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Malakoplakia of the prostate diagnosed on multiparametric-MRI ultrasound fusion guided biopsy: A case report and review of the literature

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1. Introduction

Malakoplakia is an unusual chronic inflammatory condition described by Michaelis and Gutmann in 1902 and further characterized by von Hansemann in 1903.[1] Microscopically, there are sheets of macrophages containing round concentrically basophilic intracytoplasmic inclusions (targetoid appearance) named Michaelis-Gutmann bodies; which contain calcium salts, iron, intact and degenerating bacteria within phagolysosomal bodies. A strong association with infectious process is well known, and a defective intraphagolysosomal digestive activity of macrophages and monocytes leading to inadequate killing of ingested bacteria is hypothesized. Gram-negative bacteria such as *Escherichia coli* and Klebsiella pneumonia are often isolated from malakoplakia lesions. However, association with immunosuppression has been linked too.[1,2]

Being first described from a bladder biopsy specimen, this is still the most common site of involvement. Yet, in recent years, cases of the disease affecting extravesical sites such as prostate, skin, bone, uterus and lungs, have been reported with increasing frequency.[2] Malakoplakia involvement of the prostate was initially described by Carruthers in 1959, and up to date, this location is considered extremely rare.[3,4]

We describe a case of prostatic malakoplakia, diagnosed on multiparametric MRI (mpMRI) ultrasound fusion guided biopsy in a patient with clinically suspected prostate cancer (PCa).

2. Case presentation

A 63-year old African American man, with past medical history significant for acquired polycystic kidney disease; status post bilateral cadaveric kidney transplant in 2006, was referred for urological evaluation due to persistently elevated PSA (10 ng/ml), lower urinary tract symptoms, and an enlarged prostate gland (40 cm^3) with right-side induration on digital rectal examination. A trans-rectal ultrasound (TRUS) guided prostate biopsy performed 15 years ago was negative for malignancy. Outpatient medications included tacrolimus and mycophenolate.

A repeat TRUS prostate biopsy only showed one core of high-grade prostatic intraepithelial neoplasia (PIN). Patient was started on tamsulosin with significant improvement of symptoms, and was scheduled to have a regular PSA check up every year. However, a few months after, the patient developed an *Escherichia coli* lower

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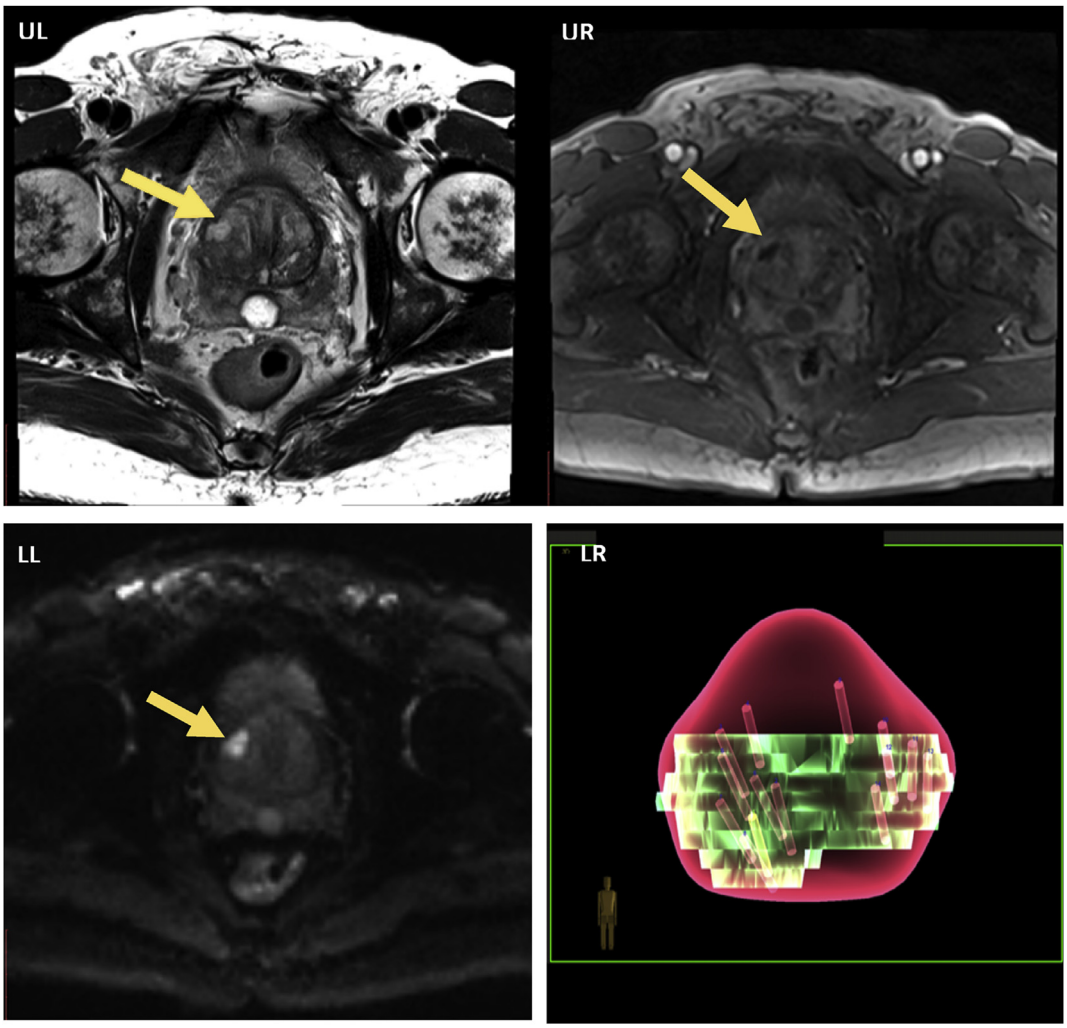

Fig. 1. Upper left: Axial T2 demonstrating a non-circumscribe, ill-defined, homogeneous, hipointense bulging lesion in the bilateral posterior mid gland and apical peripheral zone with seminal vesicle extension. Upper right: Early arterial phase DCE. Lower left: High b-value DWI. Lower right: Exact localization of the cores taken from the suspicious lesion during the mpMRI ultrasound fusion guided biopsy.

urinary tract infection that uneventfully resolved after a 14-day course of ciprofloxacin.

A year after his repeat TRUS prostate biopsy, it was noted that his PSA jumped from 10 to 18.26 ng/ml. A mpMRI of the prostate was performed using a 3-T scanner with a phased array body surface coil. T2-weighted images demonstrated a diffuse band like low signal intensity measuring 6.1 × 1.5 cm in the bilateral posterior mid gland and apical peripheral zone without evidence of prostatic capsule disruption but with seminal vesicle extension. Additionally, diffusion-weighted images (DWI) demonstrated high signal intensity with evidence of significant restriction, and dynamic contrast enhancement (DCE) images showed early enhancement with retention of the contrast in most the delay images and plateau curve (Fig. 1). A Prostate Imaging Reporting and Data System (PI-RADS) 4 score was given to the lesion, and a mpMRI ultrasound fusion guided biopsy of the prostate was performed.

Histopathological examination of the biopsy material showed pathognomonic Michaelis–Gutmann bodies and atrophic prostatic glands surrounded by marked chronic inflammation (Fig. 2), staining positive for Von Kossa, Prussian blue and Periodic acid-Schiff (PAS) in 13/14 cores. Given that the patient was asymptomatic, no further treatment was offered and annual PSA screening has been scheduled. During his last follow up visit a few months ago, his PSA was found to be 3.57. Rebiopsy is planned if his PSA increases significantly.

3. Discussion

Malakoplakia is a rarely seen chronic inflammatory disease with less than 1000 patients diagnosed in the United States yearly, affecting predominantly the genitourinary tract with special affinity for the bladder.[3] Nearly 80–90% of patients have positive urine cultures, with *Escherichia coli* and *Klebsiella pneumoniae* being the most commonly isolated bacterias. Other organisms that have been associated with malakoplakia include: Rhodococcus equi, *Pseudomonas aeruginosa*, *Staphylococcus aureus* and Mycobacterium bovis.[1,2] This association with infection as well as the association between the disease and immunosuppression has led to the theory that a defective immune response to microbial agents is the responsible pathogenic mechanism; more specifically a defect in bacterial destruction by histiocytes, in which phagolysosomes fail to completely degrade the invading bacteria forming Michalis-Gutmann bodies; a composite of calcium, iron and bacterial glycolipid, staining positive for von Kossa, Prussian blue and PAS respectively.[1]

Treatment alternatives depend on the underlying immune

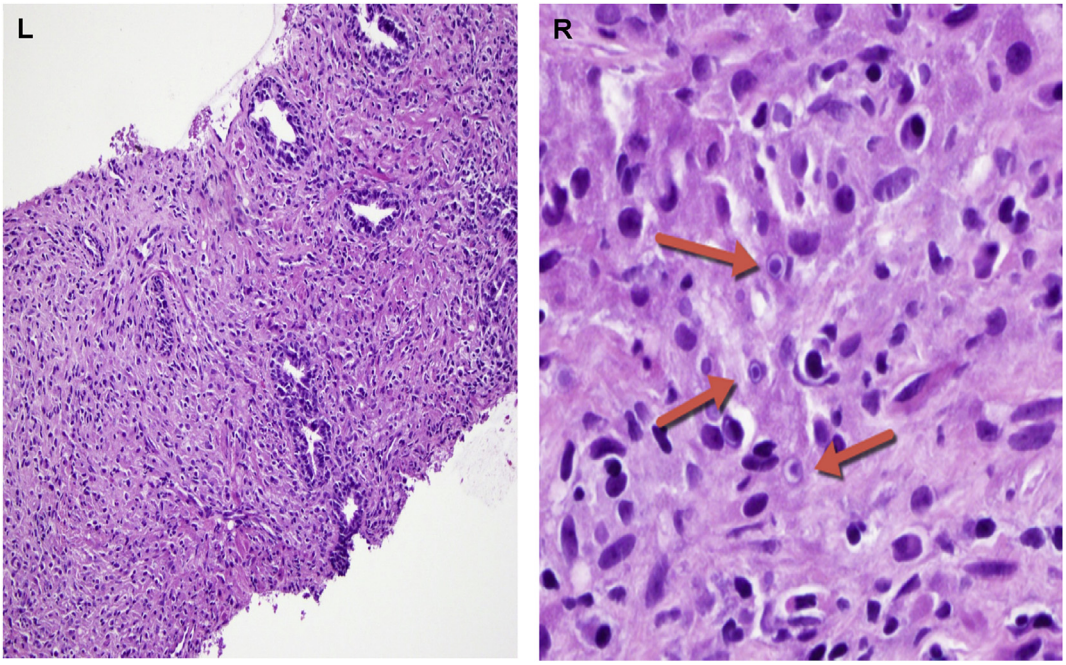

Fig. 2. Left: High power magnification showing atrophic prostatic glands surrounded by marked chronic inflammation with significant amount of histiocytes. Right: Pathognomonic Michaelis–Gutmann bodies (Right).

status and the bacterium isolated, with the improvement of the immunosuppression helping to reverse this condition.[2] Antibiotics with the ability to penetrate histiocytes, such as ciprofloxacin and trimethoprim-sulfamethoxazole are effective; killing the undigested bacteria and penetrating the histiocytes respectively. In addition to these agents, bethanecol improves phagocytic bactericidal activity by increasing cGMP level. Surgical excision has been proposed as an effective treatment in cases of skin involvement, however in prostate involvement, open surgical resection or TURP is performed, only if conservatory treatment proves to be insufficient.[3,4]

In the last decade mpMRI has demonstrated outstanding negative predictive value in the diagnosis of significant PCa (Gleason score $\geq$7) and its use has gained popularity as the first image modality before biopsy and is now been considered the most sensitive and specific imaging tool for detection, lesion characterization and staging of PCa.[5] However, several pitfalls, both interpretative and technical may be encounter, such as a prostate gland infection which can easily mimic and be indistinguishable from PCa.

4. Conclusion

This case highlights a rare differential diagnosis to be considered in the context of elevated PSA and abnormal findings on mpMRI. Malakoplakia is a rare granulomatous condition of the prostate gland, which can easily mimic prostate cancer and has been associated with urinary tract infections and immunosuppression. With only a few cases described in the literature, we hope that this case study illustrates the variability of the condition and contributes to the limited body of knowledge available up to date.

Conflicts of interest

None of the contributing authors have conflict of interests to declares.

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