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Relationship between volume, dose and local control in stereotactic radiosurgery of brain metastasis.

[Molenaar R](#), [Wiggenraad R](#), [Verbeek-de Kanter A](#), [Walchenbach R](#), [Vecht C](#).

Neuro-Oncology Unit, Dept. of Neurology, Medical Center The Hague, The Hague, The Netherlands.

The aim of this study is to analyse the efficacy of linear accelerator stereotactic radiosurgery (SRS) on prognostic factors, local control rate and survival in patients with brain metastasis. Patients with either a single metastasis or up to 4 multiple brain metastases with a maximum tumour diameter of 40 mm for each tumour and a Karnofsky Performance Status (KPS) ≥ 70 were eligible for SRS. SRS was applied to 150 lesions in 86 consecutive patients with a median age of 60 years (median 1 and mean 1.7 lesions per patient, mean KPS 86). Median overall survival was 6.2 months after SRS and 9.7 months from diagnosis of brain metastasis. Multivariate analysis revealed that a KPS of 90 or more ($p = 0.009$) and female sex ($p = 0.003$) were associated with a longer survival. Radiation dose ≤ 15 Gy ($p = 0.017$) and KPS < 90 ($p = 0.013$) were independent predictors of a shorter time to local failure. Five patients showed evidence of radionecrosis with a median survival of 14.8 months. Addition of WBRT neither led to improvement of survival nor to improvement of local control. Improved local control following SRS for brain metastases was associated with KPS ≥ 90 , a radiation dose > 15 Gy and a PTV < 13 cc. The potential of hypofractionated stereotactic radiotherapy (SRT) for brain metastases of larger volume warrants further study.

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