AbstractID: 14150 Title: Accurate spine SBRT setup with properly aligned MV and CBCT image systems

Purpose: Spine SBRT requires high accuracy and precision in treatment setup. It is not well known how to achieve the required patient setup accuracy. We hypothesized that with properly aligned MV EPID and CBCT systems, highly accurate spine setup can be achieved reliably with a three-stage image-guided setup process.

Method: We used Trilogy with OBI/CBCT imagers for the spine SBRT treatment. At treatment setup, we first took AP and Lat KV images to align the patient with DRR images to bring the planning isocenter near the radiation isocenter. Then we acquired CBCT images, to ensure no excessive patient rotation occurred and to determine the shifts aligned with planning CT using 3D match tools. After the shifts were made, we took AP and Lat MV portal images using EPID with a graticule plate to determine if the patient setup was correct compared to reference DRR. Both CBCT isocenter and the physical graticule were aligned within about 0.5 mm from radiation isocenter. Periodic QA tests were done to monitor the imager alignments. Prior to planning, the planning isocenter was placed strategically so that bony landmarks were aligned with centimeter tick marks in AP and lateral DRR images, where the graticule BB are located in MV images. The CBCT and MV EPID setup were performed with the assumption that abnormalities might occur in each step.

Results: A total of 37 consecutive ambulant spine patients were treated in 64 sessions. The discrepancies between MV and CBCT setups were (x, y, z in mm): 0.0±0.5, -0.3±0.6, -0.1±0.4. The maximum deviation was 2 mm in each direction.

Conclusion: With properly aligned imaging systems and the three-stage setup process, we can achieve agreement of within 1 mm along each axis at about 95% confident index between MV and CBCT setups.