

AbstractID: 13230 Title: Treatment plans comparison with static-gantry IMRT and RapidArc™ for head-and-neck cancers involving cervical lymph nodes

Purpose: To compare the dosimetric results and treatment efficiency of intensity modulated arc therapy using RapidArc™ to static-gantry IMRT plans for conventional fractionation treatment of head-and-neck cancer.

Materials and Methods: This study evaluated 10 patients with squamous cell carcinoma (9 oropharynx and 1 piriform sinus) of the head-and-neck who had undergone static-gantry IMRT. The dose prescription was 50Gy to the cervical nodal planning-target-volume (PTV_P) and an additional 20Gy boost to the primary tumor (PTV_B) at 2Gy/fraction. RapidArc plans were retrospectively created to compare with the static gantry plans using the Eclipse treatment planning system (version8.8, Varian Medical Systems). Two plans were generated for each PTV: IMRT (IMRT_P and IMRT_B) and RapidArc (RA_P and RA_B). IMRT_P used 9-beams and IMRT_B used 5-7 beams. RA_P used two arc fields and RA_B used one arc field.

Results:

The dosimetric differences for the organ-at-risk between IMRT and RapidArc were statistically insignificant ($p > 0.05$; $p = \text{Wilcoxon matched-pair signed-rank test}$) except for the ipsilateral parotid and brainstem. $D_{50\%}$ of ipsilateral parotid for IMRT was ~3Gy less than RapidArc ($p = 0.039$) while $V_{20\text{Gy}}$ of brainstem for RapidArc was ~5% more than IMRT ($p = 0.016$). There was no difference in PTV dose homogeneity between IMRT and RapidArc. Conformity indices for both primary and boost plans from RapidArc were significantly better than IMRT ($p = 0.002$). The integral dose showed marginal difference. No patient case completely favored one technique over the other. The estimated total treatment delivery times were, on average, 5 and 3 minutes shorter with RA_P and RA_B than IMRT_P and IMRT_B, respectively.

Conclusions:

Our preliminary study indicated that RapidArc and IMRT provided comparable sparing of organs-at-risk. RapidArc plans provided improved target conformity and reduced treatment delivery times. Our findings might be limited to tumor site specific (mostly oropharynx). This study should be extended to evaluate various primary tumor sites in the head-and-neck.