4 and ganglioglioma & dysembryoplastic neuroepithelial tumor 6 patients.

Gross total resection was done in 55 patients, while subtotal resection in 45 patients. Post operatively seizure outcome was measured using Engel’s classification I4 for seizures control.

In patients with gross total resection

TABLE I: ENGEL’S CLASSIFICATION¹⁴

Class	Description
I	Seizure free or no more than a few early, nondisabling seizures; or seizures upon drug withdrawal only
II	Disabling seizures occur rarely during a period of at least 2 years; disabling seizures may have been more frequent soon after surgery; nocturnal seizures
III	Worthwhile improvement; seizure reduction for prolonged periods but less than 2 years
IV	No worthwhile improvement; some reduction, no reduction, or worsening are possible

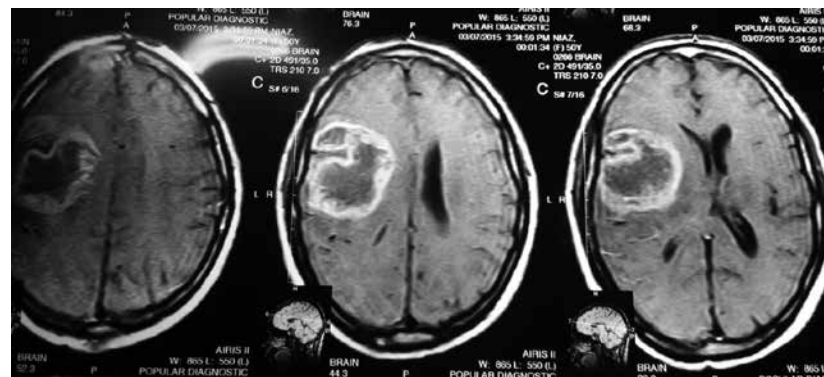


Figure 1: MRI of high grade Glioma

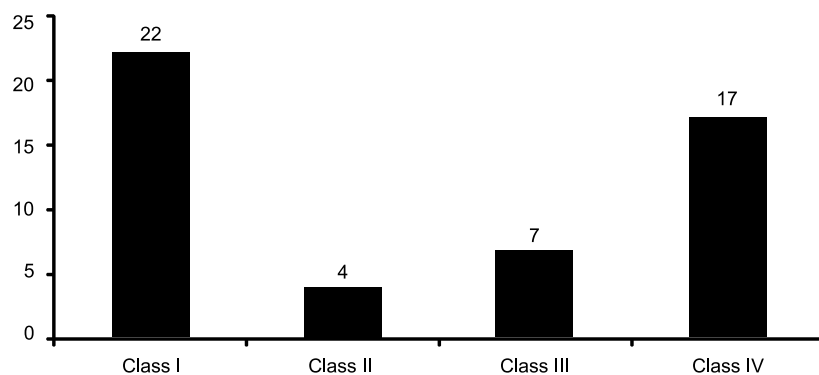


Figure 2: Seizures outcome in terms of engel classification after six months follow-up (n=100)

the seizures control was 59% in first post operative month, then until 6 months it was 37%. Moreover, in patients of sub-total resection only 30% patients gained Engel's class I seizures control which reduced to 19% until 6 months follow up so total 56% patients had no seizures till 6 months of follow. After 6 months follow up 22 patients gained Engel's class I, 17 had class IV and 11 patients had class II and III Engel's score (Figure II).

Regarding morbidity and mortality 4 patients developed motor weakness, 3 patients had language deficit, 4 patients developed hematoma in the tumor bed, 1 patient developed superficial wound infection and 6 patients expired within 6 months follow up period. Eighty-two (82%) patients were discharged on 5th post-operative day. We had follow up of 6 months with follow up visit after every 2 weeks, 1 month, 3 months and 6 months.

DISCUSSION

In the current study Engel's class I 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 Kahlenberg et al. who had done gross total removal of 56% of patients.¹⁵ Study conducted by Chang EF et al. in 2008 showed 67% seizure free (Engel class I) after supratentorial surgery for gliomas and 17% Engel's class II¹⁶, which is higher than our study and it may be because we

have no intra operative monitoring and electrocorticography facilities. However, our results are comparable with other studies as there is more variation in seizure outcome after gliomas surgery, which is in the range from 36-100%.¹⁷

We conducted this study in order to elucidate role of surgery for relief of seizures, as seizures are more commonly associated with primary brain tumors as compared to cerebral metastasis.¹⁸ Different studies have shown the effect of seizures on patient's quality of life that is suffering from supratentorial gliomas.^{19,20} Clinically, tumor-related seizures are manifested, as simple or complex partial seizures with or without secondary generalization and in more than 50% of cases, are refractory to anti-epileptic drugs despite maximum drug treatment. Tumors, which involve the frontal, temporal, and parietal lobes are more commonly associated with seizures than are occipital lesions. Severe epilepsy is particularly more frequent in tumors, which involve the temporal lobe and insular cortex.^{16,21}

In our study frontal and temporal lobe were commonly involved 40% and 35%, followed by fronto-parietal and parietal lobe. Our results are comparable to the studies conducted in other parts of the world which showed 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 tumors located in deep parts of the brain.^{16,22}

The limitations of our study are that it is a single center trial and operating surgeon bias was also there. To implement and to recommend our results, more and more multi-center trials are required in future to authenticate the findings.

CONCLUSION

The most common site for supratentorial gliomas is frontal lobe. Significant number of patients improved in terms of seizures control post-operatively. Mortality during six months was 6%.

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CONFLICT OF INTEREST

Authors declared no conflict of interest

GRANT SUPPORT AND FINANCIAL DISCLOSURE

NIL

AUTHORS' CONTRIBUTION

Following authors have made substantial contributions to the manuscript as under:

NUH: Concept & study design, acquisition analysis and interpretation of data, Drafting the manuscript, final approval of the version to be published

MIK, BZK, ZUR: Acquisition of data, Drafting the manuscript, final approval of the version to be published

MA: Acquisition of data, critical revision, supervision, final approval of the version to be published

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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