

Gamma Knife® radiosurgery Recurrent Glioblastomas



Introduction

Tumor recurrence after initial standard therapy of glioblastoma is virtually inevitable. After standard fractionated radiotherapy, 77-90 % patients relapse within 2 cm of the original glioblastoma within 20-40 weeks. The median survival time after reoperation of recurrent glioblastoma can be estimated with 3.5 – 9 months, provided that the patients are in good preoperative clinical condition.

State of Literature

In 7 studies that reported outcome after stereotactic radiosurgery according to RPA classes, the median survival in RPA class 4 was 15.2 while the historical RTOG series had reported a median survival of 11.1 months for RTOG class 4. In the situation of an almost inevitable glioblastoma recurrence, the treatment is highly complex; as fractionated radiotherapy cannot be repeated and the surgical options may be limited due to the patients' frequently reduced clinical condition. Under these circumstances stereotactic radiosurgery has been proven to be an effective alternative treatment option and patients treated at the time of progression had significantly longer overall survival than those treated on initial presentation.

A recent prospective cohort study demonstrated that stereotactic radiosurgery significantly prolonged survival as a salvage treatment in patients with recurrent glioblastomas (23 months vs. 12 months; $P < .0001$). When compared to a historical control group from the same institution with patients who had not been treated with radiosurgery for their recurrence and a case-control study showed that the combination of salvage Gamma Knife® radiosurgery followed by bevacizumab could add potential survival benefit and could reduce the risk of adverse radiation effects in patients with recurrent glioblastoma (33.2 months vs. 26.7 months). The overall survival in this study is surprisingly positive. For patients with recurrent glioblastoma the outcome after use of stereotactic radiosurgery appeared to be at least equivalent to repeated surgical resection.

Conclusion

There is retrospective evidence that radiosurgery offers a minimal invasive approach for the treatment of glioblastoma recurrences when standard treatment has been given and cannot be repeated. A prospective cohort study demonstrated that stereotactic radiosurgery significantly prolonged survival as a salvage treatment in patients with recurrent glioblastomas when compared to a control group who had not been treated with radiosurgery. A case-control study of stereotactic radiosurgery for recurrent glioblastoma showed an outcome that was at least equivalent to repeated surgical resection and a retrospective analysis showed an even improved survival after Gamma Knife® radiosurgery when compared to surgical resection of the recurrent glioblastoma. Hence, the survival after salvage radiosurgery compares favorably to the outcome after reoperation of recurrent glioblastoma, the treatment with temozolomide and the median overall survival on bevacizumab after glioblastoma recurrence.

In the situation of a glioblastoma recurrence, where virtually no other meaningful treatment is available stereotactic radiosurgery in general and Gamma Knife® radiosurgery in particular has been shown to offer a safe and effective therapeutic alternative that prolongs the survival. Future prospective studies will further define the ideal clinical criteria to achieve an optimal survival benefit for the radio-surgical treatment of glioblastoma recurrences.

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