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Impact of Extent of Resection and Adjuvant Therapy in Diffuse Gliomas of the Spine

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Abstract

Background content: Diffuse gliomas of the spine (DGS)-consisting of intradural intramedullary glioblastoma, astrocytoma, and oligodendroglioma-are exceedingly rare tumors that account for about 2% of primary spinal cord tumors. Much is unknown about their optimal treatment regimen due to a relative lack of clinical outcome data.

Purpose: To provide an updated analysis on treatment and outcomes in DGS.

Study design/setting: Observational cohort study using The National Cancer Database (NCDB), a multicenter prospectively collected oncology outcomes database. A systematic literature review was also performed to compare the resulting data to previous series.

Patient sample: Patients with histologically confirmed DGS from 2004 to 2018.

Outcome measures: Long-term overall survival and short-term thirty/ninety-day post-surgical mortality, thirty-day readmission, and prolonged hospital length of stay.

Methods: Impact of extent of resection and adjuvant therapy on overall survival was evaluated using Kaplan-Meier estimates and multivariable Cox proportional hazards regression. Univariate and multivariate logistic regression was used to analyze covariables and their prognostic impact on short-term surgical outcomes.

Results: Of the 747 cases that met inclusion criteria, there were 439 astrocytomas, 14 oligodendrogliomas, and 208 glioblastomas. Sixty percent (n=442) of patients received radiation, and 45% (n=324) received chemotherapy. Tumor histology significantly impacted survival; glioblastoma had the poorest survival (median survival time [MS]: 12.3 months), followed by astrocytoma (MS: 70.8 months) and oligodendroglioma (MS: 71.6 months) ($p<0.001$). Gross total resection (GTR) independently conferred a survival benefit in patients with glioblastoma (hazard ratio [HR]: 0.194, $p<0.001$) and other WHO grade 4 tumors (HR: 0.223, $p=0.003$). Adjuvant chemotherapy also improved survival in patients with glioblastoma (HR: 0.244, $p=0.007$) and WHO grade 4 tumors (HR: 0.252, $p<0.001$). Systematic literature review identified 14 prior studies with a combined DGS mortality rate of 1.3%, which is lower than the 4% real-world outcomes calculated from the NCDB. This difference may be explained by selection biases in previously published literature in which only centers with favorable outcomes publish their results.

Conclusions: There remains a paucity of data regarding treatment paradigms and outcomes for DGS. Our analysis, the largest to date, demonstrates that GTR and adjuvant therapy independently improve survival for certain high-grade subgroups of DGS. This best-available data informs optimal management for such patients.

Keywords: Diffuse Gliomas; Extent of Resection; Intramedullary Tumor; Malignant Spinal Tumor; Outcomes; Spinal Gliomas; Survival.

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