Material and Methods: 10 prostate cancer (PCa) patients who previously received RT to the prostate and pelvic nodes, were planned in Varian Eclipse using two full arcs with 6MV flattened, 6MV and 10MV FFF photon beams. The prescribed dose was 40Gy in 5 fractions for the planning target volume to prostate PTV(psv) (prostate and seminal vesicles) and 25Gy in 5 fractions for the PTV(LN). All plans were optimized using the same objectives and constraints. Plans were then evaluated for PTV coverage, dose fall-off, OAR doses for the rectum, bladder, small bowel, prostatic urethra, neurovascular bundle, femoral heads, penile bulb and the sigmoid colon. Physical dose metrics, EUDs, tumour control probability (TCP) and normal tissue complication probability (NTCPs) using the LKB model were investigated. The number of MU in 6MV plans was observed. However, the increase in the treatment time was found to be negligible. Despite the significantly lower monitor unit (MU) in 6MV FFF plans, these plans delivery times were the smallest among the three compared techniques due to dose rate limitations (maximum dose rate 600MU/min). Furthermore, the high dose spillage was found to be higher for 6MV. When comparing 6MV FFF and 10MV FFF plans, only minor differences were observed in the three compared techniques due to dose rate limitations (maximum dose rate 600MU/min). Further analysis showed that 10MV FFF is superior.

Results: All evaluated plans were highly conformal CI =1.2 and CN ≥0.94. There was no significant difference in the PTV dose coverage using all energies compared. Significant increase in high dose (R50) and low dose (R25) spillage outside the PTV in 6MV flattened beams compared to FFF plans was observed. Superior plans were obtained using 10MV FFF beams in terms of mean and minimum rectal dose, high and low dose spill outside the PTV and treatment time were also minimal. Despite the significantly lower monitor units (MU) in 6MV plans, these plans delivery times were the largest among the three compared techniques due to dose rate limitations (maximum dose rate 600MU/min). Furthermore, the high dose spillage was found to be higher for 6MV. When comparing 6MV FFF and 10MW FFF plans, only minor differences were identified favouring 10MW FFF plans.

Conclusions: Using two full arcs, highly conformal SABR VMAT plans for prostate and pelvic lymph node were achieved with 6MV FFF and 10MW FFF photon beams. A minor increase in the number of MU in 6MW FFF plans was observed; however, the increase in the treatment time was found to be negligible. Significant reduction in the high dose spillage was obtained with 10MW FFF beams suggesting that although both energies are suitable for use in prostate and lymph node SABR 10MW FFF is superior.

Purpose or Objective: To evaluate and compare the plan quality and efficacy of flattened and flattening-filter-free (FFF) photon beams in external beam RT for high-risk prostate cancer patients in the context of hypo-fractionated Stereotactic Ablative Radiotherapy (SABR) to the prostate and pelvic lymph nodes (LN).

Material and Methods: 25 prostate cancer (PCa) patients who previously received RT to the prostate and pelvic nodes, were planned in Varian Eclipse using two full arcs with 6MV flattened, 6MV and 10MV FFF photon beams. The prescribed dose was 40Gy in 5 fractions for the planning target volume to prostate PTV(psv) (prostate and seminal vesicles) and 25Gy in 5 fractions for the PTV(LN). All plans were optimized using the same objectives and constraints. Plans were then evaluated for PTV coverage, dose fall-off, OAR doses for the rectum, bladder, small bowel, prostatic urethra, neurovascular bundle, femoral heads, penile bulb and the sigmoid colon. Physical dose metrics, EUDs, tumour control probability (TCP) and normal tissue complication probability (NTCPs) using the LKB model were investigated. The number of MU in 6MV FFF plans was observed; however, the increase in the treatment time was found to be negligible. Despite the significantly lower monitor unit (MU) in 6MV FFF plans, these plans delivery times were the smallest among the three compared techniques due to dose rate limitations (maximum dose rate 600MU/min). Furthermore, the high dose spillage was found to be higher for 6MV. When comparing 6MV FFF and 10MW FFF plans, only minor differences were identified favouring 10MW FFF plans.

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Purpose or Objective: To evaluate and compare the plan quality and efficacy of flattened and flattening-filter-free (FFF) photon beams in external beam RT for high-risk prostate cancer patients in the context of hypo-fractionated Stereotactic Ablative Radiotherapy (SABR) to the prostate and pelvic lymph nodes (LN).