MR-Fusion prostate biopsy: The added value of the systematic cores to the targeted cores for prostate cancer grading

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Introduction and Objective: Multiparametric MRI (mpMRI) is the leading noninvasive technique for the detection and staging of prostate cancer (PCa). MR-Fusion prostate biopsy has provided an opportunity for better detection of clinically significant PCa. However, there is not a clear understanding if the random systematic cores at the time of targeted biopsy provides additional information. Hence, in this study, we investigated the value of the systematic cores in addition to the targeted cores during MR-Fusion prostate biopsy for PCa grading using wholemount histopathology (WMHP) as reference standard.

Specific Aims: To investigate the added value of the systematic cores to the targeted cores in MR-fusion prostate biopsy for PCa grading

Rationale and Background: The standard systematic biopsy is usually done during MR-fusion prostate biopsy. However, it's time consuming and might result in higher rate of complications including hemorrhage and infection. Thus, it's important to evaluate the possible added value of this method to the more specific targeted biopsy.

Methods and Materials: This is a retrospective, IRB approved HIPAA compliant observational study. It includes 295 patients with 716 pathology PCa lesions, who underwent radical prostatectomy between 7/2010-2/2019. All patients had MR-Fusion prostate biopsy including both systematic & targeted cores. The pathology reports of all of the cores were evaluated & the characteristics of the patients with higher reported Gleason score (GS) for systematic cores as compared to targeted cores are presented

Results: Patients' mean age was 62.9±6.3 years, mean PSA 8.9±10.5 ng/ml & mean PSA density 0.19±0.7 ng/ml/cc. Mean number of PCa lesions in WMHP was 2.4 (1-6). Mean of 11.4 (6-16) cores were taken as systematic & 5.3 (1-10) cores as targeted. The mean number of positive cores for systematic & targeted biopsy were 3 (0-12) and 3.3 (0-10), respectively. The per-patient performance of MR-fusion for PCa detection was 82.4% (243/295) for systematic & 95.6% (282/295) for targeted cores. A total of 37.6% (111/295) cases had similar reported GS in both systematic & targeted cores, 48.8% (144/295) cases had higher GS in targeted cores & 13.6% (40/295) cases had higher GS in the systematic cores. Among cases with higher GS in systematic biopsy, 32.5% (13/40) cases had benign reports in all targeted cores & for the reported cancer cases in targeted biopsy, in 14.8% (4/27) of the cases, higher GS in systematic biopsy corresponded to a missed lesion outside the target. Among 23 cases from the same lesion, 10, 9 & 4 were PIRADSv2 score 3, 4 & 5, respectively. 34.8% (8/23) were located in apex, 34.8% (8/23) in midgland & 30.4% (7/23) in base. 47.8% (11/23) were in a different sextant for the same lesion in contralateral side (2/11) or a different level (9/11). In 4.1% (12/295) of all cases, systematic cores upgraded the lesion from clinically nonsignificant (GS=6) to clinically significant (csPCa)(GS>6). However, in 22.5% (9/40) of overall cases & in 8.3% (1/12) of csPCa cases, the systematic core showed a false upgrading of the GS.

Discussion and Conclusion: Although systematic cores at the time of MR-Fusion biopsy can slightly improve the performance of the targeted cores for PCa grading, however, in almost one quarter of the cases, there is a false upgrading report & the improvement for upgrading clinically nonsignificant to csPCa is minimal.