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The impact of radiation therapy variables on pediatric high-grade glioma outcomes: A National Cancer Database analysis

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Abstract

Purpose: The purpose of this analysis is to report patterns of care for pediatric patients with highgrade glioma (pHGG) and evaluate the impact of radiotherapy (RT) variables on outcomes using the National Cancer Database (NCDB).

Methods: Eligibility criteria included age < 22 years, histologically diagnosed WHO grade III-IV gliomas treated with \geq 50 Gy and < 76 Gy RT between 2004 and 2013, and RT initiation within 90 days of diagnosis. RT variables including RT dose, RT timing, and RT modality were analyzed along with baseline demographic, tumor, and treatment variables to assess the impact on overall survival.

Results: A total of 498 pHGG patients were included. The median age was 15 years (range, 0-21), common diagnoses were astrocytoma (55%) and glioblastoma (30%), 73.5% underwent surgical resection and 90.2% received chemotherapy. The median RT dose was 59.4 Gy (SD 2.9 Gy) starting at a median of 4.4 weeks from diagnosis (SD 2.5 weeks). Fourteen patients were treated with proton therapy. Median follow-up was 19.6 months with 1- and 3-year overall survival of 78.4% and 40.4%, respectively. On multivariable analysis, female gender, older age, and RT delay of \geq 6 weeks were significantly associated with a lower rate of death; glioblastoma histology, no surgical resection/biopsy only, and earlier RT initiation < 6 weeks from diagnosis were associated with a higher rate of death. There was no relationship between RT dose or proton versus photon therapy and overall survival.

Conclusions: Outcomes for pHGG are poor. There was no benefit to early RT timing when RT is initiated within 90 days of diagnosis or higher RT dose in this dataset.

Keywords: Astrocytoma; glioblastoma; high-grade gliomas; pediatric; radiation therapy.

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