

First Report On Frameless Mask Optimization Using the Elekta Leksell Gamma Knife Icon

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Objective(s): Frameless, mask-based stereotactic radiosurgery (SRS) systems have a different workflow from frame-based methods. This study is the first to analyze treatment time delays due to interruptions from patient movement using the Elekta Gamma Knife (GK) Icon when using a mask-based setup.

Methods: This is a retrospective analysis of twenty consecutive patients with brain tumors who received mask-based intracranial SRS using the GK between May through September of 2018.

Results: Twenty patients receiving 26 total treatments were included in the analysis. Patients were age 66 years \pm 8.8 with 45% (9/20) male. The average number of lesions treated per session were 2.14 ± 1.65 , with 1.35 ± 0.75 fractions utilized per patient. Planned treatment times versus actual treatment times were 36 ± 20 minutes and 43.8 ± 24 minutes, respectively. Treatment delays averaged 6.64 ± 9.9 minutes. Two patients in particular had substantial delays of 33.9 and 33.9 minutes. 70% (14/20 patients) completed treatment within five minutes of their intended plan. 50% (10/20) of patients required repeat cone beam computed tomography (CBCT) imaging. High-definition motion management system alarms were triggered 1.08 ± 0.41 times per patient resulting in treatment disruptions.

Conclusion(s): This study is the first to reveal increased treatment time delays using the mask-based Elekta GK Icon, mainly due to patient motion during the procedure. Although the majority of patients did not encounter delayed treatment workflows, optimization with pre-medication and mask fit is necessary to ensure that patients can complete SRS successfully. Patients unable to remain immobile should be evaluated for potential frame-based treatment.