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Gamma Knife radiosurgery after radiation therapy as an adjunctive treatment for glioblastoma.

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Despite a randomized trial showing no benefit of stereotactic radiosurgery (SRS) prior to radiation therapy (RT), the benefits of SRS after RT and at the time of progression require further characterization. We retrospectively reviewed 48 patients with histopathological diagnoses of glioblastoma (GBM) that were treated with SRS over a 16-year period (1991-2007). Twenty-two were treated as part of their initial treatment paradigm and 26 were treated at the time of progression. The primary endpoints studied were overall survival (OS), survival after SRS and time-to-progression (TTP). Patients treated at the time of progression had significantly longer OS than those treated on initial presentation (17.4 vs. 15.1 months, $P = 0.003$). On multivariate analysis, Radiation Therapy Oncology Group (RTOG) class III patients, those with more extensive resections, and those who were not on steroids at the time of SRS had significantly improved OS. SRS margin dose was a significant prognostic factor for TTP on multivariate analysis (HR = 0.78, 95% CI: 0.62-0.98). In the subgroup of patients treated with GKS as part of their initial treatment, an increasing number of weeks between surgical resection and GKS was a poor prognostic factor on multivariate analysis (HR = 1.11, 95% CI: 1.01-1.23). In patients who were treated with SRS at the time of progression, chemotherapy was associated with a longer TTP ($P = 0.028$). Our results suggest that SRS provides a survival advantage when delivered after RT. This benefit may be best appreciated in RTOG class III patients. Moreover, SRS may be a viable alternative to open surgery for aggressive management of GBM at the time of recurrence. Prospective studies of SRS for GBM should focus on these two groups of patients.

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