

AbstractID: 6393 Title: Dose Variation of Critical Structures in Daily Treatment of Nasopharyngeal Cancer Patients Using Helical Tomotherapy Megavoltage CT System

Purpose:

To study daily spinal cord and parotid gland dose variation for nasopharyngeal cancer patients undergoing helical tomotherapy treatments, as a result of patient weight loss during the course of treatments.

Method and Materials:

Five nasopharyngeal cancer patients who received helical tomotherapy treatments were selected. At the end of the treatments, patients lost an average weight of 6.3 kg, or 8.4% relative to the weight at the beginning of the treatments. Daily megavoltage CT (MVCT) scans were performed prior to each treatment fraction, and MVCT images were registered with planning CT images for patient setup corrections. Contours for spinal cord and parotid glands were drawn on MVCT images throughout the treatment course. Based on daily MVCT images, actual dose delivered to the critical structures were calculated using the Planned Adaptive application in the helical tomotherapy treatment planning system. The maximum dose to the spinal cord and the median doses to the parotid glands were analyzed.

Results:

The maximum dose to the spinal cord, after setup corrections, did not show significant variation as a result of patient weight loss. However, the median doses to the parotid glands showed significant increase due to facial tissue shrinkage during treatments. The average median dose to the parotid glands for the five patients were 83 cGy for the first treatment fraction, and it was 143 cGy per fraction for the last fraction. The average parotid gland volume decreased from 20.5 cc to 13.2 cc during treatments.

Conclusion:

Daily patient setup corrections based on MVCT image registrations prevented significant dose variation to the spinal cord due to setup uncertainty. During the course of radiotherapy, as a result of body weight loss, the parotid glands typically receive significantly higher dose compared to the dose dictated in the treatment plan.