AbstractID: 12849 Title: Tandem and Ovoids Brachytherapy for Cervical Cancer When Evaluated by High Resolution (3.0 Tesla) MRI

Purpose: To investigate tumor coverage and organs-at-risk (OAR) sparing of Manchester system based high dose rate (HDR) for different high risk (HR)-CTV volumes.

Materials and Methods: We studied 25 HDR plans of six patients with FIGO stage Ib1-IV cervical cancer. A new plan was generated per fraction based upon the system but on MRI, utilizing titanium Fletcher-Suit-Delclos-style tandem-and-ovoids applicators. The IR (intermediate)-CTV, HR-CTV, rectum, bladder, and sigmoid were delineated on MRI. Three subgroups were categorized according to HR-CTV volumes; Non-Bulky (< 20 cc), Low-Bulky, and Bulky (≥ 40 cc). For each group, the percent values of D100 and D90 of HR- and IR-CTV, normalized to the prescription dose (Rx), were quantified, while the percent D2cc of OAR, normalized to the dose limits.

Results: We found 76%, 44%, and 68% of the plans resulted in over dose, respectively. The percent D2cc was recorded up to 143% (mean 112 ± 17%), 127% (94 ± 20%), and 181% (114 ± 34%), respectively. The D90 values of HR-CTV in the Non-Bulky group were on average 118% (± 21%) higher than Rx, while in the Bulky group it was 64% (± 17%), showing that HR-CTV coverage was significantly changed for different tumor size group. The doses at Point A received on average 100% (± 3%) regardless of the tumor size. The ICRU rectum and bladder point doses showed down to 45% and 23% of their D2cc values underestimating their maximum doses. These underestimated cases were found in 36% of cases (9 plans out of 25) and 60% of cases (15 plans out of 25).

Conclusion: More than 40% of the plans resulted in over doses in OAR while HR-CTV received 118% of Rx in Non-Bulky group. Volume optimization is expected to improve OAR sparing for all tumor sizes and in tumor coverage for small tumors.