

Surgical resection and permanent iodine-125 brachytherapy for brain metastases

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Abstract *Purpose* To evaluate the efficacy and toxicity of surgical resection and permanent iodine-125 brachytherapy without adjuvant whole brain radiation therapy (WBRT) for brain metastases. *Methods and materials* Forty patients were treated with permanent iodine-125 brachytherapy at the time of resection of brain metastases from 1997 to 2003. Actuarial freedom from progression (FFP) and survival were measured from the date of surgery and estimated using the Kaplan–Meier method, with censoring at last imaging for FFP endpoints. *Results* The median survival was 11.3 months overall, 12.0 months in 19 patients with newly diagnosed brain metastases and 7.3 months in 21 patients with recurrent brain metastases. Twenty-two patients (55%) remained free of progression of brain metastases, three failed at the resection cavity (including one with leptomeningeal dissemination), two failed with leptomeningeal spread only, and 13 failed elsewhere in the brain including two who also had leptomeningeal disease. The 1-year resection cavity FFP probabilities were 92%, 86% and 88%;

and brain FFP probabilities were 29%, 43% and 37% for the newly diagnosed, recurrent and all patients, respectively. Symptomatic necrosis developed 7.4–40.0 months (median, 19.5 months) after brachytherapy in 9 patients (23%), confirmed by resection in 6 patients. *Conclusions* Excellent local control was achieved using permanent iodine-125 brachytherapy for brain metastasis resection cavities, although there is a high risk of radiation necrosis over time. These data support consideration of permanent brachytherapy without adjuvant WBRT as a treatment option in patients with symptomatic or large newly diagnosed or recurrent brain metastases.

Keywords Brachytherapy · Brain metastasis · Brain neoplasms · Iodine-125

Introduction

Intracranial metastases are the most common malignant brain tumor and represent a major cause of morbidity and mortality in patients with systemic cancer, affecting up to 25% of cancer patients [1, 2]. The most common primary sites include tumors of the lung, breast, and kidney, which account for approximately 60% of solid metastases and skin melanoma, which has a high propensity for spread to the central nervous system [3–5]. Up to 60% of patients with malignant melanoma develop neurologic symptoms resulting from spread either to the leptomeninges or brain parenchyma [5]. With improvement in systemic cancer therapy, more patients may live long enough to develop brain metastases and die from uncontrolled brain metastasis with controlled systemic disease.

Many patients with brain metastases are managed with whole brain radiotherapy (WBRT) alone, which results in

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