Pre-biopsy anatomical T2-weighted and diffusion weighted MR imaging in patients with a clinical suspicion of prostate cancer: IMPROD clinical trial

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Purpose

To evaluate the diagnostic accuracy of biparametric MRI (anatomical T2-weighted and diffusion weighted MR imaging, T2wi+DWI) at 3 Tesla and T2wi+DWI targeted TRUS-guided biopsy using visual co-registration (TB) in patients with a clinical suspicion of prostate cancer before their first biopsy.

Materials and Methods

Sixty-five patients with elevated PSA (>2.5 ng/ml) and/or abnormal digital rectal examination underwent T2wi+DWI examination performed using surface array coils prior to a systematic 12 core biopsy (SB). If a suspicious lesion was present on T2wi+DWI, an additional 2 cores of TB were taken prior to the SB. In patients diagnosed with prostate cancer (PCa), clinically significant (SPCa) was defined if meeting at least one of the following criteria: PSA >10 ng/ml, PSA density ≥0.2 ng/ml per milliliter, three or more positive biopsy cores, and Gleason score >6.

Results

The median (range) serum PSA value was 7.0 (1.7-20.0) ng/ml. Prostate cancer and SPCa were diagnosed in 43 (66%, 43/65) and 37 (57%, 37/65) patients, respectively. The sensitivity, specificity, and positive and negative predictive values for the detection of PCa using T2wi+DWI on the patient level were 88%, 59%, 81% and 72%, respectively. The corresponding values for the detection of SPCa were 92%, 54%, 72% and 83%, respectively. In 6 patients (9%, 6/65) clinically significant prostate cancer was diagnosed by means of TB only while 3 patients (5%, 3/65) with SPCa did not have any T2wi+DWI target. The overall PCa detection rates per core were 21% (167/780) for SB and 55% (52/95) for TB ($p<0.01$). The mean core cancer lengths were 3.6 mm for SB and 5.4 mm for TB ($p<0.01$).

Conclusion

The use of T2wi+DWI is a sensitive tool for PCa detection and biopsy targeting in patients with a clinical suspicion of prostate cancer before their first biopsy.

Clinical Relevance statement:

Pre-biopsy biparametric MRI (T2wi+DWI) is a sensitive tool for biopsy targeting in patients with a clinical suspicion of prostate cancer based on PSA and/or abnormal digital rectal examination.