1061
Dosimetric Comparison Based on Consensus Delineation of Clinical Target Volume for CT- and MR-Based Brachytherapy in Locally Advanced Cervical Cancer

A.N. Viswanathan,1 I. Buzurovic,1 A.L. Damato,1 W. Bosch,2 D. Gaffney,3 S. Beriwal,4 O. Burnett,5 D. D’Souza,6 A. Jhingran,7 E.L. Jones,8 C. Kuno,9 L. Lee,9 L. Lin,9 N.A. Mayt,10 L. Petersen,11 L. Portelance,13 W. Small,14 A. Wolfson,15 C.M. Yashar,16 and B. Erickson 17

Purpose/Objective(s): To compare dosimetric results based on RTOG atlas consensus contours for computed tomography (CT) and 3 Tesla (3T) magnetic resonance (MR) image-based cervical-cancer brachytherapy.

Materials/Methods: Twenty-three gynecologic radiation oncology experts contoured 3 cervical-cancer-brachytherapy cases: case 1 with a tandem and ovoid, case 2 with tandem/ovoid with needles, and case 3 with a tandem/ring applicator. CT contours were completed before MRI contours. These were analyzed for consistency and clarity of target delineation using an expectation maximization algorithm for simultaneous truth and performance level estimation (STAPLE), with expert review and modification in order to build an online atlas for use in clinical trials. Using these consensus contours, dosimetric calculations of the D90 and D2cc to the bladder, rectum and sigmoid were performed using three different plans: a standard “point A” plan, a CT- or an MR-optimized plan. Optimization ensured that the CT or MR CTV D90 was maximized while reducing doses to the organs at risk (OAR: the sigmoid, rectum and bladder).

Results: Despite a considerably larger volume on CT for all 3 cases, there was no statistically significant difference in D90 or D2cc OAR comparing CT to MR. Case 1 (large tumor, intermediate response) had the large difference between CT and MR volumes and also had the largest difference between MR and CT optimized D90. However, this did not translate to statistically significant dosimetric differences (all p > 0.05). Table 1 shows the mean DVH values for all 3 cases combined.

Conclusions: MRI-contoured volumes are consistently smaller than CT volumes, particularly in cases with parametrial extension. In this study, these differences did not, however, translate into significant dosimetric differences in the D90 tumor or D2cc of the rectum, sigmoid or bladder for optimized plans. Future clinical trials may implement CT- or MR-based brachytherapy planning.
