

AbstractID: 4759 Title: A pseudo-IMRT method for improving the dose uniformity in the spine in Cranial-Spinal Irradiation

Purpose: To improve the dose uniformity in the treatment volume in Craniospinal Irradiation (CSI) by using a pseudo-IMRT method.

Material & Method: A supine setup was used for both patient comfort and anesthesia administration. Opposed lateral fields with pedistal and collimator rotation were used for cranial irradiation, while PA field were used for the spine. The cranial plan was conventional. Since the standard uncompensated spine field has poor dose uniformity within the cord, a novel pseudo-IMRT method was developed. By adding 2cm to each side of the spinal canal, a structure called “cord Band” was created. Then, the beam fluence and dynamic leaf sequences were optimized to deliver a uniform dose to the “cord band”. If two PA fields were used, a 4 to 6 cm region of overlap was provided. The optimization process smears out the hot and cold spots typically seen in conventional field matching, resulting in a configuration which is more forgiving of daily setup errors.

Results: The pseudo-IMRT method shows great improvement in dose coverage in the spine compared with the conventional uncompensated PA field. The percent volume covered by 95% of the prescribed dose increased from 88.3% to 98.3%. The percent volume over 110% decreased from 12.2% to 2.1%. The hot and cold spots resulted from matching the two PA fields in the conventional treatment are significantly reduced. This method increases the maximum dose outside treatment volume; however, this region is always located posterior to the vertebral body.

Discussion: We have developed a pseudo-IMRT treatment method for delivering a significantly improved uniform dose to the spine in the CSI. This method shows even more advantage in case two spine fields are required. The hot and cold spots are smeared out and the feathering between the two PA fields are eliminated.