Evaluating the Association Between Extent of Resection and Survival in Gliosarcoma

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Ahmed F, Abdullah KG, Durgin J, Jayaram M, O’Rourke DM, Brem S

Department of Neurosurgery
Hospital of the University of Pennsylvania, Philadelphia, PA
Disclosures

- The authors have no relationships to disclose and report no conflicts of interest concerning the findings specified in this abstract.
Introduction

- Gliosarcoma (GS) is a rare form of glioblastoma with unique pathological indicators that has an increased propensity to metastasize outside of the cerebrum. It is a primary mixed tumor, consisting of both sarcomatous and glial elements. Median survival time is approximately 6-17.5 months across multiple studies.

- Although the value of extent of resection (EOR) in glioblastoma patients has been confirmed as a predominant prognostic factor, no such association has been defined for GS.

- In this study, we established an association between extent of resection and survival in gliosarcoma patients.
Methods

- Data was retrospectively reviewed from thirteen patients who underwent index resection for gliosarcoma at the Hospital of The University of Pennsylvania between January 2005 and January 2017.

- Semi-Automated volumetric segmentation was completed using the classification extension of ITK-SNAP (CBICA, Philadelphia, Pennsylvania, USA).
  - EOR formula: \( \frac{\text{preoperative tumor volume} - \text{postoperative tumor volume}}{\text{preoperative tumor volume}} \).

- A paired log-rank (Mantel-Cox) test was completed to determine statistical significance among survival times between EOR groups.

- To determine an EOR threshold, Kaplan-Meir curves at 5% resection intervals were constructed.
  - EOR Threshold: First point at which two survival curves intersected.
Results

- Extent of Resection categories were defined as gross total resection (GTR >95%), subtotal resection (STR 85-95%), and partial resection (PR <85%).
- The median overall survival for the groups were as follows: GTR-21.1 months, STR-12.4 months, PR- 4.4 months
Results (Cont.)

- Overall median survival was 9.1 months
- Volumetric analysis showed a median tumor pre-op volume of 35.52 cm$^3$, and a median tumor post-op volume of 2.54 cm$^3$, both equating to a median extent of resection value of 93%
- The paired log-rank test confirmed a statistically significant association between survival and both the PR (p=.01) and STR (p=.05) groups with the GTR group as reference
- Univariate CPHM confirmed a statistically significant association, at $\alpha = .05$, between increased survival and chemo-radiotherapy [HR: 1.16]
- Serial Kaplan-Meir curves suggest a survival benefit with an EOR threshold of 90%
Discussion

- Gliosarcoma is classified as a IDH-wildtype variant along with giant cell glioblastoma and epithelioid glioblastoma according to 2016 updated WHO CNS guidelines
- GS accounted for 2.4% of all high-grade gliomas treated at the Hospital of the University of Pennsylvania from January 2005 through January 2015
- Multiple studies have documented a positive association between EOR and survival in glioblastoma patients- to our knowledge this is one of the first studies that exists to define an EOR threshold for GS
- A forward stepwise survival benefit was seen in that the sub-total resection group had increased survival in comparison to the partial resection group

Limitations
- Retrospective cohort study of a specific population subset at one academic institution
- Limited sample size- however, our patient profiles were well indexed
Summary

- This study supports preexisting evidence from glioblastoma that there is an association between extent of resection and survival time, and confirms that this association is valid in gliosarcoma patients.

- For patients undergoing surgical resection for GS, maximal surgical removal, when safely possible, should be attempted as it may result in longer survival times.

- In addition, chemo-radiotherapy was associated with lengthened survival and should be considered in determining a treatment plan for gliosarcoma patients when possible.