Differential Survival Benefit of Gross Total Resection (GTR) in Glioblastoma, Anaplastic Astrocytoma, and Oligodendroglioma

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Introduction

Since glial tumors are inherently infiltrative, microscopic total resection is not possible without significant morbidity. The efficacy of cyto-reduction through gross total resection (GTR) largely depends on the chemo-sensitivity of the remaining tumor. Since chemo-sensitivity differs depending on glioma histology, we hypothesized that the survival benefit of GTR differs accordingly.

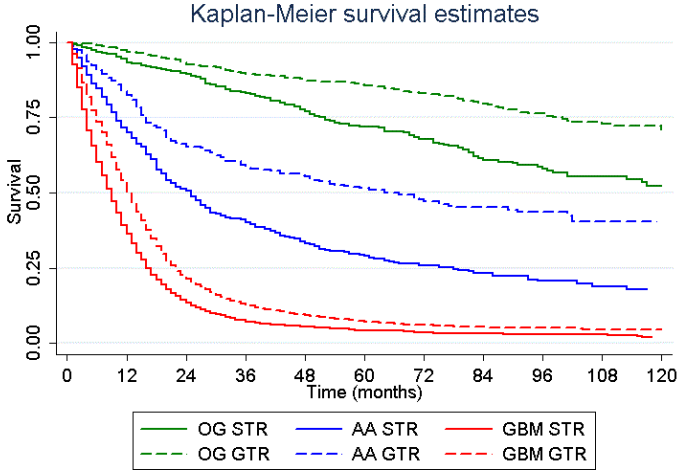
Methods

We identified patients who underwent surgery for anaplastic astrocytoma (AA, n=2,755), glioblastoma (GBM, n=21,962), and oligodendroglioma (OG, grade II n=2,378; grade III n=11,028) in the Surveillance, Epidemiology, and End Results Program (SEER, 1999-2012). Hazard ratio (HR) for dying from the disease after correction of pertinent clinical/demographic variables was determined as a function of GTR and subtotal resection (STR).

Results

The median survival for patients with OG who underwent STR and GTR was 129 months and not reached, respectively. For AA, median survivals were 25 months for STR and 64 months for GTR. For GBM patients, median survivals were 9 months for STR and 13 months for GTR (Figure 1). Comprehensive review of the published literature yielded results comparable to the SEER database.

Figure 1



Kaplan-Meier Survival Curves by Histology and Extent of Resection

The hazard of dying from AA was reduced in GTR patients by 40% relative to STR. This reduction is 59% greater than that observed in glioblastoma where GTR was associated only with a 24% reduction relative to STR. On the contrary, no statistically significant change in hazard of death was observed for OG (Table 1).

Table 1

Histology	EOR	HR (95% Confidence Interval)	% Change	p-value
All Subtypes	STR	1.00	-	*reference*
Oligodendroglioma	GTR	0.88 (0.63-1.21)	0.12	0.429
Astrocytoma	GTR	0.60 (0.49-0.73)	0.40	**<0.001**
Glioblastoma	GTR	0.76 (0.73-0.80)	0.24	**<0.001**

Results of Multivariate Cox Proportional Hazards Analysis of Survival by Histological Subtype

Conclusions

Our results indicate that surgeons should take tumor histopathology into account when deciding upon the extent of surgical resection of glial tumors and the critical need for real-time intra-operative histologic diagnosis.

References

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Learning Objectives

1. Learn which tumor histologies respond well to maximal resection and which show no survival benefit