Concurrent placement of SpaceOAR gel and gold fiducials during HoLEP: a case report

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***Abstract*:** Herein, we describe a case of a patient diagnosed with prostate cancer (PCa) who presented with lower urinary tract symptoms (LUTS) and elevated Prostate Specific Antigen (PSA). He underwent Holmium Laser Enucleation of the Prostate (HoLEP) for his severe LUTS with concurrent placement of SpaceOAR gel and gold fiducials in preparation for radiation therapy (RT). After a successful operation, the patient underwent same-day discharge and catheter removal. He regained continence at 2 weeks and started RT at 9 weeks post-HoLEP. We present that concurrent placement of fiducials and SpaceOAR during HoLEP appears to be feasible, well tolerated and effective for PCa patients who elect RT.

Keywords: gold fiducials and HoLEP, HoLEP and prostate cancer, SpaceOAR and HoLEP

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Introduction

Definitive treatment of prostate cancer (PCa) usually consists of radical prostatectomy or radiation therapy (RT).[1,2] However, in men with lower urinary tract symptoms (LUTS), RT can exacerbate symptoms or even cause urinary retention.[3] Surgery for bladder outlet obstruction prior to RT has been successful in preventing exacerbation of LUTS.[3] While transurethral resection of the prostate (TURP) has previously been performed in this setting, studies have shown Holmium Laser Enucleation of the Prostate (HoLEP) is more effective at lowering prostate symptom scores and removing more tissue, and has lower retreatment rates compared with TURP.[4] Indeed, the reoperation rate for HoLEP is around 1% at 18 years.[5]

RT can also cause rectal toxicity; therefore, SpaceOAR, a polyethylene glycol (PEG) hydrogel (Augmenix, Bedford, MA, USA), was developed to create space between the rectum and the prostate for patients undergoing RT.[6] SpaceOAR placed transperineally has been found to reduce rectal and gastrointestinal (GI) toxicity for patients undergoing RT.[1,7] Studies have suggested that SpaceOAR might minimize sexual dysfunction in PCa patients who elect RT.[7] While there have been rare reports of adverse events related to toxicity from SpaceOAR,[8] there have been no reports of increased risk with concurrent procedures at time of SpaceOAR placement. There are currently no standardized guidelines on the timing of fiducial and SpaceOAR placement in patients undergoing transurethral prostate surgeries prior to their radiation. Herein, we report successful placement of fiducials and SpaceOAR after HoLEP.

Case report

A 75-year-old man with a past medical history of coronary artery disease status post cardiac stent placement presented with an enlarged prostate and LUTS. He was found to have an elevated PSA of 5.42, which prompted a multiparametric prostate magnetic resonance imaging (MRI). This demonstrated a 99-g prostate and a Prostate Imaging-Reporting Data System (PIRADS) 5 lesion in the right anterior transitional zone at the apex. He underwent MRI–US (ultrasound) fusion prostate biopsy and was diagnosed with clinically significant PCa (grade group 2) in seven needle core biopsies. With regard to his LUTS, his American Urologic Association (AUA) symptom score was 17 and his

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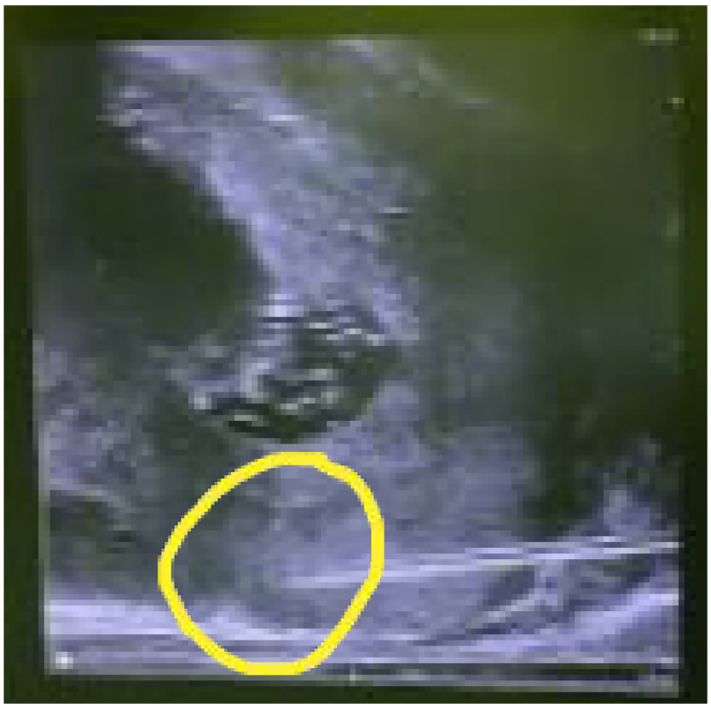

Figure 1. Intraoperative transperineal placement of gold fiducials (fiducial not yet deployed, trocar tip circled in yellow).

symptoms were inadequately controlled with alpha-blockers. After undergoing shared decision making, he elected RT. He was advised to consider HoLEP prior to his RT. After meeting with the urologic surgeon, he agreed to undergo HoLEP with concurrent SpaceOAR and fiducial placement prior to RT.

Results

HoLEP was performed in standard fashion using the Moses 2.0™ 120H Holmium laser by a fellowship-trained surgeon with significant expertise in HoLEP. The total enucleation time was 37 min and morcellation time was 9 min. The total specimen weight was 58 g. Immediately after HoLEP, a urologic oncologist placed gold fiducials (Figure 1) and SpaceOAR gel transperineally (Figure 2). The total operating room (OR) time was 2 h 18 min. The patient recovered well and underwent same-day discharge and catheter removal. The pathology report demonstrated prostatic adenocarcinoma with a Gleason score of 7 (grade group 2, 10% Gleason 4 component).

After the HoLEP, the patient regained his continence at 2 weeks and began RT approximately 9 weeks after his operation. The patient underwent intensity modulated radiation therapy (IMRT) with 10 mV photons (Figure 3). For the first phase of RT, his prostate and seminal vesicles were targeted at a dose of 1.8 Gy per day for a total dose of 54 Gy. After this phase, he received a boost to the prostate alone of 23.4 Gy. In total, he received 77.4 Gy. He had minimal symptoms during his RT and never developed any GI symptoms, rectal toxicity or hematuria. He did develop mild urinary urgency with very rare urgency incontinence but is not requiring any pads. His urinary symptoms were well controlled with Mirabegron 25 mg daily.

Discussion

This patient underwent successful HoLEP and SpaceOAR placement with relief of his LUTS. Intraoperative complexity of fiducial and SpaceOAR placement was rated equivalent to placement in HoLEP naïve patients. He regained his continence at 2 weeks. IMRT was started 2 months later with no major complications. These results corroborate previous findings that PCa patients can undergo HoLEP without major adverse outcomes[5] and suggest that concurrent SpaceOAR and HoLEP placement may be ideal.

This case report is unique in that to date there has been no record of concurrent placement of fiducial markers and SpaceOAR during HoLEP for RT. While one study found that UroLift™ implants could serve as fiducial markers for external beam radiation therapy (EBRT),[9] UroLift™ does not remove prostate tissue and patients may require retreatment. Historically, RT for patients with enlarged prostates and LUTS was discouraged due to concern of worsening LUTS.[3] However, TURP prior to RT has been shown to be effective at preventing any exacerbation of LUTS.[3] Since HoLEP has lower retreatment rates than TURP, HoLEP may be more effective for PCa patients undergoing RT. While there is also concern that RT could worsen continence outcomes post-HoLEP, studies have shown that continence outcomes for patients undergoing TURP and subsequent brachytherapy are not significantly worse.[3] Similarly, this patient regained his continence 2 weeks post-HoLEP and remains continent even after completion of RT.

We think placement of SpaceOAR at the time of HoLEP is easier and potentially safer as the

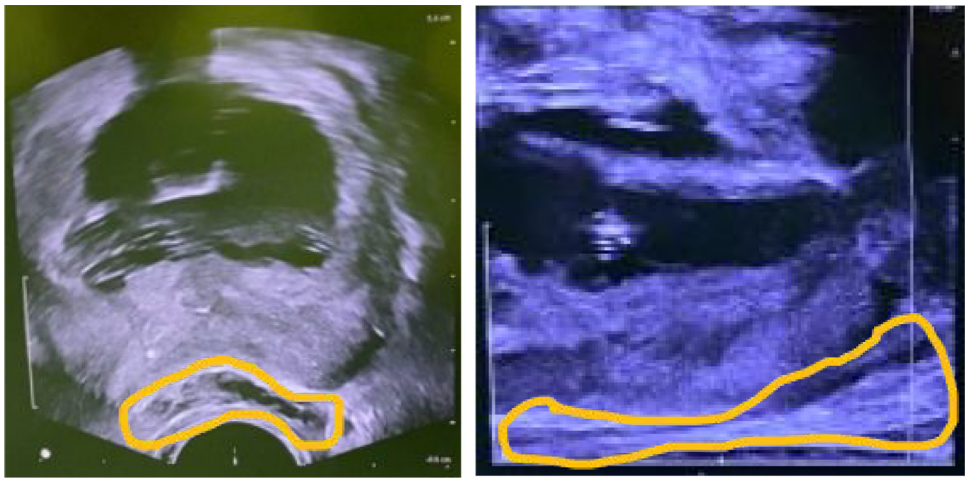

Figure 2. Intraoperative transperineal SpaceOAR placement in axial (left) and sagittal (right) views using the transrectal ultrasound probe, respectively (circled in gold).

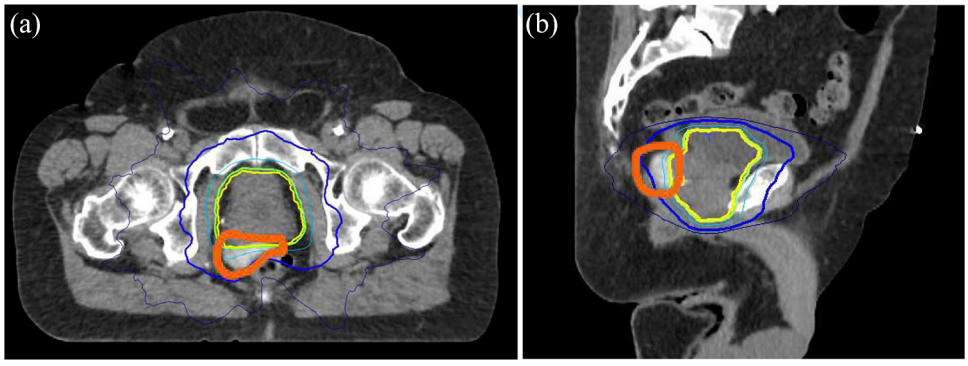

Figure 3. Simulation CTs during IMRT treatments displaying treatment zones and fiducial placements: (a) axial view and (b) sagittal view (SpaceOAR circled in orange).

perirectal space is unviolated by HoLEP and potential scarring or inflammation following HoLEP has not yet developed. Patients undergoing HoLEP (particularly those with a thin posterior capsule) can develop scarring and inflammation in the perirectal space which could make subsequent SpaceOAR placement more difficult. Combining multiple procedures into one session also reduces the need for multiple treatments, so concurrent placement of fiducials and SpaceOAR seems to be an efficient strategy for PCa patients undergoing RT.

Conclusion

For PCa patients who have significant LUTS and elect RT, concurrent placement of fiducial markers and SpaceOAR during HoLEP is feasible.

Author contributions

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Conflict of interest statement

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Ethics approval and informed consent

This study was approved by the Northwestern Institutional Review Board (STU00213284). Written informed consent was obtained from the patient for publication.

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