


Journal Article



Microsurgery plus whole brain irradiation versus Gamma Knife surgery alone for treatment of single metastases to the brain: a randomized controlled multicentre phase III trial

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Abstract *Background* Is Gamma Knife surgery alone as effective as surgery plus whole brain irradiation (WBRT) for patients with a single, small-sized brain metastasis? *Methods* Patients aged between 18 and 80 years harboring a single, resectable metastasis ≤ 3 cm in diameter, a Karnofsky performance score (KPS) ≥ 70 , and a stable systemic disease were randomly assigned to microsurgery plus WBRT or Gamma Knife surgery alone. The primary end point was length of survival, secondary end points were recurrence of tumor in the brain, health related quality of life, and treatment related toxicity. *Results* Due to poor patient accrual, the study was stopped prematurely. The final analysis was based on 33 patients in the surgery and 31 patients in the radiosurgery group. Treatment results did not differ in terms of survival ($P = 0.8$), neurological death rates ($P = 0.3$), and freedom from local recurrence ($P = 0.06$). Patients of the radiosurgery group experienced more often distant recurrences ($P = 0.04$); after adjustment for the effects of salvage radiosurgery this difference was lost ($P = 0.4$). Radiosurgery was associated with a shorter hospital stay, less frequent and shorter timed steroid application ($P \leq 0.001$), and lower frequency of grade 1/2 toxicities (according to the RTOG/EORTC CNS toxicity criteria, $P \leq 0.01$). Improved scores for role functioning and quality of life were seen 6 weeks after radiosurgery ($P < 0.05$); this difference was lost 6 months after treatment. *Conclusions* In patients harboring a single, small-sized metastasis, Gamma Knife surgery alone is less invasive; local tumor control seems to be as high as after surgery plus WBRT. Distant tumor control, however, is significantly less frequently achieved (after

radiosurgery alone). The role of radiosurgical salvage therapy (alternatively to WBRT) for distant tumor control deserves further prospective evaluation.

Keywords Brain metastases - Gamma Knife surgery - Prospective randomized study - Radiosurgery - Radiotherapy - Surgery

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