Purpose/Objective(s): 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. We focus on the evaluation of the patient treatment process.

Materials/Methods: The study considered the first nine patients treated with this technique. The commissioning of this procedure has been reported elsewhere (Cervino PMB 2010). Head positioning was achieved with a patient-specific head rest coupled to a 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 and so that motion of a region of interest consisting of the forehead, nose, eyes, and temporal bones, can be 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. The initial setup was confirmed and finalized with cone-beam CT prior to treatment. The shifts for final setup indicated by the CBCT and the time 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. If the patient came back to the reference position on his/her own, treatment was resumed; otherwise, the patient was repositioned based on the surface imaging system. For the first 4 patients, the head mold was placed on a treatment couch extension with tilt correction capabilities, while with the last 5 patients the couch extension had tilt and spin correction capabilities.

Results: The average total setup time including surface imaging and CBCT was 31 min, while the portion corresponding to surface imaging was 15 min. The average treatment time since the patient was placed on the treatment table until the last treatment beam was 44 min. Two patients needed repositioning during the treatment. The shifts identified from CBCT after initial setup with surface imaging were 2 mm in the anterior-posterior direction, and less than 1 mm in the lateral and longitudinal directions. The longest treatment times (including beam hold-offs) were due to the patient’s falling asleep on the treatment table.

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

Author Disclosure: L.I. Cervino, None; M. Taylor, None; J.D. Lawson, None; H. Pan, None; K.T. Murphy, None; A.J. Mundt, None; T. Pawlicki, None.