AbstractID: 13339 Title: Evaluation of Volumetric Modulated Arc Therapy for Cranial Radiosurgery

Purpose: To evaluate Volumetric Modulated Arc Therapy (VMAT) plans for cranial radiosurgery. As well as evaluate the combined accuracy of the resulting Eclipse (AAA8.6.15) VMAT dose calculations and VMAT delivery (Varian NovalisTx, HD120 MLC, 1000MU/min 6MV beam). **Methods and Materials**: Twelve patients with cranial lesions of variable size (0.1-29cc) were treated using VMAT (4-6 arcs). Additional comparison Dynamic Conformal Arc (DCA, 4-6 arcs) and IMRT (9 field) plans were designed for each patient. All plans were evaluated with three criteria; i) modified Paddick Conformity Index (CI) for the 99% coverage isodose (maximum dose=100%), ii) peripheral dose value (D(5cc) for the brain minus lesion+2cm margin) and iii) maximum dose gradient at abutting critical structures. A 2D dose distribution was measured for all the VMAT treatment plans using calibrated film (Kodak EDR2) placed in phantom. **Results**: In all instances the CI (0-1) was best for the VMAT plans (ave. 0.86) and worst for the DCA plans (ave. 0.68). However, lower conformity is less significant for smaller lesions (<1.5cc). The D(5cc) values were similar for the DCA and VMAT plans but about double for the IMRT plans. For lesions (>1cc), the highest gradients observed for the IMRT, VMAT and DCA were 17%/mm, 15%/mm and 10%/mm, respectively. The average difference in measured and calculated i)CAX dose, ii)profile widths and iii)profile shifts for all the VMAT plans were: 4%(±2.5%), 0.38mm(±0.34mm) and 0.24mm(±0.28mm), respectively. As previously observed, CAX dose QA is best for lesions with an equivalent sphere diameter greater than 8mm. The VMAT average MUs were double the DCA ones and similar to the IMRT ones. **Conclusions**: For the aforementioned planning and delivery system and cranial lesions greater than 8mm in diameter, VMAT consistently provides accurate and superior doses distributions with the low peripheral dose of DCA, and the conformity/high dose gradients of IMRT.