

AbstractID: 14199 Title: Simultaneous Integrated Boost Radiotherapy using Volumetric Modulated Arc Therapy (RapidArc) in the treatment of Head&Neck Cancer: a Dosimetric Comparison with Helical TomoTherapy and Intensity Modulated Radiotherapy

Purpose: To evaluate the treatment planning performance of volumetric modulated arc therapy (RapidArc) in patients with head and neck (H&N) cancers treated with simultaneous integrated boost method and to provide dosimetric comparison of plans generated with RapidArc (RA), Helical Tomotherapy (HT) and IMRT. **Method and Materials:** Ten H&N cancer patients previously treated using HT were included in this study. The gross tumor and lymph nodes were included in the high-risk planning treatment volumes (PTV70) whereas the intermediate and low-risk volumes of subclinical diseases were defined as PTV60 and PTV54. The total doses of 70 Gy, 60 Gy and 54 Gy were delivered in 33 fractions to 95% of the corresponding PTV volumes. Organs at risk (OAR) included the parotid glands, spinal cord, brainstem, larynx, esophagus and mandible. IMRT and double-arc RA plans were generated and compared with the HT plans that were used in the treatment of the patients. The paired t-test was used in the statistical analysis. All plans passed a 3 mm and 3% gamma-test. **Results:** The average maximum PTV70 doses were (111.2±1.9)%, (111.3±1.4)% and (106.6±1.8)% with RA, IMRT and HT, respectively; the average minimum PTV70 doses were (97.9±1.0)%, (98.1±0.3)% and (96.7±1.9)%. The maximum and mean OAR doses for parotid glands, mandible and larynx were comparable while statistically significant differences were observed in the brainstem, spinal cord and esophagus. The average mean doses to brainstem, for instance, were 7±2.6 Gy (IMRT), 11.8±5.1 Gy (RA) and 20.2±6.3 Gy (HT). **Conclusion:** IMRT performed better in dose sparing for brainstem, spinal cord, and esophagus than did RapidArc and Tomotherapy when delivering SIB in patients with H&N cancer. Tomotherapy was found to provide the highest PTV dose homogeneity while the treatment delivery was more efficient with RA. **Conflict of Interest:** Research sponsored by Varian Medical Systems, Inc.