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Adaptive Magnetic Resonance Guided and Computed Tomography Guided Stereotactic Body Reirradiation for Locally Recurrent Prostate Cancer: A Retrospective Analysis

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Abstract
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Abstract

Objectives:

Stereotactic body radiation therapy (SBRT) is an emerging modality for salvage therapy of previously irradiated, locally recurrent prostate cancer. However, concerns for toxicity associated with re-irradiation present a challenge for its widespread adoption. Adaptive radiation therapy potentially offers improved target coverage and normal tissue sparing, which may decrease the risk of significant toxicity. This review reports the clinical outcomes and toxicities in patients re-irradiated with either MR-guided or CT-guided adaptive SBRT.

Methods:

Thirteen patients previously treated with definitive radiation therapy of locally recurrent prostate cancer at a single institution from November 2021 to December 2023 were retrospectively reviewed under IRB approval. Two patients had received previous LDR, two patients had been previously treated with HDR, and remaining patients received EBRT doses ranging from 72 – 80 Gy. Patients underwent a whole gland salvage protocol treatment consisting of a 30 Gy dose in 5 fractions, with all but one patient also receiving a simultaneous integrated boost to 34 Gy. Two patients (15%) received adaptive CT-guided treatment and eleven patients (85%) received adaptive MR-guided treatment. Three patients (23 %) received concurrent androgen deprivation therapy (ADT). None of the patients had rectal spacers or fiducial markers placed.

Results:

Patients recurred 3.7 to 15 years after initial radiation therapy. Median follow up after SBRT was 19 months (9-32 months). All plans were adapted almost daily before each treatment (mean adaption 4.8). Median pre-reirradiation PSA was 3.9 ng/mL (1.4-13.7). All patients experienced decrease in PSA by 3 months post treatment (mean drop 91.6% at 1-18 months), excluding one patient who is currently receiving ADT. Seven patients (54%) experienced a mild but stable PSA bounce compared to post treatment nadir. Out of the six patients who completed a pre- and post- American Urological Association (AUA) Symptom Score questionnaire, four patients (67%) had worsening of genitourinary (GU) symptoms from mild to moderate (33%) or higher moderate score (33%). Two patients (33%) had no change. Three patients (23.1%) developed RTOG grade 2 GU toxicity and three patients (23.1%) developed grade 1 GU toxicity. Three patients (23.1%) had no GU toxicity, both during treatment and at subsequent follow up. Four patients (30.8%) had unchanged grade 1 or 2 GU toxicity from pre-treatment. One patient (7.7%) developed grade 1 gastrointestinal (GI) toxicity. No patients developed grade 3 or 4 GU or GI toxicity.

Conclusion(s):

Both adaptive MR-guided and CT-guided whole gland SBRT are promising technologies for locally recurrent prostate cancer in previously irradiated patients by providing good biochemical control while minimizing GU and GI toxicities. Longer follow up and more patients are needed to better evaluate the effectiveness of adaptive SBRT in the re-irradiation setting.