Purpose: To evaluate the initial clinical experience with a frameless and maskless technique for stereotactic radiosurgery using minimal patient immobilization and real-time patient motion monitoring during treatment.

Methods: The study considered the first 23 patients treated with this technique. Head positioning was achieved with a patient-specific head mold made out of expandable foam that conforms to the patient's head. The face of the patient is left open for maximal comfort. Motion of a region of interest consisting of the forehead, nose, eyes, and temporal bones, is monitored during treatment using a video surface imaging system (VisionRT, Inc, UK). Initial setup of the patient was performed with the surface imaging system using the surface of the patient obtained from the treatment planning CT scan and verified with cone-beam CT (CBCT). Shifts provided by the CBCT and the duration of all the steps in the treatment process were recorded. Patients were monitored during treatment with surface imaging, and a beam hold-off was initiated when the patient's motion exceeded a pre-specified tolerance.

Results: The average total setup time was 26 minutes, while the portion corresponding to surface imaging was 14 minutes. The average treatment time including setup was 40 minutes. Eight (35%) patients needed repositioning during the treatment. The average shifts identified from CBCT after initial setup with surface imaging were 1.85 mm in the AP direction, and less than 1.0 mm in the lateral and SI directions.

Conclusions: The frameless and maskless treatment using minimal immobilization and surface imaging has proven to be fast and accurate enough for routine clinical use. Patient compliance is important. Setup time was greatly reduced with a couch extension with tilt and spin correction capabilities. An additional degree of semi-rigid immobilization would be helpful for patients that fall asleep and involuntarily move during the procedure.