

AbstractID: 14216 Title: Volumetric Modulated Arc Therapy for Brain Tumors: Dosimetric Comparison with Intensity-Modulated Radiation Therapy

**Purpose:** We evaluate RapidArc volumetric modulated arc radiotherapy (VMAT) using coplanar and non-coplanar arcs for the treatment of brain tumors to achieve conformal dose distribution, homogeneous coverage of the planned target volume (PTV), improved sparing of organs at risk (OAR), and reduced treatment time as compared with conventional intensity-modulated radiation therapy (IMRT). **Method and Materials:** Three brain tumor patients with PTVs of 26.7, 193.4, and 425.2 cc who had completed IMRT were replanned with Varian RapidArc using single 360° arc (RA-SA), double 720° arc (RA-DA), and a combination of a single 360° arc and a non-coplanar partial arc with a 90° couch rotation (RA-NC). Non-coplanar partial arcs ranged from 0°-25° to 179.9°. At least 95% of the PTV was required to receive the prescribed dose. RA plans were compared with IMRT plans, and differences in dose distribution, PTV coverage, and OAR sparing were analyzed. IMRT plans used 6-8 non-coplanar beams. **Results:** RA-DA and RA-NC plans improved PTV coverage ( $D_{99\%}$ ) from an average of 94.6% of prescription dose for IMRT plans to an average of 97.7%. Homogeneity of dose distribution in the target volume was improved from an average of 5.3% for IMRT to an average of 3.7% for RA-NC plans. Single-arc plans were slightly inferior to multiple-arc plans, but were still comparable to IMRT. Average dose to most OAR like brainstem, optic chiasm, pituitary, and optic nerves were reduced with RA. Dose to other optical structures like lenses increased compared with IMRT but remained well within the allowed limits. **Conclusion:** RapidArc VMAT using multiple arcs for the treatment of brain tumors may provide improved target volume coverage, highly conformal and more homogeneous dose distribution in the PTV, as compared to conventional IMRT. Organs at risk may also be spared more efficiently with VMAT.