

# Fractionated Radiosurgery for Lesions Involving the Optic Apparatus

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## Abstract

**Objectives:** To compare VMAT to dynamic conformal arc for planning fractionated radio surgery (FSR) to treat of lesions involving the optic nerve (ON) and optic chiasm (OC).

**Methods:** Five patients with lesions including the ON (2 cases also involved distal part of the OC) were planned with either dynamic conformal non coplanar arcs (DCA) using iPlan software (Brainlab, Munich, Germany) or with volumetric intensity arc therapy (VMAT) using Eclipse software (Varian, Palo Alto, USA).

The dose to the tumor boundaries was 54 Gy in 28 - 30 fractions delivered to the 80-90% isodose line in the DCA plans, and to the 95-98% isodose in the VMAT plans. A volumetric threshold dose of 54 Gy and a maximal point dose of 56 Gy to the ON and OC were used. The DCA plan was generated using 4 or 5 arcs while 3 different plans were generated using the VMAT for comparison: 1- the same DCA plan; 2 – 3 arcs; 3 – 4 arcs.

The various parameters were used for comparison.

**Results:** Mean tumor volume was 2.19 cc (1-5.24 cc). The mean Dmean was 52.34±1.7 Gy vs 53.54±0.53 Gy (p<0.109), 53.68±0.47 Gy (p<0.087) and 53.61±0.42 Gy (p<0.117) in the DCA and the three VMAT plans respectively. The 98% or more of the tumor volume received at least 95% of the prescribed dose in VMAT plans only. OC mean Dmax. was 55.69±0.35 Gy vs 53.96±0.01 Gy, 53.91±0.08 Gy and 53.85±0.08 Gy in the DCA and the three VMAT plans respectively. OC D2% was higher than 54 Gy but OC D5% was less in the DCA plans. OC D2% and D5% was less than 54 Gy in the all VMAT plans. V52.5Gy in tumor volume (IT) (\*) was significantly better for VMAT plans compared to the DCA: 92.39±6.91 % (p<0.014), 96.36±3.62 % (p<0.016), 95.34±6.5 % (p<0.018) and 45.87±30.66 % respectively. V52.5Gy out of tumor volume (OT) was better with the DCA plans compared to the VMAT.

**Conclusions:** VMAT allowed better tumor dose coverage with improved safety profile to ON and OC in tumors including these organs. The need for quality assurance in VMAT complicates its use compared to DCA but radiation delivery is faster with VMAT (plan2).

\* - value normalized to tumor volume – (V100% / Vtumor) \* 100%

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