Indications and Efficacy of Gamma Knife Stereotactic Radiosurgery for Recurrent Glioblastoma: 2 Decades of Institutional Experience.

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Abstract

BACKGROUND: The role of stereotactic radiosurgery (SRS) for recurrent glioblastoma and the radionecrosis risk in this setting remain unclear.

OBJECTIVE: To perform a large retrospective study to help inform proper indications, efficacy, and anticipated complications of SRS for recurrent glioblastoma.

METHODS: We retrospectively analyzed patients who underwent Gamma Knife SRS between 1991 and 2013. We used the partitioning deletion/substitution/addition algorithm to identify potential predictor covariate cut points and Kaplan-Meier and proportional hazards modeling to identify factors associated with post-SRS and postdiagnosis survival.

RESULTS: One hundred seventy-four glioblastoma patients (median age, 54.1 years) underwent SRS a median of 8.7 months after initial diagnosis. Seventy-five percent had 1 treatment target (range, 1-6), and median target volume and prescriptions were 7.0 cm (range, 0.3-39.0 cm) and 16.0 Gy (range, 10-22 Gy), respectively. Median overall survival was 10.6 months after SRS and 19.1 months after diagnosis. Kaplan-Meier and multivariable modeling revealed that younger age at SRS, higher prescription dose, and longer interval between original surgery and SRS are significantly associated with improved post-SRS survival. Forty-six patients (26%) underwent salvage craniotomy after SRS, with 63% showing radionecrosis or mixed tumor/necrosis vs 35% showing purely recurrent tumor. The necrosis/mixed group had lower mean isodose prescription compared with the tumor group (16.2 vs 17.8 Gy; P = .003) and larger mean treatment volume (10.0 vs 5.4 cm; P = .009).

CONCLUSION: Gamma Knife may benefit a subset of focally recurrent patients, particularly those who are younger with smaller recurrences. Higher prescriptions are associated with improved post-SRS survival and do not seem to have greater risk of symptomatic treatment effect.

ABBREVIATIONS: EBRT, external beam radiotherapy; GK, Gamma Knife; OS, overall survival; partDSA, partitioning deletion/substitution/addition; SRS, stereotactic radiosurgery.