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Gamma Knife surgery combined with resection for treatment of a single brain metastasis: preliminary results. Clinical article.

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Abstract

OBJECT: Resection and whole-brain radiation therapy (WBRT) have classically been the standard treatment for a single metastasis to the brain. The objective of this study was to evaluate the use of Gamma Knife surgery (GKS) as an alternative to WBRT in patients who had undergone resection and to evaluate patient survival and local tumor control.

METHODS: The authors retrospectively reviewed the charts of 150 patients treated with a combination of stereotactic radiosurgery and resection of a cranial metastasis at their institution between April 1997 and September 2009. Patients who had multiple lesions or underwent both WBRT and GKS were excluded, as were patients for whom survival data beyond the initial treatment were not available. Clinical and imaging follow-up was assessed using notes from clinic visits and MR imaging studies when available. Follow-up data beyond the initial treatment and survival data were available for 68 patients.

RESULTS: The study included 37 women (54.4%) and 31 men (45.6%) (mean age 60 years, range 28-89 years). In 45 patients (66.2%) there was systemic control of the primary tumor when the cranial metastasis was identified. The median duration between resection and radiosurgery was 15.5 days. The median volume of the treated cavity was 10.35 cm³ (range 0.9-45.4 cm³), and the median dose to the cavity margin was 15 Gy (range 14-30 Gy), delivered to the 50% isodose line (range 50%-76% isodose line). The patients' median preradiosurgery Karnofsky Performance Scale (KPS) score was 90 (range 40-100). During the follow-up period we identified 27 patients (39.7%) with recurrent tumor located either local or distant to the site of treatment. The median time from primary treatment of metastasis to recurrence was 10.6 months. The patients' median length of survival (interval between first treatment of cerebral metastasis and last follow-up) was 13.2 months. For the patient who died during follow-up, the median time from diagnosis of cerebral metastasis to death was 11.5 months. The median duration of survival from diagnosis of the primary cancer to last follow-up was 30.2 months. Patients with a pretreatment KPS score \geq 90 had a median survival time of 23.2 months, and patients with a pretreatment KPS score $<$ 90 had a median survival time of 10 months ($p < 0.008$). Systemic control of disease at the time of metastasis was not predictive of increased survival duration, although it did tend to improve survival.

CONCLUSIONS: Although the debate about the ideal form of radiation treatment after resection continues, these findings indicate that GKS combined with surgery offers comparable survival duration and local tumor control to WBRT for patients with a diagnosis of a single metastasis.

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