AbstractID: 10865 Title: Comparison of Elekta VMAT with Tomotherapy: Plan Quality, Delivery Efficiency and Accuracy

Purpose: Helical Tomotherapy and Volumetric Modulated Arc Therapy (VMAT) are arc-based approaches to IMRT delivery. The objective of this study is to compare VMAT and helical tomotherapy in terms of plan quality, delivery efficiency and accuracy. **Method and Materials:** Twelve cases including 4 prostate, 4 head & neck, and 4 lung were selected for this study. Tomotherapy plans were developed using a Hi-Art II planning station. VMAT plans were generated using both the Pinnacle^3 SmartArc IMRT module and our home-grown arc-sequencing algorithm. The same set of CT images and contours were used for both VMAT and tomotherapy plans. The percentage volume of the PTV that received 95% of the prescribed dose (V95) was used to compare the target coverage. VMAT and tomotherapy plans were delivered using Elekta's PreciseBeam VMAT® control system and TomoTherapy HI_ART II system, respectively. VMAT plan QA was performed using the IBA MatriXX system, and an ion-chamber and films were used for tomotherapy plan QA. **Results:** For prostate cases, VMAT provided slightly improved V95 (98.1% vs. 97.6%) and lower dose to the rectum and the bladder. Tomotherapy attained slightly higher target coverage and uniformity in HN cases, with improved V95 (98.9% vs. 98.3%) and reduced standard deviation of the PTV dose (1.2 Gy vs. 1.4 Gy). In lung cases, VMAT provided similar target coverage with improved sparing of the cord and total lung. In terms of delivery efficiency, VMAT plans on average took 2.2 minutes for prostate and lung cases, and 5.4 minutes for HN cases. These values increase to 4.8 and 7.6 minutes for tomotherapy plans. Both VMAT and tomotherapy plans can be delivered accurately based on their own QA standard. **Conclusion:** VMAT is able to provide ~40% reduction in treatment time while maintaining comparable plan quality to that of helical tomotherapy. Research supported by Elekta.