AbstractID: 10754 Title: Dosimetric Evaluation of a Redesigned High-dose Rate (HDR) Vaginal Applicator for Treatment of Cervical Cancer with Extension into Lower Vagina

Purpose: The vaginal applicator was redesigned to reduce the rectal and bladder dose to optimal level for patient having cervical cancer with extension into the lower vagina without compromising the dose to the point A. Compared with the Miami applicator; it can be implanted easily without affecting by necrotic nature of the tumour around cervix. **Method and Materials:** The original set of the vaginal applicator consists of different lengths of intrauterine tube with different angles and different diameters of cylinder. Six cylindrical holes were drilled at 30°, 90°, 150°, 210°, 270° and 330° positions where are located 5 mm away from the surface of the cylinder. Six OncoSmart ProGuide Needles (Nucletron) were placed into the holes to form a multi-channel vaginal applicator which allows dose optimization to the area of interest. The applicator was anchored by a Perspex lock and affixed to a base plate to prevent displacement. A set of CT images were taken to reconstruct the applicator. Using HDR brachytherapy planning system, the standard dose distribution was adjusted to achieve the prescribed dose which is 7 Gy at point A and 5 mm away from the cylinder surface. After insertion in the patient, one set of orthogonal films was taken to localize the ICRU points with reference to the applicator. Doses to the bladder and rectum are optimized to approximately 80% and 75% respectively of the prescribed dose. The biologically effective dose (BED) to all ICRU points was compared. **Results:** The redesigned multi-channel cylinder with intrauterine tube allows much better control than the original vaginal applicator. The BED of the rectum and target decreased by 20% and increased by 24% respectively during brachytherapy. **Conclusions:** The redesigned multi-channel vaginal applicator enables conformal isodose shaping and dose control to organs at risk without compromising the dose to the target.