

Purpose: The arc and modulating features of RapidArc treatments facilitate fast dose fall off and desirable dose distribution around the PTV and spinal cord in spine SBRT/SRS treatments. This is a study of the dosimetry characters of 11 RapidArc SBRT spine plans.

Methods: All patients had treatment plans formulated on the Varian Eclipse system, and were treated on RapidArc upgraded Varian Trilogy unit, using 6MV photon beams. Patients were immobilized with the BodyFix system or the T-frame mask system (cervical spine targets). All SBRT spine plans consisted of two arcs, each ~350 degrees. To minimize MLC leakage and finite leaf width (0.5 cm) effects, we used collimator angles of 155 and 215 (Varian scale). Fraction doses ranged from 400 cGy to 1800 cGy. Spinal cord/cauda equina were contoured on CT myelogram or MRI images; the spinal cord contour was expanded between 1-3 mm. Expanding the CTV by 2 mm generated the PTV, except where the PTV would intersect the spinal cord contour described above, in which case the PTV was restricted. Next, the original cord contour was again expanded by 5 mm, this time avoiding the PTV. The PTV, this second spinal cord expansion contour, as well as other OAR's were used for plan optimization.

Results: This process allows for extremely rapid dose fall off. In particular, for 5 patients, the average minimum distances between 100% and 70%, and between 90% and 50% isodose lines were 2.5 mm and 3.4 mm respectively. 90% of the PTV received 100.0% of the prescription dose on average, while 1% of the PTV received 121.7% of dose. An average of 0.1 cc of spinal cord received 39.7% dose.

Conclusions: We have been able to achieve improve SBRT plans for spine patients using this paradigm.