SURGICAL OUTCOME OF SUPRATENTORIAL LOW GRADE GLIOMAS: STUDY OF 85 CASES

Naeem Ul Haq[1], Mumtaz Ali[2], Muhammad Usman[3], Bakht Zar Khan[4], Farooq Azam[5]

[1-5] Department of Neurosurgery, Lady Reading Hospital, Peshawar - Pakistan.
Address for correspondence:
Dr. Naeem ul Haq
Department of Neurosurgery, Lady Reading Hospital, Peshawar - Pakistan.
Email: brainsurgeon1978@yahoo.com
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ABSTRACT

Objective: To determine the surgical outcome of supratentorial low grade gliomas.

Methodology: This prospective study was conducted in Department of Neurosurgery Lady Reading Hospital Peshawar from December 2009 to November 2013. All patients who were operated for supratentorial low grade gliomas were included in the study while operated patients of infra tentorial gliomas, high grade gliomas, and other tumors of the brain were excluded from the study. Patient's age, gender, pre-operative sign and symptoms, location of glioma, post operative outcome and type of glioma based on histopathology were recorded on predesigned proforma. Post op follow up was done up to 1 year. All the data was analyzed by SPSS 16 and results were presented in the form of tables/graphs/charts.

Results: We included 85 patients in this study, males 50(58%) were and females were 35(41%). Age ranged from 18 to 80 years with mean 49 ±5 years. Pre-operative Kernofsky performance score (KPS) was 90 in 38(45%) and 80 in 17(20%). On neuroimaging frontal lobe was most commonly involved i.e. in 44(50%). Based on histopathology astrocytoma grade II was the commonest and reprted in 34(40%) cases. Gross total resection was done in 29(35%) patients while subtotal resection in 56(65%). Post-operatively headache and vomiting improved in 44 (50%) patients and seizures in 47(56%) patients. KPS improved in 24 (28%) patients while deteriorated in 3(3.5%) patients.

Conclusion: Concious level, Kernofsky performance score, control of seizures and headache are important parameters for surgical outcome in patients with low grade gliomas and improved in significant number of our patients.

Key Words: Surgical outcome, Supratentorial, Low grade glioma

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INTRODUCTION

During embryogenesis the neuroectoderm divides to give rise to neuroepithelium which further divides into neuroblast, the spongioblast and the primitive ependymocytes. Intracranial tumors can take origin at any level of division of these cells[1]. Low-grade gliomas (LGG), 40% consists of all glial tumors. Common age for occurrence is 40 years[2]. The common histological Types of LGG are astrocytomas, oligodendrogliomas, and mixed oligoastrocytomas[3]. Low-grade gliomas include WHO grade I and II gliomas. WHO grade I lesions, which include pilocytic astrocytomas and gangliogliomas, while WHO grade II gliomas are well circumscribed and non -infiltrative. Gross total removal is considered curative all over the world[4]. The annual, incidence of cerebral gliomas is almost 3.7 per 100,000 for male patients while 2.6 per 100,000 for females. Cerebral gliomas are common both in adults and pediatric patients[5,6]. Low-grade gliomas are more common in white people and among men.

Low-grade glial tumors in adults are more commonly located in the cerebral hemispheres, more commonly located in the supplementary motor cortex and the insula[7]. Oligodendroglial tumors have predilection for cerebral convexities, in areas below cortex, especially in the frontal lobe. These tumors are diagnosed by neuroradiological investigations like CT brain with and without contrast and MRI brain with and without contrast. On postcontrast images of CT brain, Low grade gliomas are hypo dense, which may or may not enhance. 20% of oligodendrogliomas can have mass effect and calcification which are not common in astrocytomas . On MRI brain, LGGs are usually hypo intense on T1, and Hyper intense on T2 weighted images, with minimal or

no contrast enhancement (figure 1). Fluid attenuated inversion recovery (FLAIR) sequences are the best images between presumed infiltrating tumor territory and normal brain[8]. Diagnosis is confirmed by histopathology. Objectives of treatment are to arrest progression of disease and increase overall survival. Management of choice for patients with low grade astrocytoma is still not clear and is controversial[9-11]. Treatment options are observation only, biopsy followed by observation, surgical removal, radiation, and chemotherapy.

Recent studies have shown that surgical treatment of cerebral gliomas can decrease the recurrence and increase chances of progression free survival and it has been experienced that maximal possible resection of tumor have a significant advantage to the patient[12-16]. Indications of surgery are raised intracranial pressure, neurologic deficits, mass effects and refractory seizures. Treatment of these tumors start with surgical resection of tumor accompanied by intraoperative adjuncts like neuronavigation, intraoperative MRI, perop ultrasound, stimulation mapping techniques and florescence guided surgery. These all modalities are used to remove maximum tumor with minimal morbidity[17]. Therefore we conducted this study to assess about surgical outcome for supratentorial low grade gliomas.

METHODOLOGY

This study was conducted in Neurosurgery Unit, Lady Reading Hospital Peshawar from December 2009 to November 2013. 85 patients admitted as diagnosed cases of supra-tentorial low grade gliomas (diagnosed on neuro-imaging like CT brain, MRI brain with MRS and other sequences and confirmed on histopathology) underwent surgery. Both male and female patients of all ages who had supratentorial low grade gliomas and were operated were included and those with high grade gliomas confirmed on histopathology, infra-tentorial gliomas and other tumors of the brain, were excluded from the study. Patients were admitted through OPD or through casualty in case of severe seizures, headache, vomiting or loss of consciousness. After admission all patients were subjected to detailed history, neurological examination, hematologic tests like full blood count, urea, sugar, serologic tests like hepatitis profile and other base line investigations were done. All the patients were operated after establishing a neuroradiological diagnosis. Neuroradiological investigations included CT scan brain and MRI brain with and without contrast and with all sequences. Preoperative work up was done including fitness for general anesthesia. For proper tumor localization operative microscope was used. All the patients underwent craniotomy. Cyto-reduction, biopsy and microsurgical resection of tumor were done. For tissue diagnosis, biopsy specimen was sent for histopathology (figure 2). All patients were kept in ICU for 24 hours and then shifted to ward. Patients were observed. Post operatively surgical outcome was measured by improvement in symptomatology, performance score, control of seizures, and event free survival postoperatively for seizure control. Post op Follow up was done at 2 weeks, 1 month, 3rd and 6th month and 1 year. On 5th post op. day all patients were discharged. All data was entered into a proforma and were analyzed using SPSS version 17. Results were expressed in the form of tables/graphs/charts.

RESULTS

We included 85 patients with supratentorial low grade glioma in study, males were 50(58%) and females were 35(41%). Age ranged from 18 to 80 years with mean 45.37±18.11 years. Seizures was the most common presenting symptom in 47(55%) of patients. Frequency of other presenting symptoms is shown in table 1. Pre-op Kernofsky performance score was 90 in 38(45%) patients. KPS in rest of the patients is shown in table 2. On neuroimaging frontal lobe was most commonly involved in 44(50%) patients. Tumor location is shown in table 3. Histopathology showed astrocytoma grade II in 34(40%) of patients. Frequency of other LGG is shown in figure 3.

Gross total resection (GTR) was done in 29(35%) patients and subtotal resection (STR) in 56(65%). Post operatively surgical outcome was measured by improvement in symptomatology, performance score, control of seizures, event free survival as shown in table 4. Headache and vomiting improved in 44(50%) patients. Conscious level improved in 2 out of 3 patients who had come with loss of consciousness. Kernopsy performance scale (KPS) improved to above level in 24 (28%) patients. Performance score improved more in patients with gross total resection.

DISCUSSION

In this study we determined analysis of supratentorial low grade gliomas in 85 patients with the primary aim to determine the effect of surgical resection of tumor on progression free survival. In literature there are studies showing role of surgery in low grade gliomas and they clearly show benefit on survival of patients due to surgery[18-22]. A number of patient and tumor factors have been studied as prognostic factors, such as age, KPS, histology, seizures, and extent of resection. Age is a known prognostic factor, prognosis being poor in old age[20,23,24].

In our study the tumor was found to be more common in 4th decade of life. The prognosis for young patients is better than aged patients[20,25-27]. Performance status or KPS score is another well-documented predictor of survival in patients with low grade gliomas[20,28,29].

Table 1: Presenting symptoms (n=85)

Presenting symptom	Patients	%age
Seizures	47	55%
Headache	34	40%
Hemiparesis/ Hemiplegia	20	25%
Aphasia	8	9%
Visual Defect	5	6%
Confusion	13	15%
Coma	7	8%
Papilledema	21	25%

Table 2: Kernofsky performance score (n=85)

KPS	No. of patients	%age
90	38	45%
80	17	20%
70	12	14%
100	10	11.76%

Table 3: Tumor location (n=85)

Location in brain	Patients	%age
Frontal lobe	44	50%
Parietal lobe	12	14%
Insula	25	29%
Eloquent brain	25	29%
Occipital lobe	5	5.88%
Temporal lobe	35	41%
Fronto-parietal	10	11%

Figure 1: MRI brain showing low grade glioma (oligodendroglioma)

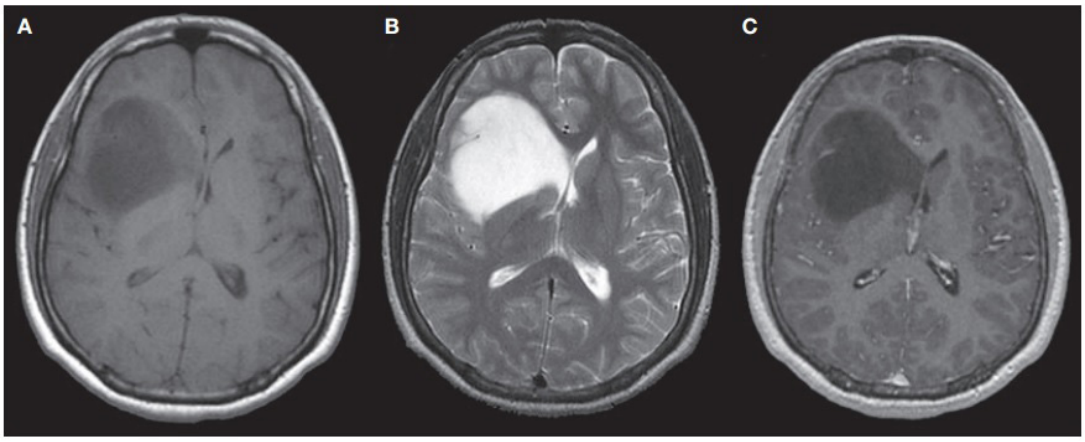


Figure 2: Histopathology of low grade glioma (grade 2 astrocytoma)

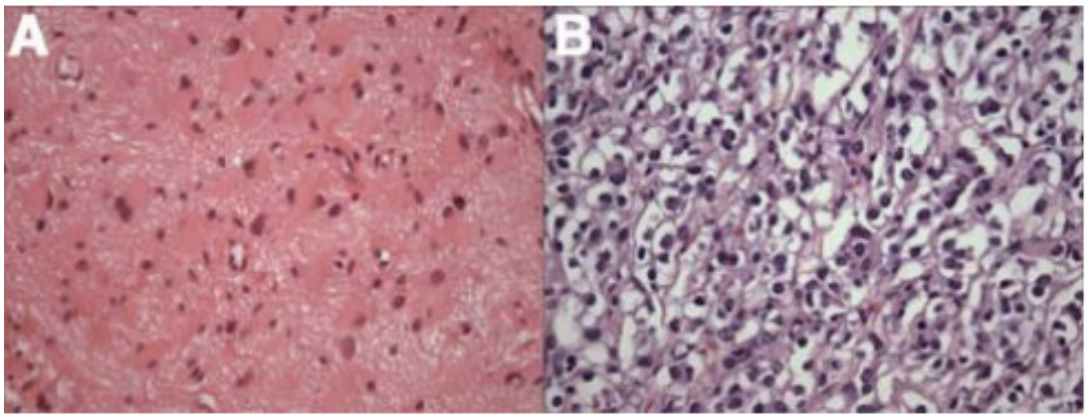


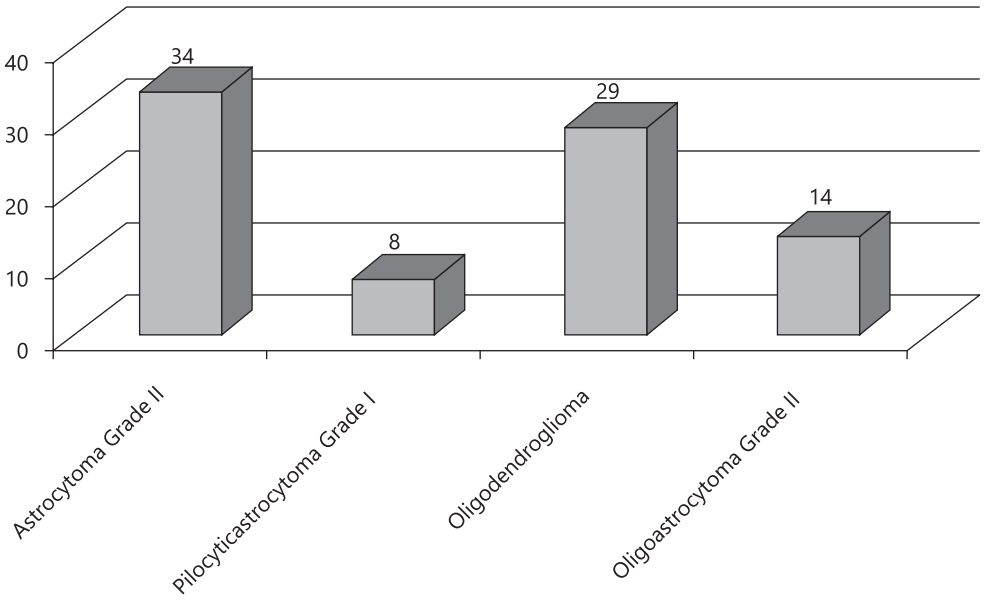
Table 4: Surgical outcome (n=85)

Type of Resection and Out Come Variants	Number	%age
Gross Total Resection (GTR)	29	35%
Subtotal Resection (STR)	56	65%
Kernofsky Performance Score (KPS)		
Improved	24	28%
Deteriorated	3	3.5%
Conscious Level Improvement	2	60% of unconscious pts
Seizures Control	47	56%
Headache Relief	44	50%
Motor Weakness	3	3.52%
Language Deficit	3	3.52%
Hematoma in the Tumor Bed	5	5.88%
Superficial Wound Infection	2	2.35%
Total Expiry	4	4.70%

In our study majority of patients had KPS 90, in 45% patients. Study conducted by Chang et al[30] in 2008 in University of California showed that 79.7% patients had KPS 90. It is because of early diagnosis of these cases. In our study tumor was located in frontal lobe in 50% patients, followed by temporal lobe 41%. Other studies also show that tumor is more commonly located in cerebral hemispheres and involve frontal lobe in majority of cases[7,31]. We had astrocytoma WHO grade 2 more common on histopathology i.e. in 40% patients, followed by oligodendroglioma in 35%. Another study by Van Veelen et al[22] in University Hospital Rotterdam showed astrcytoma WHO grade 2 in 80% patients. Gross total resection was done in 35% while subtotal resection 65% cases. It is due to the fact that these tumors are diffuse and removal of whole tumor becomes difficult due to its diffuse nature. Our results are comparable with that of Chang et al[30] having GTR in 33% cases and STR in 67% cases.

However considering both retrospective and prospective analysis more surgeons favors maximal resection[32-34]. Evreli[35] at Osmangzai University Turkey had GTR in 45.3%, and STR in 54.7% patients. In our study KPS improved one level in 28% patients and deteriorated in 3.5% patients and remained unchanged in 58 patients. which is comparable with that of Van Veelen et al[22]. Seizures were controlled in 56% patients. Seizures as presenting symptoms are well documented in literature due to early presentation and diagnosis of glioma[25,36]. Our results regarding seizures control postoperatively are comparable with some international studies because there is variation in seizure outcome after gliomas surgery which ranges from 36 to 100%[37]. Postoperatively headache relieved in 50% patients and conscious level improved in two third of patients.

Figure 3: Frequency of different types of low grade gliomas based on histopathology (n=85)



LIMITATION OF STUDY

Limitation of our study was that we did not follow our patients for median survival. We measured surgical outcome by tumor resection and postoperative KPS, control of seizures and relief of symptomatology like headache and loss of consciousness.

CONCLUSION

Concious level, Kernofsky performance score, control of seizures and headache are important parameters for surgical outcome in patients with low grade gliomas and improved in significant number of our patients.

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CONTRIBUTORS

NUH conceived the idea, planned the study, and drafted the manuscript. MU, BZ and K FA helped acquisition of data and did statistical analysis. MI supervised the study and critically revised the manuscript. All authors contributed significantly to the submitted manuscript.