AbstractID: 6911 Title: Evaluation of daily tumor localization shifts in the H&N region based on bony anatomy and soft-tissue implanted markers

Purpose: To evaluate tumor localization in H&N patients with implanted markers based on co-registered MVCT and KVCT images using bony anatomy and marker-based alignments

Method and Materials: Daily MVCT images from a tomotherapy unit were acquired for a total of 35 fractions for a patient with two implanted gold markers in the base of tongue. The MVCT and KVCT image sets were retrospectively aligned (MVCT with respect to KVCT) based on two alignment criteria: (1) marker-based alignment. (2) Alignment to the cervical vertebral bony anatomy. Shifts from each alignment method were recorded and analyzed.

Results: We found insignificant inter-marker distance variation or migration through the course of treatment. Relative shifts (differences between bony anatomy and marker-based shifts) in the vertical and lateral directions between the two methods yielded a maximum of 7 mm (in one direction). A histogram of the relative shifts showed that ~14% of the relative shifts in the vertical direction and ~ 43% of the relative shifts in the lateral direction differ by more than 3mm. There was no obvious temporal trend in the daily shifts throughout the course of treatment. However, the data shows that the standard deviation of the shifts based on markers is nearly twice that of bony anatomy based shifts, indicating more interfraction positional variability with respect to the CT planning images.

Conclusion: Daily MVCT imaging for a base-of-tongue cancer patient revealed significant difference in tumor localization between marker-based and bony-based registration with KVCT in the H&N. Dosimetric evaluation of these two localization methods is necessary to determine the most clinically beneficial alignment approach.

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