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[J Neurosurg.](#) 2009 Dec 25. [Epub ahead of print]

### Factors influencing the risk of local recurrence after resection of a single brain metastasis.

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**Object** Local recurrence (LR) of a resected brain metastasis occurs in up to 46% of patients. Postoperative whole-brain radiation therapy (WBRT) reduces that incidence. To isolate factors associated with the risk of LR after resection, the authors only studied patients who did not receive adjuvant radiotherapy. **Methods** The authors reviewed data from 570 cases involving patients who had undergone resection of a previously untreated single brain metastasis at The University of Texas M. D. Anderson Cancer Center between 1993 and 2006 without receiving postoperative WBRT. All tumors were measured preoperatively on MR images. The resection method (en bloc resection [EBR] or piecemeal resection [PMR]) was noted at the time of surgery. Predictors of LR were assessed using the Cox proportional hazards model. **Results** The median patient age was 58 years, 55% were male, and 88% had a Karnofsky Performance Scale Score  $\geq$  80. The most common primary cancers were those of the lung (28%), skin (melanoma, 21%), kidney (19%), and breast (11%). Piecemeal resection was performed in 201 patients (35%) and EBR in 369 (65%). Local recurrence developed in 84 patients (15%). The histological type of the primary cancer did not significantly predict LR; however, 7 of 22 patients with sarcoma developed LR ( $p = 0.16$ ). The authors identified 2 variables that increased the risk of LR. Undergoing PMR carried a significantly higher LR risk than EBR (crude hazard ratio [HR] 1.7, 95% CI 1.1-2.6,  $p = 0.03$ ). Tumors exceeding the median volume (9.7 cm<sup>3</sup>) had a significantly higher LR risk than those that were  $< 9.7$  cm<sup>3</sup> (crude HR 1.7; 95% CI 1.1-2.6;  $p = 0.02$ ). In the multivariate analysis, small tumors removed by EBR had a significantly lower LR risk. **Conclusions** The LR risk of a single brain metastasis is influenced by biological factors (such as tumor volume) and treatments (such as the resection method). Early administration of postoperative WBRT may be particularly warranted when such negative tumor-related prognostic factors are noted or when treatment-related ones such as PMR are unavoidable.

PMID: 20035574 [PubMed - as supplied by publisher]

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