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Check the reliability of Optical Guided Stereotactic Radiosurgery Target localization using Cone-beam CT

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Purpose: The Optical Guided System (OGS) Stereotactic Radiosurgery target localization is different from the traditional Stereotactic Radiosurgery (SRS) target localization. Instead of mechanically aligning the laser to the marked isocenter on the SRS localization frame or box, the OGS accomplishes localization digitally by matching the target coordinates read from the treatment planning system under the guidance of the OGS software (SonArray). The OGS also offers advantages of inter-arc (i.e. among couch rotations for arc beams) localization adjustment and real-time patient position monitoring. These new features provide the potential of higher accuracy of target localization. However, the procedure of using the new features loses the intuition and its quality is fully depended on the system's reliability. The purpose of the study is to verify the reliability of OGS in target localization and adjustment. **Methods and materials:** A comprehensive SRS head phantom with a cubic insert is used in the study. The CT images of the phantom are taken and transferred to SRS treatment planning software to define the pseudo target and isocenter. The planned images and isocenter are then transferred to the OGS for initial target localization and Cone-beam CT acquisition. The SRS phantom is displaced to the indicated translations and rotations guided by OGS. Cone-beam CT are taken and compared to the initial Cone-beam images to measure the displacements. The agreement of the measured phantom displacements to the indicated phantom displacements tells the reliability of OGS in target localization and adjustment. **Results:** For each phantom translation or rotation, the displacement captured by Cone beam CT matches the indicated displacement accurately. **Conclusion:** The OGS system is reliable in providing new features for higher accuracy of Stereotactic Radiosurgery target localization.