Frameless, real-time, surface imaging-guided radiosurgery: clinical outcomes for brain metastases.


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Abstract

BACKGROUND: Frameless stereotactic radiosurgery is commonly used to treat intracranial metastases, but mask-based immobilization can be uncomfortable for patients.

OBJECTIVE: To describe the clinical outcomes using a novel real-time, frameless, surface imaging-guided radiosurgery (SIG-RS) technique to treat brain metastases.

METHODS: Data were prospectively gathered for 44 consecutive patients totaling 115 intracranial metastases treated with SIG-RS in a median of 1 fraction (range, 1-5) to a median dose of 20 Gy (range, 15-30 Gy). Local control, regional control, and overall survival were estimated by the Kaplan-Meier method.

RESULTS: Median follow-up for all patients was 6.0 months (range, 0.3-21.6 months), with 31 of 44 (70%) deceased at the time of analysis. The 35 patients (80%) with follow-up imaging totaled 88 lesions evaluable for local control. Actuarial 6- and 12-month local control was 90% (95% confidence interval, 82-98) and 76% (95% confidence interval, 60-91), respectively. Regional failure was observed in 16 patients (46%). The median actuarial overall survival was 7.7 months (95% confidence interval, 5.7-9.7). Analysis of the subset of 22 patients (55 lesions) who received SIG-RS alone (no prior treatment) in a single fraction yielded comparable clinical outcomes. Grade 3 or greater toxicity occurred in 4 patients (9%). The median treatment time from beam on to beam off was 15 minutes (range, 3-36 minutes).

CONCLUSION: SIG-RS for treating intracranial metastases can produce clinical outcomes comparable to those with conventional frame-based and frameless stereotactic radiosurgery techniques while providing greater patient comfort with an open-faced mask and fast treatment times.

ABBREVIATIONS: CBCT, cone-beam computed tomography; CI, confidence interval; LINAC, linear accelerator; RPA, recursive partitioning analysis; SIG-RS, surface imaging-guided radiosurgery; SRS, stereotactic radiosurgery; WBRT, whole-brain radiation therapy.

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