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Role of extent of resection on quality of life in patients with newly diagnosed GBM

Usama Khalid Choudry, Huzaifa Ismail Shaikh, Areeba Nisar, Saad Akhtar Khan, Muhammad Shahzad Shamim

Abstract

Glioblastomas known for their adverse outcomes are most reportedly managed by surgical resection. Studies on the impact of (Extent of Resection) EOR against Quality of Life (QOL) are very limited. We have collected data from recent studies in this review to extract a general consensus among the neurosurgeons regarding the EOR. Key parameters like functional independence, neurocognitive improvements and global health status have been explored in the context of QOL. The currently available data suggests that an increased EOR may help improve QOL in GBM patients. With the help of recent advancements it may be possible to attain a better extent of resection while operating on GBMs.

Keywords: Glioblastoma, Quality of Life, Resection margins, Prognosis.

Introduction

GBM patients by convention have low quality of life, as well as a very low survival rate (14 months with surgical and adjuvant treatments to 5 month with no treatment).¹ The quality of life (QOL) can be assessed by using a number of parameters like functional independence, surgical morbidity, neurocognitive functions and postoperative deficits using KPS scores and EuroQol inventories.

Review of Evidence

The relation between the extent of resection (EOR) and the quality of life (QOL) of GBM patients after surgery is a topic that has not been explored extensively. Jakola et al stated a study of 88 GBM patients in which surgical resection had no significant alteration in the quality of life. The Karnofsky Performance Scale (KPS) scores had improved in 24.1% patients, however they were equal in 47.2% and had deteriorated in 28.7% of all cases. The EuroQol 5D tests (EQ-5D) results had improved in 35.2%, were equal in 20.5% and had deteriorated in 28% of all cases. However they mentioned non usage of intraoperative ultrasonography on the resection control

group as an indicator of worsening QOL ($p=0.021$). This indirectly indicates the correlation of QOL with EOR as intraoperative ultrasonography could have possibly helped in attaining a more desirable resection threshold and help the surgeon decide the most suitable EOR.² The association of prolonged functional independence (PFI) with gross total resection (GTR) was documented in a study by Chaichana et al. In this study of 544 patients, the researchers pointed a positive association of PFI with GTR ($p<0.0001$). The functional independence was mentioned to be a part of improving QOL. They also utilized Fisher exact analysis to determine an association of increasing EOR with postoperative motor deficits. They found no statistical relation between the two ($p=0.28$).³ This, however, pointed an improvement in the QOL of patients with a maximum EOR value. In another study by Adam Sacho et al on 84 patients showed that the surgical resection had a statistically significant relation with increased survival with functional independence ($p=0.006$), thus, with an improved QOL.⁴ Similarly Brown et al in their study of 124 patients pointed that GTR was better related with higher QOL ($p=0.003$) compared to subtotal resection (STR).⁵

Another study, by Yukiitaka Ushio et al, however had negative outcomes in this aspect. GTR was performed on 35 patients (33%), partial resection (PR) on 57 patients (54%) and biopsy in 13 patients (12%). The researchers presented no significant change in KPS scores of PR and biopsy groups (70% to 72% and 64% to 62% respectively). Although some improvements were seen in the KPS scores of GTR group (78% to 83%) yet still, the results were mentioned to be not statistically significant.⁶

A study by Oppenlander et al evaluated 170 patients. The researchers observed a deterioration of NIH Stroke Scale in higher number of patients with a higher EOR compared with patients with lower EOR (39.1% of the patients with $EOR \geq 80\%$ against the 16.7% of patients with $EOR < 80\%$). They did note that the increase in neurological morbidity did not continue more than 30 days postoperatively ($p=0.1279$). This indirectly points to a short but negative association of EOR with QOL.⁷ This stands in contrast to a study by Hoffermand et al where the researchers noticed a decrease in surgical morbidity of the 124 patients selected in GTR compared with STR and PR. The

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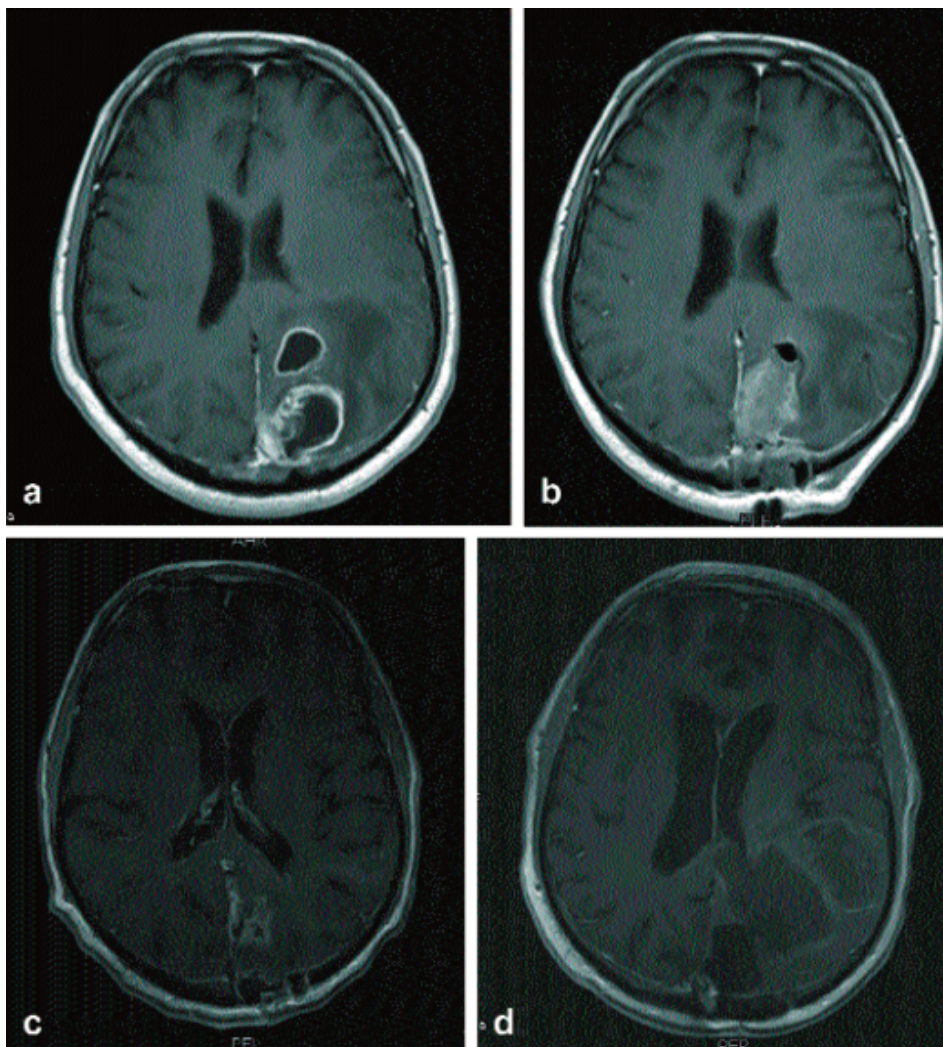


Figure-1 (a-d): MRI Axial T1WI with contrast at 6-months interval showing a left occipital GBM, post-operative scan showing gross total resection, follow up scan showing controlled disease, and the last scan showing extensive parieto-occipital recurrence.

decrement, however, was not of statistical significance ($p=0.06$).⁸

A recent prospective study by Jakola AS et al of 16 patients also showcased an improvement of QOL in patients with higher EOR. The researchers mentioned the median EOR to be 93% (IQR 78-99). 24% had GTR. They found an increase of 0.11 in the EQ-5D scores of the patients from a preoperative score of 0.34 ± 0.38 to a score of 0.45 ± 0.32 in the postoperative tests ($p=0.30$), although, 3 patients had a deterioration in QOL after surgery.⁹ A longitudinal study by Diagle K et al pointed the improvement of QOL in larger EOR performed patients as well. Of 35 patients selected, the researchers used different EORs. The Sherbrooke Neuro-oncology assessment scale was used for QOL assessment. Better QOL scores were mentioned across all

domains when resection was compared to biopsies. Compared within the EOR differences, functional wellbeing and neurocognitive functions were observed as being the most improved QOL domains ($r=0.0616$, $p=0.005$ and $r=0.51$, $p=0.026$ respectively).¹⁰ Similarly, Suchorska B et al noted a higher association of general motor dysfunction of the patients that underwent incomplete resection compared with the ones that had complete tumour resection ($p=0.04$). Likewise, the complete resection cohort had better global health status ($p=0.008$).¹¹

Conclusion

The parallel review of all the studies under consideration tends to point a positive association between increased extent of resection (EOR) and higher quality of life (QOL). The patient cohorts that underwent gross total resection had the most benefit in terms of QOL, although, the cohorts with subtotal resection still benefited in accordance of their EOR. The improvements were reported across all domains, particularly in the domain of functional independence of the patients.

Surgical morbidity has been reported as a risk, despite its brief presence after surgery or its absence altogether. Although the dominant effect of increased EOR with improved QOL can be illustrated by this review. There is a pressing need for establishment of a higher level of evidence in this aspect.

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