

AbstractID: 6445 Title: Comparison of helical tomotherapy to SMLC IMRT for treatment of parotid gland tumors

Purpose: To investigate the quality of helical tomotherapy intensity modulated radiotherapy treatment plans for parotid gland tumors by comparing them to step-and-shoot MLC (SMLC) IMRT plans

Method and Materials: Helical tomotherapy (TomoTherapy Hi-Art System) plans were generated for five patients previously planned using Pinnacle³ and treated using SMLC IMRT with bolus. One primary and two elective planning target volumes (PTVs) and anatomic structures that had been outlined in Pinnacle³ were imported into Hi-Art. Hi-Art plans were generated without bolus. Doses from the Hi-Art plans were transferred to Pinnacle³ for analysis and plan comparisons. All dose-volume histogram (DVH) calculations were done in Pinnacle³. PTV doses were compared using cumulative DVH, conformity index (CI), and tumor control probability (TCP). Doses to the critical structures were compared using maximum dose, mean dose, and normal tissue complication probability (NTCP).

Results: PTV doses were generally higher for the Hi-Art plans. Hi-Art plans also had steeper dose gradients at the edges of PTVs, leading to greater minimum doses. In addition, the maximum target doses were generally smaller, suggesting greater PTV dose homogeneity for the Hi-Art plans. The conformity index was generally higher for the Hi-Art plans. TCPs were 100% for both techniques, except for one case. Hi-Art surface doses without bolus were comparable to SMLC IMRT ones with bolus. Mean contralateral parotid dose was lower for all of the Hi-Art plans, substantially so in three of the cases. Doses to eyes, optic nerve, and spinal cord were similar or lower for Hi-Art plans. Similar or decreased NTCPs were found for all the OARs.

Conclusion: Hi-Art plans generally gave higher and more uniform target doses. Both SMLC IMRT and Hi-Art plans were excellent for sparing critical structures, except for the contralateral parotid, where Hi-Art plans were better.

Supported in part by a research agreement with TomoTherapy, Inc.