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Gamma knife for glioma: selection factors and survival.

Larson DA, Gutin PH, McDermott M, Lamborn K, Sneed PK, Wara WM, Flickinger JC, Kondziolka D, Lunsford LD, Hudgins WR, Friehs GM, Haselsberger K, Leber K, Pendl G, Chung SS, Coffey RJ, Dinapoli R, Shaw EG, Vermeulen S, Young RF, Hirato M, Inoue HK, Ohye C, Shibazaki T.

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Abstract

PURPOSE: To determine factors associated with survival differences in patients treated with radiosurgery for glioma.

METHODS AND MATERIALS: We analyzed 189 patients treated with Gamma Knife radiosurgery for primary or recurrent glioma World Health Organization (WHO) Grades 1-4.

RESULTS: CONCLUSION: The median minimum tumor dose was 16 Gy (8-30 Gy) and the median tumor volume was 5.9 cc (1.3-52 cc). Brachytherapy selection criteria were satisfied in 65% of patients. Median follow-up of all surviving patients was 65 weeks after radiosurgery. For primary glioblastoma patients, median survival from the date of pathologic diagnosis was 86 weeks if brachytherapy criteria were satisfied and 40 weeks if they were not ($p = 0.01$), indicating that selection factors strongly influence survival. Multivariate analysis showed that increased survival was associated with five variables: lower pathologic grade, younger age, increased Karnofsky performance status (KPS), smaller tumor volume, and unifocal tumor. Survival was not found to be significantly related to radiosurgical technical parameters (dose, number of isocenters, prescription isodose percent, inhomogeneity) or extent of preradiosurgery surgery. We developed a hazard ratio model that is independent of the technical details of radiosurgery and applied it to reported radiosurgery and brachytherapy series, demonstrating a significant correlation between survival and hazard ratio.

CONCLUSIONS: Survival after radiosurgery for glioma is strongly related to five selection variables. Much of the variation in survival reported in previous series can be attributed to differences in distributions of these variables. These variables should be considered in selecting patients for radiosurgery and in the design of future studies.

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