The disappearing PI-RADS 5 prostate lesion

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Prostate Imaging Reporting and Data System version 2 (PI-RADS v2) identifies prostate cancer on the basis of multiparametric MRI (mpMRI). As an assessment tool, it correctly predicts clinically significant cancer in the vast majority of cases. In this light, we report a rare patient, for whom a PI-RADS 5 lesion vanished over the course of 13 months.

Key Words: assessment tool, PI-RADS, prostate cancer

Introduction

In US men, prostate cancer is the most common non-dermatologic cancer and the second leading cause of cancer death. Multiparametric MRI (mpMRI) has emerged as an effective imaging modality for not only identifying and localizing prostate lesions, but also highlighting those with a higher likelihood of harboring prostate cancer. Prostate mpMRI is also useful in assessing nodal involvement and metastases. In an attempt to optimize application of mpMRI in prostate cancer risk stratification and management, PI-RADS continues to evolve. Its most current iteration, PI-RADS v2, implements mpMRI in a sequential fashion, based on anatomic involvement.[1] Diffusion weighted imaging (DWI) is the optimal tool for peripheral zone lesions, while T2-weighted imaging (T2W) should receive initial consideration within the transition zone. The product of this system is a numerical representation of the likelihood of clinically significant prostate cancer, ranging from 1 (very low probability) to 5 (very high probability), as determined by a radiologist experienced in reading prostate mpMRI.

Instrument validation studies have attempted to characterize PI-RADS v2, correlating a score ≥ 3 with a sensitivity of 0.85, specificity of 0.73, positive predictive value (PPV) of 0.75 and negative predictive value (NPV) of 0.84 for prostate cancer detection.[2] At its extremes, a PI-RADS score of 1-2 is associated with a 98% NPV, whereas a score of 5 accurately predicts significant cancer in 93% of cases.[3] More specifically, more than 80% of PI-RADS 5 lesions are ultimately graded ≥ 7 by the Gleason system.[4] Furthermore, in terms of patient prognosis, biochemical recurrence-free survival rates following prostatectomy are significantly reduced in patients with PI-RADS scores ≥ 4.[5]

In this report, we describe a patient with a history of PSA elevation, for whom a PI-RADS 5 lesion, initially concerning for clinically significant prostate cancer, disappeared and became PI-RADS 1 over a 13 month time frame.

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Case report

A 63-year-old male with no family history of prostate cancer was referred by his primary care physician for work up of a persistently elevated PSA. He had a previous diagnosis of benign prostatic hyperplasia (BPH) with significant lower urinary tract symptoms (LUTS), inadequately managed with tamsulosin.

Despite a benign standard prostate biopsy in 2014, his PSA continued to rise, peaking at 11.09 ng/mL. A subsequent mpMRI was performed at 3 Tesla using a 32 channel phased array surface coil, generating T1-weighted, T2-weighted, diffusion-weighted and DCE-MRI images of the prostate. The prostate was enlarged (volume of 121 cc) with a PSA density of 0.09 ng/mL.[2] At this time, two lesions were characterized: a 2.1 cm PI-RADS 5 lesion in the left apical mid peripheral zone with no evidence of extraprostatic extension (EPE) or seminal vesicle invasion (SVI), Figure 1A, and a 0.8 cm PI-RADS 3 lesion in the right apical anterior transition zone. Interestingly, at these two targeted locations, subsequent magnetic resonance (MR)/ultrasound (US) fusion biopsy in July 2016 revealed only benign prostatic tissue. On the other hand, chronic inflammatory changes were observed at two random biopsy sites, the left lateral apex and left lateral base. Approximately 13 months later, the patient's PSA was noted to be 5.3 ng/mL, and his prostatic volume and PSA density had fallen to 102 cc and 0.05 ng/mL,[2] respectively. The patient revealed that he had begun taking finasteride 5 mg daily about 7 months prior. Remarkably, his most recent prostate mpMRI from August 2017, read by the same radiologist at the same institution, exhibited complete disappearance of both lesions (PI-RADS 1), Figure 1B. A to B, initial T2-weighted (T2W) mpMRI (A) and diffusion-weighted (DWI) mpMRI. (B), demonstrating a 2.1 cm PI-RADS 5 lesion in the left apical mid peripheral zone; C to D , repeat T2W (C) and DWI (D), charaterized as PI-RADS 1, exhibiting complete disappearance of the PI-RADS 5 lesion.

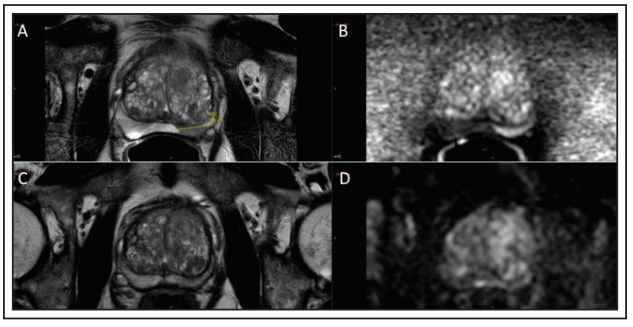

Figure 1. A to B, initial T2-weighted (T2W) mpMRI **(A)** and diffusion-weighted (DWI) mpMRI **(B),** demonstrating a 2.1 cm PI-RADS 5 lesion in the left apical mid peripheral zone; **C to D**, repeat T2W **(C)** and DWI **(D)**, charaterized as PI-RADS 1, exhibiting complete disappearance of the PI-RADS 5 lesion.

Discussion

The clinical utility of the MR/US fusion platform is to highlight high risk prostatic lesions. Current recommendations warrant targeted fusion biopsy for all PI-RADS 4 and 5 lesions and encourage it for PI-RADS 3 lesions in the setting of other clinical factors, such as digital rectal exam (DRE) and PSA density. In particular, the negative predictive value of mpMRI is bolstered when PSA density is interpreted alongside the PI-RADS assessment, facilitating selective sparing of potentially unnecessary biopsies. In patients with a PI-RADS score ≤ 3 and a PSA density < 0.15 ng/mL,[2] multiple institutions have uncovered no clinically significant prostate cancer on subsequent biopsy.[6] On the basis of our patient in question, we seek to explore clinically relevant variables that may impact the PPV of mpMRI and the stringency of a PI-RADS 5 score.

To this end, we present evidence that our patient's prostatic pathology may have represented benign change. Firstly, he is an amateur road cyclist, who rides over 5000 miles every year. A link between long-distance cycling and elevations in PSA, particularly in healthy male subjects over 50 years of age, has been proposed.[7] Furthermore, athletic activities involving sustained hip flexion, have been shown to exacerbate prostatitis-like symptoms, such as dysuria.[8] Next, at the time of initial mpMRI, he was suffering significant LUTS, namely weak stream and urgency. Interestingly, these symptoms improved substantially after treatment of concurrent constipation, supporting the possibility that retained stool was mechanically obstructing urine outflow and causing both urinary dysfunction and prostatic inflammation. Finally, the disappearance of his PI-RADS 5 lesion on repeat mpMRI, as well as the reduction in his prostate size and PSA density, occurred in parallel with 7 months of finasteride treatment. For many years, this medication has consistently achieved shrinking of enlarged prostate glands and amelioration of associated symptom scores, but has no approved role in prostate cancer therapy.[9]

On these grounds, we hypothesize that even some patients with PI-RADS scores ≥ 4 may never harbor prostate malignancy, in spite of what their initial imaging suggests. A balanced analysis of mpMRI data, together with other pertinent background and clinical

information, may augment the PI-RADS assessment system, affording more effective and individually tailored patient management.

Conclusion

Even though a PI-RADS 5 lesion is highly suggestive of prostate cancer and should most likely be biopsied, this patient's clinical course demonstrates that even in cases where imaging dictates high cancer suspicion, considering mpMRI findings in the context of the entire clinical picture may be more predictive of the patient's disease state. □

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