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 Volume 70, Issue 5, 1 April 2008, Pages 1319-1324

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**Clinical Investigation**

**Surgical Resection Followed by Whole Brain Radiotherapy Versus Whole Brain Radiotherapy Alone for Single Brain Metastasis**

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Received 19 June 2007; revised 10 August 2007; accepted 10 August 2007. Available online 25 March 2008.

**Purpose**

To compare the outcome of surgical resection followed by whole brain radiotherapy (WBRT) with WBRT alone in patients treated for single brain metastasis.

**Methods and Materials**

The data from 195 patients with single brain metastases were retrospectively evaluated. Of the 195 patients, 99 underwent resection of the metastasis followed by WBRT and 96 underwent WBRT alone. Seven additional potential prognostic factors were investigated: age, gender,

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Eastern Cooperative Oncology Group performance score, tumor type, interval between initial tumor diagnosis and WBRT, extracranial metastases, and recursive partitioning analysis class. Both treatment groups were well balanced for these factors.

## Results

On multivariate analysis, improved survival was associated with resection (relative risk [RR], 1.20; 95% confidence interval [CI], 1.11–1.31;  $p < 0.001$ ), lower recursive partitioning analysis class (RR, 1.58; 95% CI, 1.22–2.06;  $p < 0.001$ ), age  $\leq 61$  years (RR, 1.79; 95% CI, 1.23–2.61;  $p = 0.002$ ), Eastern Cooperative Oncology Group performance score of 0–1 (RR, 2.47; 95% CI, 1.70–3.59;  $p < 0.001$ ), and the absence of extracranial metastases (RR, 1.99; 95% CI, 1.41–2.79;  $p < 0.001$ ). Improved local control was associated with resection (RR, 1.25; 95% CI, 1.11–1.41;  $p < 0.001$ ) and age  $\leq 61$  years (RR, 1.77; 95% CI, 1.09–2.88;  $p = 0.020$ ). Improved brain control distant from the original site was associated with lower recursive partitioning analysis class (RR, 1.65; 95% CI, 1.03–2.69;  $p < 0.035$ ), age  $\leq 61$  years (RR, 1.81; 95% CI, 1.12–2.96;  $p = 0.016$ ), and the absence of extracranial metastases (RR, 2.42; 95% CI, 1.52–3.88;  $p < 0.001$ ). Improved control within the entire brain was associated with surgery (RR, 1.24; 95% CI, 1.12–1.38;  $p < 0.001$ ) and age  $\leq 61$  years (RR, 1.83; 95% CI, 1.21–2.77;  $p = 0.004$ ).

## Conclusion

In patients with a single brain metastasis, the addition of resection to WBRT improved survival, local control at the original metastatic site, and control within the entire brain, but did not prevent the development of new brain metastases distant to the original site.

**Author Keywords:** Single brain metastases; Whole-brain radiotherapy; Surgery; Prognostic factors; Treatment outcome

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