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Clinical Study

Comparison of Stereotactic Radiosurgery and Brachytherapy in the Treatment of Recurrent Glioblastoma Multiforme

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Abstract

THE PURPOSE OF this study was to compare the efficacy of stereotactic radiosurgery (SRS) and brachytherapy in the treatment of recurrent glioblastoma multiforme (GBM). The patients had either progressive GBM or pathologically proven GBM at recurrence after previous treatment for a lower grade astrocytoma. Thirty-two patients were treated with interstitial brachytherapy, and 86 received treatment with stereotactic radiosurgery (SRS). The patient characteristics were similar in the two groups. Those patients treated with SRS had a median tumor volume of 10.1 cm^3 and received a median peripheral tumor dose of 13 Gy. Patients treated with brachytherapy had a median tumor volume of 29 cm^3. Median dose to the periphery of the tumor volume was 50 Gy delivered at a median dose rate of 43 cGy/hour. Twenty-one patients (24%) treated with SRS were alive, with a median follow-up of 17.5 months. Median actuarial survival, measured from the time of treatment for recurrence, for all patients treated with SRS was 10.2 months, with survivals of 12 and 24 months being 45 and 19%, respectively. A younger age and a smaller tumor volume were predictive of better outcome. The tumor dose, the interval from initial diagnosis, and the need for reoperation were not predictive of outcome after SRS. Five patients (16%) treated with brachytherapy were alive, with a median follow-up of 43.3 months. The median actuarial survival for all patients treated with brachytherapy was 11.5 months. Survivals of 12 and 24 months were 44 and 17%, respectively. The age of the patient (but not tumor volume, interval from initial diagnosis, or tumor dose) was predictive of outcome in these patients. A comparison of the results between patients treated with SRS and brachytherapy indicated a similar survival rate. Nineteen patients (22%) required reoperation after SRS, compared with 14 (44%) in the brachytherapy group. The actuarial risk for reoperation was 33% at 12 months and 48% at 24 months after SRS, compared with 54 and 65%, respectively, after brachytherapy ($P = 0.195$). Those patients undergoing reoperation after brachytherapy survived longer than similar patients not undergoing reoperation. The outcome after SRS was independent of a need for reoperation. The treatment of recurrent GBM with SRS resulted in a survival rate similar to that obtained with interstitial high-activity ^{125}I implantation. This outpatient procedure is currently the treatment of choice for recurrent GBM at our institution in patients whose disease is amenable to SRS.