Introduction & Objectives

Despite its low sensitivity transrectal ultrasound (TRUS)-guided random biopsy (RB) represents still the gold standard for the diagnosis of prostate cancer (PCa). However, with the advent of modern fusion biopsy systems enabling fusion of preinterventional MR-imaging of the prostate to TRUS and thus targeting suspicious areas more accurately increased detection rates are reported. Recently, PET-imaging using a novel 68Gallium-labelled ligand of the prostate-specific membrane antigen (PSMA) has been introduced in the diagnostic work-up of PCa. Therefore, the aim of this initial study was to determine the accuracy of PCa detection by PSMA-PET/MRI imaging using a newly established open source framework for fusion biopsy guidance.

Material & Methods

16 patients (age 45-75 years; median PSA 7.82 ng/ml (range 4.0 – 13.2 ng/ml)) who had at least one prior negative prostate biopsy were included in this study. Every patient underwent multiparametric PSMA-PET/MR imaging of the prostate. All patients received a systematic 10-core random biopsy as well as fusion-guided transrectal biopsy of suspicious lesions on PSMA-PET/MR in an outpatient setting. Results of imaging and histological analysis of prostate biopsies were compared per patient and per prostate sextant (apical, medial, basal).

Results

On PSMA-PET/MRI 44% (7/16) of the prostates revealed at least one PCa-suspicious lesion, 31% (5/16) were described as equivocal and in 25% (4/16) no suspicious lesion was present. The pathological analysis revealed PCa in 50% (8/16) of all patients – six patients with suspicious findings and two with equivocal findings on PSMA-PET/MR. Of note, histological analysis did not show PCa in any of the patients with inconspicuous PSMA-PET/MRI. On a sextant basis, 23% (22/96) were suspicious on PSMA-PET/MRI. In 16% of all sextants (15/96) PCa was histologically proven. 80% (12/15) of these areas, where PCa was found, were also suspect on PSMA-PET/MRI.

Conclusions

In this initial analysis, PSMA-PET/MRI in the combination with a newly developed fusion biopsy system proved as valuable tool for the detection of PCa in patients after prior negative prostate biopsy. However, greater patient cohorts are necessary to establish the exact clinical role of PSMA-PET/MRI-guided fusion biopsy.