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ORIGINAL ARTICLE

Language and Visual Deficits after Parietal Lobe Glioma Microsurgery

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ABSTRACT

Objective: *To see language and visual field outcome after high grade glioma excision of parietal lobe area.*

Study Design: *It was observational experimental study.*

Setting: *Department of neurosurgery unit 1, Lahore General Hospital, Lahore.*

Duration: *Three years from March 2015 to April 2018.*

Inclusion Criteria: *Both male and female of 13 to 56 yrs of age having intrinsic tumours in left or right parietal lobe area with midline shift, seizure and headache.*

Exclusion Criteria: *Butterfly glioma, gliomatosis cerebri, lymphoma suspected on MRI brain, patient unfit for anaesthesia and surgery. The patients on anticoagulants and with bleeding disorder were also excluded from the surgery. The patients with chronic systemil ailment like renal failure, liver failure and ischemic heart disease were also excluded from the study.*

Material and Methods: *Two hundred and forty one (241) patients were included in the study. All patients were prepared for the surgery and informed consent obtained from all patients. All patients under went microsurgical excision of the tumours and followed for 3 months. But forty patients lost to follow-up in three months.*

Results: *Maximum tumor resection was attempted up to 99 percent. Median age was 47 years (13 – 56 years) and kernofsky performance scale was 75 percent at presentation. Most common presentation was seizure 76 percent, only 3.5 percent presented with parietal lobe syndromes. The most common deficit was language disturbance, which was also noticed in patients with right parietal lobe gliomas. Parietal lobe gliomas produce language and visual deficits in addition to other neurological dysfunction.*

Recommendations: *Result can be improved by preoperative better localization with diffusion tensor tractography and peroperative cortical mapping.*

Conclusions: *Microsurgical resection would increase language and visual deficits in tumors located on supramarginal and angular gyri which are reduced in postoperative period and become fixed in three months.*

Keywords: *parietal lobe glioma. Visual deficits. Language deficits. Supramarginal gyrus. Angular gyrus. Parietal lobe syndromes.*

INTRODUCTION

Parietal lobe gliomas can involve sensory, speech and visual pathways. Nearly 30 percent of high grade and 10% of the low grade tumor are found in this area presenting as variety of parietal lobe syndromes.[1,2,4,6,8,9] Majority of the patients do not suffer major neurological catastrophies after tumor resection in terms of sensory and motor deficits. If language and visual deficits occur, these affect the patient's capabilities to significant extent.[3] It is also observed that speech defect, occurs in both right and left sided parietal lobe operations, which can be reduced by

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preoperative diffusion tensor tractography images and peroperative cortical and subcortical mapping.

MATERIAL AND METHODS

This was observational experimental study conducted at department of neurosurgery unit 1, Lahore General Hospital Lahore from march 2015 to April 2018. Total of 241 patients were included in my study. All patients were adult (age 13 -56 yrs) and were of both genders. MRI brain plane and contrast was obtained and patient having tumours in left or right parietal lobes were included in the study. All patients fulfilling the inclusion criteria were prepared for the surgery and informed consent was taken from all patients. Complete blood picture, LFTS, RFTS, RBS and MRI brain plane and contrast was done in all patients. Perioperatively patients had complete neurological examination. All the findings were entered on the Performa. Microsugical excision of the tumours were done in all cases. All patients had postoperative MRI to look for residual tumor or ischemic insult. Follow up examination was done at 7th postoperative day, one month and three months postoperatively. Those who don't recover after three months were labeled to have fixed deficits.

Exclusion Criteria

Patients with butterfly glioma or suspected diagnosis on radiology other than glioma were excluded from the study.

Data Collection and Analysis

The data about the age, gender, presenting complaints, kernofsy performance scale, MRI findings and surgical outcome were entered into a proforma for collection and analysis. Data was analyzed using SPSS version 20. Mean value ± S.D was determined for quantitative data like age Frequency and percentages were used for qualitative data like gender. P value less than 0.05 was considered as significant.

RESULTS

Two hundred forty one (241) patients with parietal lobe glioma underwent microsurgical excision. Median age was 47 years (range 18 – 65 years). The 126 were male and 115 were female. Median kernofsky performance scale was 75 (range 30-100) at presentation. Clinical follow up was up to three months, forty patients lost to follow-up (16.6%). The signs and symptoms at presentation were seizures 76%, sensory change 11 percent, dysphasia 9.5 percent and only 3.5 percent have sign and symptoms peculiar to parietal lobe only (confusion, acalculia, finger agnosia, astereognosis, contralateral neglect and loss of two point discrimination. Tumors were most frequently located superficially 79.4% and 19.6% have deeply seated gliomas. The preoperative mean volume of the tumor was 65.5 cm^3 (range 25.4 – 265cm^3). The histological grades of tumors were grade I in 21 patients (7.8%) II in 52 patients (23.2%) III in 148 patients (61.4%).201 patients had primary resection and 40 had secondly resection after biopsy or primary surgery somewhere else. The median postoperative tumor volume was 1.3cm^3 (range 1.0-54.5cm^3). This means an average 98.77% tumor resection was achieved (range 1.0-99%).

Postoperative neurosurgical deficit soon after recovery from anesthesia (6-8hrs) were noticed, most frequent was language deficit in 15% (36 patients) followed by visual changes in 11 percent (27 patients).[7] These deficits gradually reduced which was noticed in follow-up neurosurgical examination; at three months follow up this was reduced to 9.5 % and 6.7% respectively and considered to be fixed. These deficits can be reduced considerably if intraoperative mapping is used.[5] Language deficit was also observed in five patients, who had tumor in the right parietal lobe. The perioperative complications like wound infection, hematoma in the tumor bed and seizures occurred in 3.5 %, 1.5% and 8.5% respectively. Seven patients died due to pneumonia and three patients due to cardiovascular events, total mortality was 4.2%. Eighteen patients were labeled to have right to left neglect in the perioperative period which was reduced to eight patients by three months postoperatively.

Gliomas were found more frequently in the left hemisphere 55% as compared to right hemisphere 45%. More aggressive surgery was performed for right hemisphere tumor. Most permanent neurological deficit was found in left hemisphere tumor and the language deficit was most common in tumors, located in supramarginal gyrus and visual deficits were present in tumors of angular gyrus.

DISCUSSION

Glioma is the most common brain tumour among glioma, Glioblastoma multiform is the most common tumour in our country. This is also the pattern in many

other countries worldwide. Glioblastoma (GBM) is the grade IV glioma of astrocytic origin.[19] GBM is common primary brain tumour 16% and most common among glial cell tumours 54%.[20] GBM remains a highly malignant tumours with no proper treatment and median survival of 15 months.[21] Studies from Nigeria[10] shows that proportion of high grade glioma is lower among other glioma. It is also proved in the study that patient with GMB usually presents at early age as compared to other studies like Caucasians.[11] In countries with poor health facilities and insurance coverage, the treatment decisions will more likely favour the productive age group. Secondary GBM is known to be more common among the younger age group and runs a relatively benign course compared to that of primary GBM[12] However, given that secondary GBMs are less frequent than the primary GBM,[13] Parietal lobe glioma usually presents Parietal lobe syndromes and its very difficult to diagnose parietal lobe syndrome preoperatively in patients. Parietal lobe glioma also presents with seizures, sensory dysfunction, language and visual deficits. After microsurgical excision of parietal lobe gliomas language pathways are involved in 15% of excisions and that improved to 9.5% in three months and this can be diagnosed on detailed examinations and different language tests. Such imperceptible deficits diagnosed on detailed examinations don't disturb too much patient's quality of life. Language and visual disturbance commonly occurs in patients when glioma is located at **supramarginal** or **angular gyri** and disrupts patient routine life too much.

In parietal lobe gliomas those located at supramarginal and angular gyri, there location should be properly determined by preoperative functional MRI and diffusion tensor tractography and peroperative confirmation of eloquent areas with cortical mapping and monitoring. Such recent techniques significantly reduces the morbidity but no such technique was used in our study. Which is a limitation of this study. Language deficit can occur in patient with right parietal lobe lesions, 20% of total language deficits are in patients with right parietal lobe glioma. Recently possibilities of neuropsychological or cognitive mapping and monitoring are under investigations and lot of neurosurgeons and psychologist working on it. Several authors have already highlighted the importance of neuropsychological testing before, during, and after glioma surgery.[15] The clinical relevance of monitoring other cognitive functions like calculation[14] has been shown.

Navigated tumor surgery is not only able to map function but also to modulate it.[16] Recent studies have shown its impact on connectivity within functional networks and therapeutic applications in a wide range of diseases—depression, acute and chronic[17,18] pain, and epilepsy are under investigation.

CONCLUSION

1. In parietal lobe gliomas language and visual deficits in the postoperative patients can affect quality of life even with microsurgical technique.
2. It is recommended that the role of tractographic image and role of preoperative cortical mapping can be of immense help for better result, in both right and left sided parietal lobe gliomas.

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REFERENCES

1. Duffau H, Denvil D, Lopes M, Gasparini F, and Cohen L, Capelle L et al: intraoperative mapping of the cortical areas involved in multiplication subtractions: an electrostimulation study in a patient with a left parietal glioma. J Neurol Neurog Psychiatry.
2. Kurimoto M, Asahi T, Shibata T, Takahashi C, Nagai S, Hayashi N, et al: save removal of glioblastoma near the angular gyrus by awake surgery preserving calculation ability case report. Neurol Medi Chir (Tokyo) 2006; 46: 46-50.
3. McGirt MJ, Mukherjee D, Chaichana KL, Weingart JD, Quinonas HA: Association of surgically acquired motor and language deficits on overall survival after resection of glioblastoma multiforme. Neurosurgery, 2009; 65: 463-470.
4. Nakano M, Tanaka S, Aria H, Ebato M, Ueno H: (a case of selective short-term memory disturbance due to a glioma in the left temporo-parietal lobe). No To Sheinkel. 1993; 45: 465-471, (JPN).
5. Nadir S, Juan Mand M. Morbidity profile following aggressive resection of parietal lobe gliomas. J Neurosurgery, 2012; 116: 1182-1186.
6. Russell SM, Elliott R, Forshaw D, Kelly PJ, Folfinos JG. Resection of parietal lobe gliomas: incident and evolution of neurological deficits in 28 consecutive patients correlated to the location and morphological characteristics of the tumor. J Neurosurgery, 2005; 103:

1010-1017.
7. Sanai N, Mirzadeh Z, Berger MS: functional outcome after language mapping for glioma resection. N Engl J Med. 2008; 358: 18-17.
8. Scarone P, Gatignal P, Guillaume S, Denvil D, and Capelle L, Duffau H: agraphia after awake surgery for brain tumors for brain tumor: new insight into the anatomy: functional network of writing. Sur Neurol. 2009; 72: 223-241.
9. Zangwill OL, Agraphia due to a left parietal glioma in a left handed man. Brain, 1954; 77: 510-520.
10. Odeku EL, Adeloye A. Gliomas of the brain among Nigerians. Afr J Med Med Sci. 1976; 5: 31-3.
11. Central Brain Tumour Registry of the United States (CBTRUS). CBTRUS Statistical Report: Primary Brain and Central Nervous System Tumours Diagnosed in the United States in 2004–2007. Hinsdale, IL; 2011. p. 48. Available from: [Last accessed on 2017 Mar 6].
12. Ohgaki H, Kleihues P. The definition of primary and secondary glioblastoma. Clin Cancer Res. 2013; 19: 764-72.
13. Wai-man L, Kan-suen JP. Astrocytomas. In: Greenberg MS, editor. Handbook of Neurosurgery. 8th ed. New York: Thieme Medical Publishers; 2016: p. 612-28.
14. Della Puppa A, De Pellegrin S, d'Avella E, Gioffrè G, Munari M, Saladini M, et al: Right parietal cortex and calculation processing: intraoperative functional mapping of multiplication and addition in patients affected by a brain tumor. J Neurosurg. 2013; 119: 1107–1111.
15. Duffau H: Brain plasticity: from pathophysiological mechanisms to therapeutic applications. J Clin Neurosci 2006; 13: 885–897.
16. Duffau H: Cognitive assessment in glioma patients. J Neurosurg. 2013 ; 119: 1348–1349.
17. Lefaucheur JP: Transcranial magnetic stimulation in the management of pain. Suppl Clin Neurophysiol. 2004; 57: 737–748.
18. Lefaucheur JP, Drouot X, Ménard-Lefaucheur I, Nguyen JP: Neuropathic pain controlled for more than a year by monthly sessions of repetitive transcranial magnetic stimulation of the motor cortex. Neurophysiol Clin. 2004; 34: 91–95.
19. Louis N, Perry A, Reifenberge RG, von Deimling A, Figarella-Branger D, Cavenee WK, et al. The 2016 World Health Organization classification of tumors of the central nervous system: A summary. Acta Neuropathol. 2016; 131: 803–20.
20. Ostrom QT, Gittleman H, Farah P, Ondracek A, Chen Y, Wolinsky Y, et al. CBTRUS statistical report: Primary brain and central nervous system tumors diagnosed in the United States in 2006–2010. Neuro Oncol. 2013; 15 Suppl. 2ii–56.
21. Koshy M, Villano JL, Dolecek TA, Howard A, Mahmood U, Chmura SJ, et al. Improved survival time trends of glioblastoma using the SEER 17 population-based registries. J Neuro Oncol. 2012; 107 (1): 207–12.

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