

hydrogel spacer is used to reduce the rectal toxicity, but the clinical data of SBRT with hydrogel spacer are limited. The aim of this prospective single-center phase II study was to determine the efficacy and safety of FFF-VMAT SBRT combined with hydrogel spacer for localized prostate cancer.

Materials/Methods: Men with localized prostate cancer were eligible for the study. A hydrogel spacer was inserted into the perirectal space between prostate and rectum before the initiation of SBRT. All patients underwent the planning CT scans before and after the spacer placement. Patients received 36.25 Gy to 95% of the PTV in 5 fractions every other day excluding weekends with 6MV single arc FFF-VMAT. The primary endpoint was acute toxicities during and within 3 months after the completion of SBRT. Toxicities were assessed using Common Terminology Criteria for Adverse Events v4.03. The secondary endpoints were International Prostate Symptom Score (IPSS) and quality of life (QOL) assessed by the Expanded Prostate Cancer Index Composite (EPIC) questionnaire. Target and normal tissue dosimetry were compared before and after the hydrogel spacer insertion.

Results: Between February 2017 and July 2018, forty patients with localized prostate cancer were enrolled. The median age was 70 years (55-79). Three, 25, 6, and 6 patients had low-, intermediate-, high-, and very high-risk prostate cancer according to the National Comprehensive Cancer Network (NCCN) risk classification. Twenty-three patients (58%) received concomitant androgen deprivation therapy. The hydrogel spacer placement was successful in 39 cases (98%). Seven (18%) and eighteen patients (45%) developed grade 2 acute gastrointestinal and genitourinary toxicities, respectively. No grade 3 acute toxicities were observed. Median IPSS temporarily increased at 2 weeks and 1 month after RT when compared to the pretreatment baseline ($P < 0.05$, 0.05, respectively), and returned to the baseline value in 3 months. EPIC urinary and bowel scores significantly declined at 2 weeks and 1 month after RT ($P < 0.05$, 0.05, respectively), and no difference was observed at 3 months post-RT. Spacer use was associated with lower rectum dose for mean dose, maximum dose, and V100% to V50% (all $P < 0.05$).

Conclusion: FFF-VMAT SBRT with a hydrogel spacer can be safely administered with acceptable acute toxicity. Hydrogel spacer insertion significantly reduced the dose to the rectum.

Author Disclosure: **M. Ogita:** Technical advice; Augmenix (Boston Scientific). **H. Yamashita:** None. **Y. Nozawa:** None. **S. Ozaki:** None. **S. Sawayanagi:** None. **T. Ohta:** None. **K. Nakagawa:** None.

2686

The Role of ^{68}Ga -PSMA-PET/CT in Pelvic Field Delineation in Prostate Cancer Patients with Pelvic Lymph Node Metastasis



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Purpose/Objective(s): The pelvic field irradiation field has been previously defined by consensus statement and guidelines have been published for defining pelvic lymphatic field. However, whether target volumes defined by guidelines for pelvic field encompass the metastatic lymph nodes detected with ^{68}Ga -PSMA-PET/CT is still unknown. In this study, we analyzed the role of ^{68}Ga -PSMA-PET/CT in defining pelvic lymphatic target volumes.

Materials/Methods: The clinical data of 107 locally advanced prostate cancer patients were retrospectively analyzed. All patients were initially staged with thoracoabdominal computed tomography (CT), pelvic magnetic resonance imaging (MRI) and bone scintigraphy. All patients had pelvic lymph node metastasis. The pelvic lymphatics were initially delineated according to consensus guidelines and contouring atlas for pelvic node delineation in prostate and pelvic node intensity modulated radiation therapy. The lymph nodes detected in ^{68}Ga -PSMA-PET/CT was placed in delineated volume, and whether it is placed within the delineated

volume or not was analyzed. The number and location of lymph nodes staying outside the delineated area was assessed.

Results: Median age for entire cohort was 69 years (range 51 – 87 years). The median PSA was 37.8 ng/dL (range 2.1 – 432.5 ng/dL). The patient distribution according to Gleason score (GS) was: 36 patients (34%) 7, 25 patients (23%) 8, 35 patients (33%) 9, and 11 patients (10%) 10, respectively. The mean SUV of primary tumor (SUV_p) and metastatic lymph nodes (SUV_{ln}) were 20.2±17.8 (range, 1.3 – 83.4) and 14.9±14.4 (range 2.0 – 64.5), respectively. A total of 162 lymph node metastasis was observed in ^{68}Ga -PSMA-PET/CT images, of them 95 lymph nodes (59%) were located outside the consensus pelvic field. Of 107 patients, 49 patients (46%) had lymph node metastasis outside the standard pelvic field. The mean SUV of lymph nodes located outside the standard pelvic field was 15.0±14.2 (range 2.0 – 64.3). 13 of 49 patients (27%) had multiple lymph nodes outside the pelvic field. The location of lymph nodes outside the standard pelvic fields are para-aortic lymphatics (19 patients, 39%), iliac lymph nodes (19 patients, 39%), perirectal lymph nodes (11 patients, 22%), presacral lymph nodes (8 patients, 16%), obturator lymph nodes (4 patients, 8%). Patients with GS ≥ 7 disease has higher rates of extra-field lymph node metastasis compared to patients with GS 7 disease (31% vs. 53%; $p = 0.02$).

Conclusion: We demonstrated that ^{68}Ga -PSMA-PET/CT helps to better define the pelvic lymph node fields in prostate cancer patients with pelvic lymph node metastasis, with 46% of patients requiring treatment field modifications. Our preliminary results needed to be verified with clinical outcomes and studies including higher patient number.

Author Disclosure: **C. Onal:** None. **P. Hurmuz:** None. **N. Torun:** None. **M. Tuncel:** None. **O. Guler:** None. **M. Reyhan:** None. **M. Caglar:** None. **G. Ozyigit:** None.

2687

Patient Reported Quality of Life after Short Course Radiation for Prostate Cancer; A Comparison of LDR, HDR, and SBRT Outcomes



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Purpose/Objective(s): We sought to quantify and compare changes in patient reported quality of life (PRQL) after all forms of short course RT for prostate cancer including stereotactic body radiation therapy (SBRT), high dose rate (HDR) and low dose rate (LDR) brachytherapy.

Materials/Methods: Eligible patients included those with T1-2, N0, M0 prostate cancer who received SBRT, HDR or LDR monotherapy radiation at a single NCI designated comprehensive cancer center for whom PRQL was prospectively collected. International Prostate Symptom Score (IPSS) and Sexual Health Inventory For Men (SHIM) were collected for all modalities. Expanded Prostate cancer Index Composite Short Form (EPIC-26) was collected for patients receiving HDR or SBRT. Patients who received prior prostate RT, TURP, or ADT as part of their initial treatment were excluded. Patients were censored at time of salvage therapy. Disease and demographic characteristics were compared using Fishers exact and chi square tests. We used regressions estimated by Generalized Estimating Equations to identify associations among patient/treatment variables and early (3-6 month) and late (1-2 year) PRQL scores.

Results: 338 LDR, 101 HDR, 71 SBRT patients treated from 2001-2017 were eligible. Gleason score and initial PSA were higher for SBRT/HDR compared to LDR ($p < 0.001$). Median prostate volume for LDR, HDR and SBRT was 33.9mL, 34.0mL, and 44.8mL, respectively ($p < 0.001$). BMI, Zubrod Performance, and smoking status were similar between modalities. Mean baseline IPSS score was similar between LDR, HDR, and SBRT groups (6.0, 5.9, and 6.7, respectively). HDR and LDR IPSS score worsened at early (+1.9, +7.3) and late (+1.3, +3.5) time points compared to baseline (SS) while SBRT did not. On adjusted MVA, HDR and SBRT showed statistically significant early (-5.4, -7.0, respectively) and late (-2.1, -3.5, respectively) IPSS improvements compared to LDR. There were no differences between SBRT and HDR IPSS score at any time point. IPSS score increased on average by 0.6/10cc prostate