

AbstractID: 10709 Title: Preliminary results about reliability and accuracy of stereo camera based quality assurance system for stereotactic head frame

Purpose: By virtue of a stereotactic head frame (SHF), stereotactic radiosurgery is considered one of the precisest treatments. Several studies, however, presented the SHF could be bent and/or displaced due to weight-bearing to the frame and/or patient position change, which might cause significant inaccuracy up to 6 mm in certain circumstances. Nevertheless, to our best knowledge, no clear mechanism of SHF QA has been established. We are under development of a stereo-camera-based QA system for SHF to check its integrity of shape and placement. In this preliminary study, a prototype of camera system was developed and its reliability and accuracy were evaluated. **Method and Materials:** The prototype of camera system consists of two CMOS (complementary metal oxide semiconductor cameras) and a control computer. It was designed to measure 3D coordinates of points from left-right image pair through calibration and triangulation. A software program was written in C for system operation and image reconstruction. For reliability test, six image pairs of a fixed circle-pattern were obtained every 5 minutes for 25 minutes. Then, the vector of each circle's center was calculated between the first- and n-th image pair. To evaluate accuracy, sets of image pair for translation and rotation were obtained. Then, differences in translation and rotation from the reference were calculated using singular value decomposition. **Results:** The camera system showed reliability of within 0.5mm during 25 minutes. The accuracy was within 1 mm in translation and 1° in rotation. **Conclusion:** The prototype of stereo camera system developed in this study demonstrated its potential of being applied for SHF QA. The study will be continued for further evaluation and improvement.