AbstractID: 7779 Title: Collimator Angle Effect in Optimizing Prostate IMSR Plans using 3-mm MLC

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Purpose: To evaluating the effect of two common collimator angles in optimizing intensity modulated stereotactic body radiosurgery (IMSR) plans.

Methods and Materials: 8 localized prostate carcinoma cases were selected. Treatment plans were performed with Brainlab iPlan RT Dose™ v3.0.1 platform on 2 mm CT data sets at supine position. Each plan consists of seven Novalis™ 6 MV photon beams, symmetrically spread along the patient axial plane. The maximum dimension of PTV's was 6.3 cm or less, which fits the 3-mm MLC portion. Contours defining the rectum were drawn anatomically as extending from the sigmoid flexure to the anal verge. For each case, two IMRT plans were calculated with identical parameters, except collimator angles were set at 0^o, when MLC travel parallel to the rectum (test group), and 270^o for the control. Beamlet size max was 4 mm. The goal dose of 75.6 Gy was normalized to D99.5 (ranged from $D_{99.2}$ to $D_{99.7)}$ of PTV.

Results: Dose homogeneity shows significantly superior in the test group, indicated by a lower maximal dose (mean 81.95 Gy vs. 83.45 Gy, $p<0.01$). An improved rectal dose sparing was also suggested in the test group with lowered rD_{10cc} (56.48 Gy vs. 58.23 Gy, $p=0.04$).

Discussion and conclusions: The longitudinal resolution along the travel direction of MLC routinely sets as 4 mm or greater in clinic, which creates an unsymmetrical resolution during IMRT optimization with 3-mm MLC's. Dose gradient changes are significant along the cross section of PTV/rectal junction (PRJ). When a finer calculation steps used perpendicularly, a better overall dose optimization was indicated. Although a better gantry clearance with a 270^o collimator angle, it may not be the optimal setting in all prostate IMRT as clearly implied in this study.