Purpose: To implement and measure treatment setup error of a relocatable head frame (BrainLAB) used for multifraction linac-based stereotactic radiotherapy (SRT) of intracranial lesions.

Methods: 32 patients were treated with a total of 639 SRT fractions. A custom multi-layer thermoplastic mask was formed and attached to a stereotactic head frame. External and internal fiducials were identified by the placement of BB's at tattoo points on the patients' skull, and clips placed at the time of surgery respectively. Diagnostic and megavoltage orthogonal film pairs were obtained with a localizer box to define the fiducial points in 3D stereotactic coordinate space. These data were compared against 25 external Depth HelmetTM (Radionics) measurements obtained at each fraction.

The observed deviations from 3D film localization were: Internal Clips, AP=0.6±0.8mm (mean±SD),

Lateral = 0.4 ± 0.7 mm, Vertical= 0.9 ± 1.1 mm and External BB's, AP= 0.8 ± 0.6 mm, Lateral= 0.6 ± 0.9 mm,

Vertical=1.0±1.3mm. The Depth Helmet (DH) setup measurement errors were AP=0.3±0.1mm,

Lateral=0.3±0.1mm, and Vertical=0.5±0.1mm.

Conclusions: This system was used to deliver precise conformal fractionated radiotherapy while reducing treatment morbidity associated with single fraction radiosurgery. The system has been well tolerated by conscious patients as young as 6 years old as well as patients with dentures. Setup and treatment time is less than 20 minutes. The setup error measured with orthogonal films is larger than the Depth Helmet method most likely due to limited resolution of the DH rod as compared with film scanning and geometric projection methods to analyze the BB positions.