

AbstractID: 13462 Title: Pediatric Craniospinal Irradiation with RapidArc: A Feasibility Study and Dosimetric Comparison

Purpose: To investigate the feasibility of pediatric craniospinal irradiation (CSI) using RapidArc, and to provide a dosimetric comparison to conventional three-dimensional conformal radiotherapy (3DCRT) techniques. **Method and Materials:** CT datasets of pediatric patients with a variety of neoplasms were included in this retrospective study. All patients previously received 3DCRT CSI in the supine position. Single planning target volumes (PTVs) were generated for each patient to include the cranial contents and the vertebral column, both with additional uniform volumetric margins. RapidArc treatment plans were created for 6 MV photons using two arcs for the cranial section of the PTV and a single arc for the entire spinal section of the PTV. All RapidArc plans were normalized so that 100% of the prescription dose (36 Gy) was delivered to 95% of the CSI PTV. The RapidArc and 3DCRT CSI plans were compared based on several dosimetric parameters in order to determine organ at risk (OAR) sparing, PTV coverage and PTV homogeneity. **Results:** The RapidArc CSI plans were able to achieve similar or improved OAR sparing when compared to their original 3DCRT CSI counterparts. As a whole, the RapidArc plans were able to decrease the maximum dose to all of the relevant OARs. However, for some OARs, such as the lungs and bowel, the mean doses were elevated due to the increased number of beam angles. When conformity and dose homogeneity indices were evaluated, the RapidArc plans illustrated improved PTV coverage and superior target volume homogeneity in all cases. **Conclusion:** The dosimetric results indicate that RapidArc is an advantageous alternative for pediatric CSI. When compared to 3DCRT, the proposed method has the potential to deliver a more uniform dose to the craniospinal PTV, thus minimizing areas of overdose and underdose and eliminating the need for difficult and time-consuming field matching techniques.