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Prognostic factors for pediatric, adolescent, and young adult patients with non-DIPG grade 4 gliomas: a contemporary pooled institutional experience

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Abstract

Purpose: WHO grade 4 gliomas are rare in the pediatric and adolescent and young adult (AYA) population. We evaluated prognostic factors and outcomes in the pediatric versus AYA population.

Methods: This retrospective pooled study included patients less than 30 years old (yo) with grade 4 gliomas treated with modern surgery and radiotherapy. Overall survival (OS) and progression-free survival (PFS) were characterized using Kaplan-Meier and Cox regression analysis.

Results: Ninety-seven patients met criteria with median age 23.9 yo at diagnosis. Seventy-seven patients were ≥ 15 yo (79%) and 20 patients were < 15 yo (21%). Most had biopsy-proven glioblastoma (91%); the remainder had H3 K27M-altered diffuse midline glioma (DMG; 9%). All patients received surgery and radiotherapy. Median PFS and OS were 20.9 months and 79.4 months, respectively. Gross total resection (GTR) was associated with better PFS in multivariate analysis [HR 2.00 (1.01-3.62), p = 0.023]. Age ≥ 15 yo was associated with improved OS [HR 0.36 (0.16-0.81), p = 0.014] while female gender [HR 2.12 (1.08-4.16), p = 0.03] and DMG histology [HR 2.79 (1.11-7.02), p = 0.029] were associated with worse OS. Only 7% of patients experienced grade 2 toxicity. 62% of patients experienced tumor progression (28% local, 34% distant). Analysis of salvage treatment found that second surgery and systemic therapy significantly improved survival.

Conclusion: Age is a significant prognostic factor in WHO grade 4 glioma, which may reflect age-related molecular alterations in the tumor. DMG was associated with worse OS than glioblastoma. Reoperation and systemic therapy significantly increased survival after disease progression. Prospective studies in this population are warranted.

Keywords: Adolescent; Diffuse midline glioma; Glioblastoma; High grade glioma; Pediatric; Young adult.