

AbstractID: 11014 Title: Retrospective Analysis on Patient Localization Accuracy for Linac-based Intracranial Stereotactic Radiosurgery Using Frameless System

Purpose: The frameless system has been used in our clinic for intracranial stereotactic radiosurgery. This study reports our retrospective analysis and findings on patient setup and isocenter localization of radiosurgery treatment. **Method and Materials:** The frameless immobilization consists of a bite-block with fiducial markers and an infra-red camera system. To test bite-block seating, patient was taken for reseat verification before imaging. The SRS-plan and images were sent to the camera computer for fiducials digitization. Prior to treatment, patient setup was guided by the camera readings on fiducials for isocenter localization. Orthogonal kV-images were taken as verification only. In this study, we have analyzed reseat test and fiducial digitization data of 53 patients. Retrospective comparison of KV-images with planning DRRs was carried out. **Results:** The patient reseat test is found of no correlation with the actual 3D treatment isocenter displacements. The sample mean of predicted error at isocenter from fiducial digitization is 0.46 mm. The histogram of 3D iso-displacements shows that 86.8% of patients have localization error $E \leq 1$ mm, 5.7% of $1 < E \leq 2$ mm, 3.8% of $2 < E \leq 3$ mm, and 3.8% of $3 < E \leq 5.1$ mm. As a result, for 92.5% of patient sample, treatments were proceeded through optical guidance, where iso-displacement errors range from 0 to 2 mm with a median of 0.0 mm, and sample mean of 0.4 mm. For the rest 7.5% of patient population, where 3D iso-displacements were greater than 2 mm as compared with KV images, isocenter shifts were applied and patient positions were realigned using OBI, and treatments proceeded without the optical guidance. **Conclusion:** Our study concludes that the frameless localization for radiosurgery treatment has acceptable accuracy and using KV-imaging as a verification tool is a necessity to ensure its efficacy. Also, adding 2 mm margin to CTV to form PTV in the radiosurgery planning is strongly recommended.