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Comparative analysis of treatment modalities for pediatric spinal cord glioblastoma: insights from a meta-analysis

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Abstract

Introduction: Glioblastomas (GBM) are aggressive tumors that make up about 7% of central nervous system tumors in children. Spinal GBMs (sGBMs) are extremely rare, accounting for less than 1% of pediatric spinal tumors. sGBMs are difficult to treat due to their infiltrative nature and cause significant morbidity. While there is extensive literature on treatment outcomes for cranial GBMs, there is limited research on pediatric sGBMs. This meta-analysis aims to assess the impact of available treatments on overall survival (OS) and progression-free survival (PFS) in pediatric sGBM patients and to identify prognostic factors.

Methodology: A comprehensive review of pediatric sGBM cases up to June 2024 was conducted using PubMed and Mendeley. Inclusion criteria were case series and case reports of pediatric sGBM, excluding those with metastatic sGBM or aggregated patient data. A total of 2202 articles were identified, with 46 meeting the inclusion criteria. Data on demographics, tumor characteristics, extent of resection, and treatments were collected. Kaplan-Meier and Cox proportional hazards models were used for statistical analysis.

Results: The data was collected from 81 patients, 43 females and 38 males, with an average age of 10.7 years. The majority of tumors were found in the cervical region (32%). Subtotal resection (STR) was performed in 53% of cases, and 59% of patients received both chemotherapy (QT) and radiotherapy (RT). The average progression-free survival (PFS) was 10.95 months, with RT significantly improving PFS (15.2 months vs. 2.1 months, $p = 0.001$). The average OS was 13.4 months, with RT and QT being significant protective factors ($p < 0.05$). Age over seven years and cervical tumor location were associated with worse OS.

Conclusion: This study highlights the significance of radiation therapy and chemotherapy in enhancing overall survival and progression-free survival in pediatric patients with spinal cord glioblastoma. Specifically, RT significantly improves PFS, while advanced age and tumor location in the cervical region are associated with worse outcomes. These findings can help shape treatment approaches and ultimately enhance the quality of life for pediatric sGBM patients.

Keywords: Anastomotic ulcers; Bariatric Surgery; Laparoscopic Roux-en-Y Gastric Bypass.