

Micro-ultrasound versus multiparametric MRI in the detection of prostate cancer: Results from a prospective single center trial

EUR Urol Suppl 2019;18(11):e3410

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Introduction & Objectives: Multiparametric MRI(mpMRI) of the prostate has consolidated its role in the diagnosis of prostate cancer for patient screening and targeting of suspicious lesions. High-resolution micro-ultrasound (microUS) is a new real-time US-based imaging modality enabling real-time targeted prostate biopsies. We examined the efficacy of microUS in detecting and targeting suspicious lesions during transrectal ultrasonography and subsequently compared the diagnostic accuracy of micro-US and mpMRI within a prospectively collected cohort of patients with suspected prostate cancer(PCa).

Materials & Methods: The study population consisted of 268 consecutive patients with at least one suspicious lesion (PIRADSv2≥3) according to mpMRI who were enrolled within a prospective trial aimed at comparing the diagnostic accuracy of microUS and mpMRI. The PRI-MUS risk identification protocol was used to identify targets on microUS. The urologist, newly trained in performing microUS targeted-biopsies, was blinded to the mpMRI results until after the microUS targeting was complete. All subjects received targeted biopsy (based on micro-US and mpMRI imaging) as well as systematic random biopsies. The overall presence of PCa and clinically significant (Gleason score≥7) PCa was assessed. Concordance between mpMRI and micro-US findings and biopsy results were determined.

Results: Mean patient age was 65.2(±SD 7.5) years with a mean total PSA of 8.3(±SD 6.1) ng/mL; 128(47.8%) patients were in the repeat biopsy setting. PCa detection rate was 55.2%(148/268), while csPCa detection rate was 39.6%(106/268). The proportion of patients with csPCa increased significantly according to PRIMUS (from 22.6% to 39.4% and 65.5% for patients with a PRIMUS score 3, 4 and 5 lesion, respectively; p<0.01), and to PIRADS score (from 21.2% to 38.2% and 59.2% in patients with a PIRADS score 3, 4 and 5 lesion, respectively; p<0.01). MicroUS csPCa sensitivity was 89.6%(95/106 csPCa patients having at least one lesion at microUS). Negative predictive value was 78.0%, while positive predictive value was 43.6% and specificity was 24.1%. Out of 354 target lesions detected at mpMRI and 275 detected at microUS, 170 were considered to be concordant (63 positive for csPCa). Although presenting with suspicious lesions at both mpMRI and microUS, 11.3%(12/106) patients were diagnosed with csPCa by random cores only.

Conclusions: Micro-US is a promising new imaging modality with high sensitivity for csPCa, allowing for csPCa screening and targeting of suspicious lesions during prostate biopsies. This work suggests that micro-US may provide additional information regarding the presence or absence of csPCa in patients with suspected PCa according to mpMRI. Further studies are warranted to investigate how the new micro-US modality can best be leveraged within the prostate cancer diagnostic pathway.