



## Indications and efficacy of Gamma Knife stereotactic radiosurgery for recurrent glioblastoma: Two decades of institutional experience

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### Introduction

The role of stereotactic radiosurgery (SRS) for glioblastoma recurrence in patients who received radiotherapy at diagnosis remains unclear, specifically the role of concurrent chemotherapy and radionecrosis risk. Larger studies would help inform proper SRS indications, efficacy and risks in recurrent disease.

### Methods

We retrospectively reviewed our radiosurgery database from 1991-2013 to identify patients who underwent Gamma Knife SRS for recurrent glioblastoma. We collected clinical parameters and used Cox proportional hazards modeling to identify factors associated with increased time to progression.

### Results

178 GBM patients received Gamma Knife a median of 8.7 months (range 2.1-195.8 months) after diagnosis. Patients undergoing radiosurgery had mean age of 53 (range 5-85) and were 58% male. 75% of patients had one treatment target (range=1-6). Median total targeted volume was 6.7 cm<sup>3</sup> (range 0.3-39.0) with a mean of 16.7 Gy (range 12-20) prescribed to the 50% isodose line. Median progression-free and overall survival were 4.3 (range=0.5-83.4) and 9.4 months (range=1.4-84.6) from the time of SRS, respectively. Concurrent chemotherapy was given with radiosurgery in 75% of patients, with common agents including temozolomide (30%), CCNU (24%) and BCNU (13%). Multivariate modeling including target volume, 50% isodose prescription, concurrent chemotherapy, age, and gender revealed only younger age ( $p=0.04$ ) and increased isodose prescription ( $p=0.006$ ) to be associated with increased time to progression. 46 patients went on to have craniotomy a mean of 11.5 months after SRS with 61% showing radionecrosis or mixed tumor and radionecrosis versus 37% showing recurrent tumor. The necrosis/mixed group had a lower mean isodose prescription compared to the tumor group (16.4 versus 17.6 Gy,  $p = 0.0025$ ).

### Conclusions

Gamma Knife SRS may benefit a subset of focally recurrent glioblastoma patients, particularly those who are younger. Higher SRS prescriptions are associated with longer progression-free survival but do not seem to have higher risk of symptomatic treatment effect in our cohort.

### Learning Objectives

By the conclusion of this session, participants should be able to: 1) Describe the current literature surrounding the usage of stereotactic radiosurgery for the treatment of recurrent GBM 2) Understand the indications, efficacy and potential toxicities of using Gamma Knife SRS for recurrent disease 3) Identify factors which suggest whether a recurrent GBM patient has higher risk of progression post Gamma Knife therapy

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