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## **Gamma Knife radiosurgery to the surgical cavity following resection of brain metastases.**

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**Object** This study evaluated the efficacy of postoperative Gamma Knife surgery (GKS) to the tumor cavity following gross-total resection of a brain metastasis. **Methods** A retrospective review was conducted of 700 patients who were treated for brain metastases using GKS. Forty-seven patients with pathologically confirmed metastatic disease underwent GKS to the postoperative resection cavity following gross-total resection of the tumor. Patients who underwent subtotal resection or who had visible tumor in the resection cavity on the postresection neuroimaging study (either CT or MR imaging with and without contrast administration) were excluded. Radiographic and clinical follow-up was assessed using clinic visits and MR imaging. The radiographic end point was defined as tumor growth control (no tumor growth regarding the resection cavity, and stable or decreasing tumor size for the other metastatic targets). Clinical end points were defined as functional status (assessed prospectively using the Karnofsky Performance Scale) and survival. Primary tumor pathology was consistent with lung cancer in 19 cases (40%), melanoma in 10 cases (21%), renal cell carcinoma in 7 cases (15%), breast cancer in 7 cases (15%), and gastrointestinal malignancies in 4 cases (9%). The mean duration between resection and radiosurgery was 15 days (range 2-115 days). The mean volume of the treated cavity was 10.5 cm<sup>3</sup> (range 1.75-35.45 cm<sup>3</sup>), and the mean dose to the cavity margin was 19 Gy. In addition to the resection cavity, 34 patients (72%) underwent GKS for 116 synchronous metastases observed at the time of the initial radiosurgery. **Results** The mean radiographic follow-up duration was 14 months (median 10 months, range 4-37 months). Local tumor control at the site of the surgical cavity was achieved in 44 patients (94%), and tumor recurrence at the surgical site was statistically related to the volume of the surgical cavity ( $p = 0.04$ ). During follow-up, 34 patients (72%) underwent additional radiosurgery for 140 new (metachronous) metastases. At the most recent follow-up evaluation, 11 patients (23%) were alive, whereas 36 patients had died (mean duration until death 12 months, median 10 months). Patients who showed good systemic control of their primary tumor tended to have longer survival durations than those who did not ( $p = 0.004$ ). At the last clinical follow-up evaluation, the mean Karnofsky Performance Scale score for the overall group was 78 (median 80, range 40-100). **Conclusion** Radiosurgery appears to be effective in terms of providing local tumor control at the resection cavity following resection of a brain metastasis, and in the treatment of synchronous and metachronous tumors. These data suggest that radiosurgery can be used to prevent recurrence following gross-total resection of a brain metastasis.

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