

AbstractID: 8381 Title: Comparison of Volumetric Modulated Arc Therapy (VMAT) with serial Tomotherapy and segmental (step and shoot) IMRT for boost treatment of prostate cancer

**Introduction:** VMAT is about to be established clinically on a wide basis and may increase the efficiency of Intensity Modulated Radiotherapy (IMRT) treatment. The goal of this investigation was to compare VMAT to established IMRT delivery techniques of serial Tomotherapy and segmental IMRT for prostate cancer.

**Methods:** Using CT data sets of 9 patients treated for prostate cancer, treatment plans for all three techniques were created. Segmental IMRT was planned for a conventional MLC (Elekta MLCi, 2x40leaves, 1cm) and serial Tomotherapy for the MIMiC Multivane-Collimator (NOMOS, Corp.), using the Corvus 6.3 (Nomos; Pencil beam). VMAT was planned with ERGO++ R1.6 (3D Line Medical Systems/Elekta; Pencil beam). Segmental IMRT plans with MLC used 7 isotropic beams. Serial Tomotherapy plans were calculated in 1cm mode and for a 300° rotation. VMAT plans were created with a 360° and two 100° rotations. Evaluation of plan quality used metrics of conformity index ( $CI = V_{\text{tissue } D_{\text{min}}} / V_{\text{target}}$ ), homogeneity index ( $HI = D_{\text{max}} / D_{\text{prescribed}}$ ), dose to normal tissue and the isodose which encompasses 95% of the target volume.

**Results:** Median indices for conformity and homogeneity of the Corvus plans were CI 2,34/HI 1,21; MLC based segmental IMRT CI 2,89/HI 1,22; and VMAT plans CI 2,02/HI 1,11. 76Gy were prescribed to the median dose of the PTV. The resulting median doses to organ at risk (OAR) for (MIMiC/MLC/VMAT) were as follows: for anterior rectum (52,2Gy/52,4Gy/60,5Gy), posterior rectum (32,3Gy/33,5Gy/34,3Gy) and bladder (44,9Gy/44,1Gy/53,7Gy). Volumes for 50% of prescribed dose (38Gy) in normal tissue were 1091ml/1583ml/1191ml. Dose encompassing 95% of PTV was (MIMiC/MLC/VMAT) 68,8Gy/66,6Gy/70,7Gy. Median treatment time (MIMiC/MLC/VMAT) was 15min/7,5min/3min.

**Conclusion:** Rotational therapy techniques showed higher conformity, coverage and lower normal tissue dose. Homogeneity and dose to posterior rectum were similar for all approaches. VMAT plans are deliverable within a 3minute time slot which is the most efficient treatment option compared to the other approaches.