

# Image-guided positioning in intracranial non-invasive stereotactic radiosurgery for the treatment of brain metastasis

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## ABSTRACT

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**Aims and background.** The aim of the study was to examine the feasibility of non-invasive image-guided radiosurgery to improve patient comfort and quality of life in stereotactic radiosurgery planning and treatment of patients with brain metastasis. Precise immobilization is a rule of thumb for stereotactic radiosurgery. Non-invasive immobilization techniques have the potential of improved quality of life compared with invasive procedures.

**Methods and study design.** A total of 92 lesions from 42 patients with brain metastasis were included in the study. After immobilization with a thermoplastic mask and a bite-block unlike the invasive frame-based procedure, planning computed tomography images were acquired and fused with magnetic resonance images. After contouring, intensity-modulated stereotactic radiosurgery (IM-SRS) planning was done, and the patients were re-immobilized on the treatment couch for the therapy procedures. While patients were on the treatment couch, kilovoltage-cone beam computed tomography images were acquired to determine setup errors and achieve on-line correction and then repeated after on-line correction to confirm precise tumor localization. The patients then underwent single-fraction definitive treatment.

**Results.** For the 92 lesions treated, mean  $\pm$  SD values of translational setup corrections in X (lateral), Y (longitudinal), and Z (vertical) dimensions were  $0.7 \pm 0.7$  mm,  $0.8 \pm 0.7$  mm, and  $0.6 \pm 0.5$  mm, and rotational set-up corrections were  $0.5 \pm 1.1^\circ$ ,  $0.06 \pm 1.1^\circ$ , and  $-0.1 \pm 1.1^\circ$  in X (pitch), Y (roll), and Z (yaw), respectively. The mean three-dimensional correction vector was  $1.2 \pm 1.1$  mm.

**Conclusions.** Non-invasive image-guided radiosurgery for brain metastasis is feasible, and the non-invasive treatment approach can be routinely used in clinical practice to improve patient's quality of life.

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**Key words:** brain metastasis, stereotactic radiosurgery.

The authors declare that there is no conflict of interest.

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