

AbstractID: 11815 Title: Arc Therapy Comparison of TomoTherapy, RapidArc and Dynamic Conformal Arc

Purpose: IMRT and Dynamic Arc Therapy techniques conform the dose to the GTV with varying degrees of normal tissue sparing. Four dose delivery methods (TomoTherapy, RapidArc, Dynamic Conformal Arc and fixed field IMRT) are compared for dose delivery to the tumor and dose sparing of Organs At Risk. A modest cost comparison is also performed to offer a complete healthcare perspective.

Methods and Materials: Treatment sites are chosen to clearly demonstrate the strengths and weaknesses of the dose delivery methods. Dose delivery comparisons are performed for esophageal cancer, base of tongue cancer, cranial metastases, and lymph node irradiation. The dose distributions were measured with film densitometry and calculated with adaptive convolution superposition algorithm in TomoTherapy, the pencil beam algorithm in the BrainSCAN system (v. 5.31) and the Analytical Anisotropic Algorithm (AAA) implemented in Varian's Eclipse (v. 7.3.10) treatment planning system (TPS). Each site/modality is subject to identical dose constraints.

Results: Each treatment modality has limitations based on the intensity modulation method, collimator design and field size. TomoTherapy HI-ART v3 delivers a broad penumbra inferior and superior to the PTV due to the fixed slit width. This necessitates dose delivery to more normal tissue than the competing techniques. For the esophageal lesion with longitudinal symmetry, the dose to normal tissue is less than RapidArc and Tomotherapy.

Conclusion: One can find treatment sites that are best treated with any of the four treatment modalities. In general, TomoTherapy conforms the dose to target more rigorously than RapidArc, Dynamic Conformal Arc or fixed field IMRT.