

High-dose radiotherapy to 78 Gy with or without temozolomide for high grade gliomas

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Abstract *Objectives* To describe outcomes associated with high-dose radiotherapy with and without temozolomide for high grade central nervous system (CNS) neoplasms. *Methods* Retrospective chart review of 60 patients diagnosed with malignant glioma treated with ≥ 70 Gy radiotherapy. *Results* Median age at diagnosis was 52 years, and 52 patients had astrocytomas (38 glioblastomas). Median prescribed radiotherapy dose was 78 Gy (range 70–80), and 29 patients received concurrent temozolomide. Eighty-six percent completed the planned course treatment. Three patients experienced RTOG grade 3 acute CNS toxicity; late brain necrosis was suspected in four patients. Overall median survival was 13 months (range 2–83). Within glioblastoma patients, temozolomide provided a statistically significant survival improvement over no chemotherapy (median survival 12.7 vs. 7.5 months; $P = 0.0058$). *Conclusions* High dose conformal radiotherapy to ≥ 70 Gy with chemotherapy

for high-grade CNS neoplasms appears safe but survival remains suboptimal. Within glioblastoma patients, temozolomide provided statistically significant survival improvement over no chemotherapy.

Keywords High grade glioma · Temozolomide · Radiotherapy · Dose escalation

Introduction

High-grade gliomas of the central nervous system (CNS) are characterized by poor survival and local failure despite aggressive local treatment including complete surgical resection, focal radiotherapy, and administration of chemotherapy. Local recurrence (within the high dose irradiation volume or surgical bed) is the predominant pattern of failure for high grade gliomas (World Health Organization grade 3 and 4). Post-operative radiotherapy has been shown in a randomized cooperative trial to increase overall survival in patients with high-grade gliomas as compared with resection alone [1]. A review of patients enrolled into three prospective Brain Tumor Study Group protocols demonstrated improved median survival in patients treated to 60 Gy as compared with lower dose levels [2]. Systemic therapy, most recently with the oral alkylating agent temozolomide, has been demonstrated to confer a modest but significant survival advantage when administered concurrently and adjuvantly with radiotherapy in the setting of maximally resected glioblastoma multiforme (GBM) [3]. Unfortunately, median survival remains approximately 14.5 months, and survival at 2 years remains $<30\%$ even after complete surgical resection, timely completion of adjuvant radiotherapy, and adherence to prescribed chemotherapy [2, 3]. The

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