Comparison between the diagnostic accuracy of micro-ultrasound versus multiparametric MRI in the detection of prostate cancer: preliminary results from a single-institutional ongoing prospective trial
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Background: MRI/ultrasound (US) fusion biopsies have been adopted as an alternative to US-guided biopsies in patients with suspected PCa. However, the widespread use of this diagnostic strategy has been limited both by cost-effectiveness considerations and by studies suggesting that mpMRI may miss a significant proportion of cancers, especially in the initial biopsy setting. Micro-US is an imaging modality with resolution down to 70 microns. We compared the diagnostic accuracy of micro-US and mpMRI within a prospectively collected cohort of patients with suspected PCa.

Methods: Data on 24 consecutive patients who were scheduled for a MRI/US fusion biopsy for the presence of suspicious (PIRADS score ≥3) lesions at mpMRI were prospectively collected. Prior to fusion biopsy, all patients were imaged with the ExactVu micro-US system and eventually subjected to micro-US targeted biopsies by a urologist blinded to mpMRI results. The PRI-MUS protocol was used to locate targets (defined as a PRI-MUS score ≥3 lesion) on micro-US. Besides microUS and fusion biopsies all patients received also a standard 12-core biopsy. The overall PCa and clinically significant PCa (defined as a Gleason score ≥7 PCa; csPCa) detection rates were assessed. Concordance rate between mpMRI, micro-US findings and biopsy results was determined.

Results: Median patient age was 64 years and median total PSA was 7.0 ng/mL. The majority of patients (n=16, 66.6%) were in the repeat biopsy setting. Overall, 11 (45.8%) had a PIRADS 3 lesion at mpMRI, while 8 (33.3%) and 5 (20.8%) had PIRADS 4 and 5 lesions, respectively. Prostate cancer and csPCa detection rate were respectively 58.3% (n=14) and 25% (n=6). Micro-US did not identify any suspicious lesion in 7 (29.1%) out 24 patients. Of these, 5 patients were confirmed as having a negative histology at biopsy, while 2 individuals harboured clinically insignificant PCa. In those patients where a micro-US lesion was detected, the concordance rate between micro-US and mpMRI was fairly good (13 out of 17 lesions; 76.5%). Of the 4 discordant cases, 1 patient showed a GS 3+4 tumor located in the transitional zone at MRI/US fusion biopsy, 2 patients harbour a clinically insignificant PCa and 1 was negative both at fusion and random biopsies. The sensitivity and negative predictive value of micro-US were respectively 83.3% and 85.7%, while its specificity was 38.8%, result that may be attributed to the initial phase of the learning curve.

Conclusions: According to our preliminary experience, micro-US appears to be a valuable tool capable of providing additional information regarding the presence or absence of csPCa in patients with suspected PCa according to mpMRI. Future studies evaluating and comparing the diagnostic accuracy of micro-US and mpMRI may help to refine our ability to detect csPCa.