Necrosis can be seen after the resolution of the abscess and florid inflammatory changes from an infectious prostatitis, or after focal therapy. Necrosis shows low T2 signal intensity and diffusion restriction, due to the coagulative state characterised by reduced water movement, as well as by the adjacent inflammatory infiltrate and atrophy. There is also no enhancement. Together, these features suggest the presence of necrosis and fibrosis on mpMRI.

Calcification is due to concreted prostatic secretions, calcified corpora amylacea and phleboliths in the periprostatic venous plexus. Calcifications show low signal intensity on T2-WI and ADC images, together with no enhancement and a persistent, marked low signal intensity on DWI at all *b* values.

All the aforementioned pitfalls (focal atrophy, necrosis and calcifications) have specific features that help to distinguish them from PCa when applying PI-RADS v. 2 (e.g., no enhancement or less restriction on DWI).

Pitfalls related to technical and physiological artefacts

The use of an endorectal coil in addition to the surface coil improves the signal-to-noise ratio and the spatial resolution both at 1.5 and 3 T. On the contrary, patient or bowel movements during image acquisition may cause repetitive circular artefacts along the boundaries of the endorectal coil. These artefacts can be minimised by rectal emptying and by the administration of a spasmolytic drug prior to the examination.

According to PI-RADS v. 2, an area of homogeneous low-signal intensity on T2-WI in the PZ, showing restricted diffusion on DWI and focal enhancement (+) can be scored as 4/5, suggesting the presence of clinically significant PCa. However, the use of a single surface coil could erroneously suggest extracapsular extension (T3 stage) because of the lower resolution. In this case, the application of PI-RADS v. 2 together with the use of the endorectal coil could help to rule out capsular involvement (T2 stage), thanks to the increased resolution.

The endorectal coil should be positioned correctly, in order to avoid the risk of incurring potential diagnostic pitfalls that could mimic the presence of PCa. The correct position of the coil is in a plane perpendicular to the left-right phase encoding direction. If the coil is not positioned properly, it is possible to see a focal area of enhancement (+) with restricted diffusion (scored 4/5 according to PI-RADS v. 2) adjacent to the coil surface. This finding could be erroneously interpreted as a lesion (Fig. 15), but the ADC maps and T2-WI do not show this artefact, and therefore PCa can be ruled out.

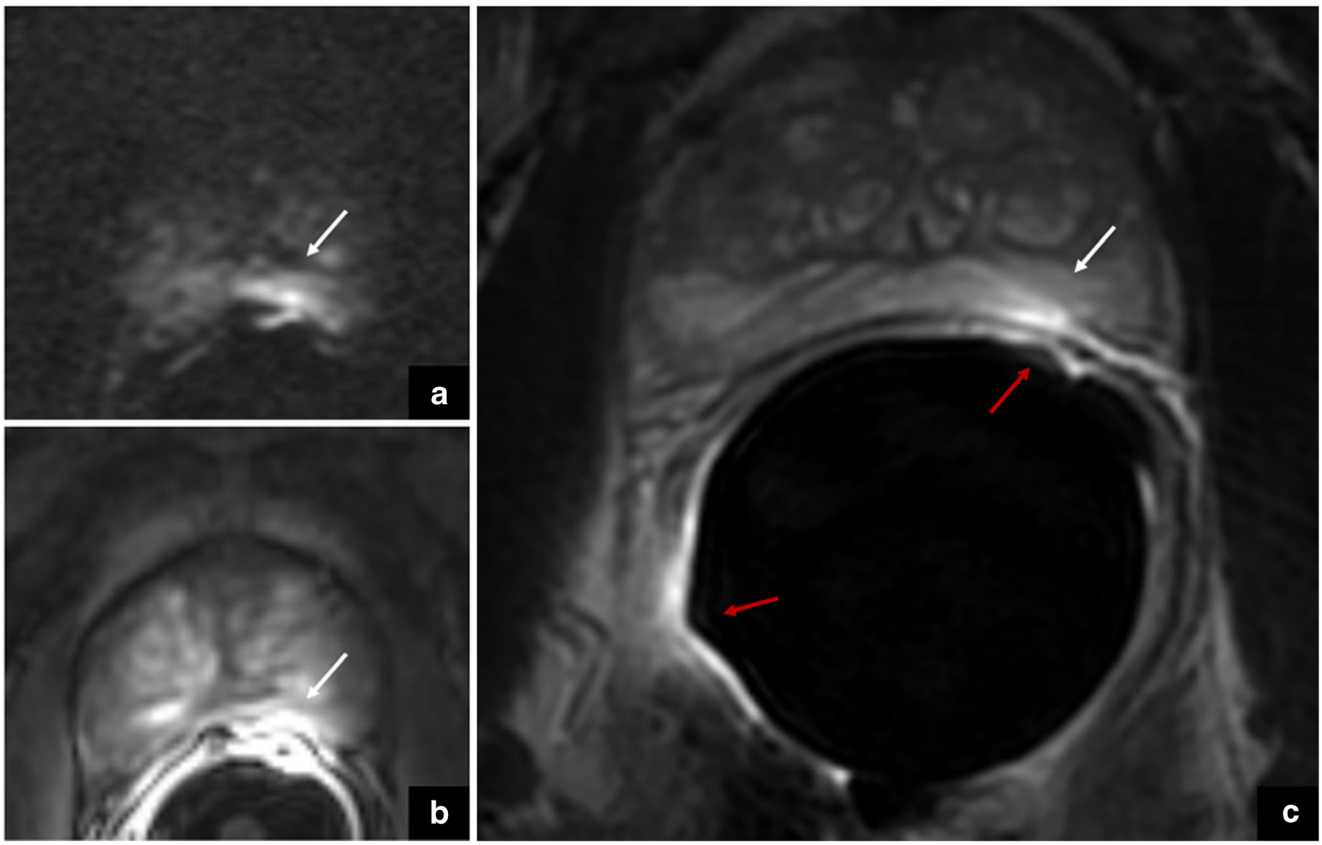

Fig. 15 The white arrows show an area mimicking restricted diffusion on DWI (**a**) and focal enhancement on DCE imaging (**b**) in the left peripheral zone, very close to the prostatic capsule and adjacent to the endorectal coil surface. This finding could be erroneously interpreted as a lesion, but the axial T2-weighted image (**c**) does not show this artefact, and therefore prostate cancer can be ruled out. Red arrows show the coil surface

To sum up, there are different artefacts that can mimic the presence of PCa and which the radiologist should be aware of. These include the presence of gas in the rectum, and the interpretation of ADC maps with low-value pixels, as these latter can show the same dark signal as fat, creating problems for lesions along the capsule. As far as the use of spasmolytic agents is concerned, the radiologist should bear in mind that many patients undergoing mpMRI will have a large prostate due to BPH (with related urinary problems). Therefore, these medications should be administered carefully and preferably before positioning the patient on the mpMRI table. Glucagon should be chosen in patients with urinary retention.

Conclusions

Since its introduction, mpMRI of the prostate has been changing the management of suspicious PCa, especially in men with non-specific high PSA, where the detection of clinically significant PCa has been shown to be more accurate than standard TRUS biopsy [14]. Despite the standardised attempts to report mpMRI (PI-RADS v 2) [7], some para-physiologic appearances of the prostate gland can mimic cancer. As there are no established guidelines that suggest scoring a TZ lesion that protrudes into the PZ using the dominant sequence from the TZ (rather than PZ), we deem that in this scenario the experience of the radiologist and the knowledge of prostate anatomy and specific morphological features of BPH (e.g., regular capsule and margins) are more important than ever. Moreover, we believe that the radiologist should be aware of clinical data such as the exposure to antiandrogen therapy for BPH, as this could affect the conspicuity of tumours in the TZ as well as on DWI. The radiologist should also keep in mind that other sequences (e.g., DWI) can be of great help while reporting prostate mpMRI, if there are some doubts on T2-WI, as suggested by the PI-RADS v. 2 guidelines [15–21]. Although these guidelines use DWI to upgrade some PI-RADS 3 lesions in the TZ to PI-RADS 4, DWI alone is nonetheless a sensitive sign for detection of tumours even in the TZ [22–23]. Rosenkrantz and colleagues [22] reported that the incorporation of DWI and ADC maps (b value:1000 s/mm^2) significantly improves the sensitivity for TZ tumours compared with T2-WI alone. The main reason is the diffuse background heterogeneity and the presence of multiple nodules in the TZ, which make tumours harder to identify on T2-WI. As known, DWI investigates the movement of water molecules within tissues and reflects changes in cellularity; thus, it provides complementary information that may help depict lesions not initially visible on T2-WI, leading to improved sensitivity.

In conclusion, we recommend that any radiologist involved in prostate mpMRI be fully aware of the pitfalls mentioned in this pictorial report, in order to avoid underestimation and overestimation of PCa detection. We also deem that this manuscript gives a repertoire of potential solutions for the improvement of the future PI-RADS guidelines.

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