

AbstractID: 10840 Title: Radiotherapy treatment plans with RapidArc for head-and-neck cancer.

Purpose: The purpose of this study is to compare RapidArc plans and conventional IMRT plans for head-and-neck cancer treatment involving bilateral nodes.

Methods and Materials: This study included 10 locally advanced head-and-neck cancer patients. The planning target volume (PTV) included a 3-mm margin onto the clinical target volume. The prescription was 50Gy to the PTV (2Gy/fraction). Right/left parotids, oral cavity, larynx, brainstem, spinal cord and mandible were contoured as critical organs. For each patient, 9-fixed-field IMRT and 3-arc RapidArc plans were generated. For IMRT plans, the beams were spaced 40° apart and the collimator jaws were fixed to avoid shoulders. RapidArc plans had a total of 600° rotation, one full rotation and two anterior 120° rotations (179°-181°, 60°-300° and 300°-60°). All plans were normalized to cover 90% of PTV with 100% of the prescribed dose. Dosimetric results and treatment time were compared.

Results: The homogeneity index of PTV was (1.07; 1.06) and the normal-tissue receiving dose greater than 110% of the prescription dose was (0.11%; 0.01%) for (RapidArc; IMRT). The average median doses were (right parotid; 46.6%; 43.1%), (left parotid; 39.9%; 34.5%), (oral cavity; 50.0%; 51.7%) and (larynx; 45.7%; 41.4%) for (structure; RapidArc; IMRT). The average maximum doses were (brainstem; 45.5%; 49.9%), (spinal cord; 52.9%; 65.6%) and (mandible; 108.5%; 107.1%) for (organ; RapidArc; IMRT). The statistical analysis showed that the differences in homogeneity index and median doses to right/left parotids and spinal cords were statistically significant ($p < 0.05$), and all others were not. The MU values were reduced by 56% in average and the total treatment time was reduced by 7 minutes when RapidArc was compared to IMRT.

Conclusions: IMRT performs better for parotid glands whereas RapidArc performs better for spinal cord. IMRT and RapidArc provide comparable plans for other organs. Treatment time with RapidArc is much reduced compared to IMRT.