The Potential Impact of Delayed Radiation Therapy on Patients with Glioblastoma

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ABSTRACT: Background: Radiation therapy (RT) is the major component of glioblastoma treatment; however, the time to initiate RT after surgical intervention varies between institutions. Our study examined the time from diagnosis to the initiation of RT and its effects on overall patient survival. Methods: We retrospectively examined 267 patients with glioblastoma who received RT as part of their therapy in two Canadian tertiary care centers. The primary goal of the study is to assess if time to RT can predict/impact survival in glioblastoma patients. Results: The following variables were associated with an increased risk of death: hazard ratio (HR) of time to RT was 0.95 [95% confidence interval (CI), 0.91–0.99] for every extra week. HRs for the type of surgery (resection or biopsy) and type of management received (standard of care in comparison with RT regardless of chemotherapeutic agents other than concomitant and adjuvant temozolomide) were 0.50 (95% CI, 0.37–0.66) and 0.53 (95% CI, 0.38–0.75), respectively. HR for age was 1.02 (95% CI, 1.01–1.03) for every extra year. Standard 60 Gy RT HR was 0.70 [95% confidence interval (CI), 0.51–0.97] in younger patients. Conclusions: The time from diagnosis to the initiation of RT was found to be a significant prognostic factor for overall patient survival. The addition of temozolomide to the treatment protocol, age, standard RT dose in younger patients and extent of surgery are others factors associated with longer survival periods.

Glioblastoma is the most prevalent and aggressive primary malignant brain tumor in adults. Since the publication of Stupp et al., the standard of care for the treatment of glioblastoma includes maximal surgical resection followed by radiation therapy (RT) and concomitant and adjuvant temozolomide treatment. Despite the use of this state-of-the-art treatment regimen, the median survival time of patients with glioblastoma is only 14.6 months. Well-established favorable prognostic factors include the addition of RT and novel chemotherapeutic agents such as temozolomide, the maximal extent of surgical resection, younger age, and a higher Karnofsky Performance Score. The addition of RT to treatment protocols in three randomized phase III trials demonstrated an approximate doubling of survival and has been the considered standard of care since the late 1970’s. The standard time for RT for most patients is between two and six weeks following surgery; however, in certain resource-limited centers, it may be as long as 16 weeks. Clinicians always advocate “the sooner the better” in regards to initiation of RT. Given that delayed RT has been found to be associated with poorer outcomes in cancers such as breast cancer and head and neck cancer, one may expect a similar finding in the delayed initiation of RT in patients with glioblastoma.