INTRODUCTION AND OBJECTIVES: Precise localization of tumor locus is critically important for successful focal therapy in prostate cancer. The accuracy of multiparametric MRI (mpMRI) for prostate cancer localization is still unknown.

METHODS: We retrospectively analyzed 176 prostate cancer patients who underwent preoperative 3.0T multiparametric MRI (mpMRI) followed by radical prostatectomy (RP) without neoadjuvant androgen deprivation. Images of mpMRI were evaluated by a single radiologist based on PI-RADS version 2. PI-RADS score 4 or greater was considered positive. Tumor distribution was evaluated on radical prostatectomy specimen sliced at 5-mm thick and tumor volume was estimated based on planimetry.

RESULTS: Of the 176 study patients, 79 (45%) had negative mpMRI. Patients with negative mpMRI had smaller index tumor compared with those with positive mpMRI with a marginal significance (1.79 ± 0.25 vs 20.5 ± 0.22 cc, p = 0.05, Figure and Table). They were also more likely to have clinically insignificant cancer (Gleason score ≤6 and tumor volume <0.5 cc.) compared with those with positive mpMRI (Tables). However, the sensitivity and specificity for clinically significant prostate cancer was only 60% and 57%, respectively, indicating that mpMRI missed 40% of clinically significant cancer.

CONCLUSIONS: Although negative mpMRI is associated with favorable pathological findings in prostate cancer patients who underwent radical prostatectomy, mpMRI could not safely exclude clinically significant index tumor. Further improvement in the accuracy for tumor localization is warranted for the possible application of mpMRI to plan focal therapy.

INTRODUCTION AND OBJECTIVES: There is much enthusiasm for multi-parametric MRI (mpMRI)-ultrasound fusion biopsy in those with an elevated PSA, a prior negative biopsy or those on active surveillance. However, the predictive value of MRI — targeted biopsy in predicting final cancer grade has not been well addressed. The uncertainties of both over staging and under staging using MRI fusion targeted biopsy have not been well addressed. We aimed to evaluate the accuracy of cancer risk estimation with MRI fusion biopsy; traditional sextant and anterior (14 cores) ultrasound guided biopsy or the combination, using whole-mount histopathology at time of prostatectomy.

METHODS: We retrospectively analyzed 114 patients who had radical prostatectomy in 2014-2016. All patients had undergone systematic ultrasound guided biopsy and mpMRI fusion biopsy. We compared Gleason Score (GS ≥7) upgrading or downgrading between MRI fusion and systematic ultrasound guided biopsy to that of the final Gleason score evaluated by whole-mount histopathological analysis. Logistic regression was used to evaluate association to adverse pathological outcome for each biopsy approach.

RESULTS: Of 114 patients, GS ≥7 cancer grade found on MRI fusion biopsy matched final pathology in 46% of the cases while it was overestimated in 15% of patients and underestimated in 39%. Cancer found on traditional systematic biopsy matched final pathology in 56% of patients while it underestimated grade in 26% and underestimated grade in 17% of patients with GS ≥7. The highest Gleason score from combined MRI fusion and systematic biopsy only underestimated 11% of patients but overestimated grade in 33% of patients who had GS ≥7 on their final pathology. In the logistic regression model, having a GS ≥ 3-4 detected on MRI fusion biopsy was associated with higher odds (OR: 3.5 95% CI 1.3-9.3, p <0.01) of higher stage cancer (>3T3a) at RP. The association persisted when the model was adjusted for clinical CAPRA score. This study was limited by its retrospective nature.

CONCLUSIONS: Risk of over- staging using MRI fusion biopsy is low compared to systematic biopsy. However, MRI fusion biopsy alone could significantly underestimate those with clinically significant disease. Using MRI fusion biopsy alone to detect high grade cancer may not be adequate in this contemporary cohort. This data may have important implications for guiding treatment decisions.

Source of Funding: none

MP20-10
THE ACCURACY OF MAGNETIC RESONANCE IMAGING (MPMRI) GUIDED TRANSPERINEAL FUSION PROSTATE BIOPSY (TPFB) TO EVALUATE LESIONS ON PROSTATE MPMRI USING PROSTATECTOMY SPECIMENS AS A VALIDATION TOOL.
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INTRODUCTION AND OBJECTIVES: Prostate mpMRI guided biopsies improve detection of Gleason score ≥7 cancer (PCa). The objective of the current study is to assess diagnostic reliability in comparison to definitive histological diagnosis. We present a retrospective analysis of our detection accuracy of PCa by mpMRI and TPFB in comparison to histological specimens from Robotic-Assisted Radical Prostatectomy (RARP).

METHODS: 1002 men have had TPFB at Cambridge University Hospitals Trust between March 2012 and April 2016. 93 have subsequently undergone RARP for PCa. mpMRI was performed on all 93 patients and reported according to PI-RADSv2. 79/93 (84.9%) patients had ≥1 mpMRI lesions with Likert score >2 (Likert 3–11; Likert 4–27; Likert 5–41). TPFB was performed on each patient. 2-4 samples were taken from the target zone identified on mpMRI (TB) and 18-24 samples systematically taken according to Ginsburg protocol (SB). 14/93 had a negative mpMRI but were diagnosed with PCa following SB. Samples were retrospectively compared to RARP histology. Data was examined to determine the accuracy of TPFB compared to RARP histology. RESULTS: 79 patients were compared to 93 RARP histology and 14/93 (15%) were found to have positive PCa on RARP histology. We compared Gleason score (GS ≥7) by MPMRI fusion biopsy (MP), systematic biopsy (SB) and TPFB. We also compared the accuracy of TPFB with the accuracy of prostatectomy. TPFB underestimated Gleason score in 26% of patients, overestimated Gleason score in 9% of patients and underestimated clinical stage in 5% of patients. TPFB matched prostatectomy findings in 61% of patients. TPFB underestimated Gleason score (GS ≥7) in 34% of patients in comparison to prostatectomy.

CONCLUSIONS: TPFB has good diagnostic accuracy in comparison to definitive histological diagnosis. Prospective validation of TPFB is warranted.

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MP20-09
EVALUATING MRI FUSION BIOPSY VS SYSTEMATIC ULTRASOUND GUIDED BIOPSY IN PREDICTING HIGH GRADE CANCER AT TIME OF RADICAL PROSTATECTOMY
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INTRODUCTION AND OBJECTIVES: Although mpMRI can help to predict malignancy, it is unknown how the best biopsy strategy is determined. TPFB has greater localizing capacity for abnormal lesions on mpMRI. We aimed to evaluate whether the addition of TPFB improves diagnostic accuracy of high grade cancer (HG) on mpMRI.

METHODS: We performed a retrospective analysis of a database between 2002 and 2015 consisting of patients who underwent radical prostatectomy (RARP). The primary endpoint was the accuracy of diagnostic prostatectomy (TPFB vs MP). We divided patients into four groups: MP only biopsy, MP+SB, SB only biopsy and TPFB only biopsy. HGs were defined as Gleason score ≥7. Patients were categorized as positive biopsy if they had HG identified on pathology. We compared diagnostic performance for each strategy using sensitivity, specificity and positive predictive value for HG.

RESULTS: A total of 714 patients were included with mpMRI only biopsy (41%), MP+SB biopsy (43%) and SB only biopsy (16%). The TPFB only biopsy group included 9 patients. Overall, biopsy only had sensitivity of 57% (95% CI 50-64), specificity of 99% (95% CI 98-100), PPV for HG of 49% (95% CI 45-53) and NPV of 96% (95% CI 95-97). When comparing biopsy only with the TPFB only group, sensitivity improved from 57% to 77% (OR 2.6 95% CI 1.0-6.3, p<0.05), specificity decreased from 99% to 98% (OR 0.2 95% CI 0.01-0.6, p<0.05) and PPV for HG increased from 49% to 67% (OR 2.9 95% CI 1.1-7.5, p<0.05).

CONCLUSIONS: TPFB improves diagnostic accuracy of high grade cancer on mpMRI compared to biopsy only. Using TPFB with mpMRI should improve cancer detection compared to biopsy only.
MP20-11
ACCURACY OF MULTI-PARAMETRIC MAGNETIC RESONANCE IMAGING FOR DETECTION OF PROSTATE CANCER EXTRACAPSULAR EXTENSION AND RELATION TO ITS HISTOLOGIC EXTENT
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INTRODUCTION AND OBJECTIVES: Clinical assessment of extracapsular extension (ECE) in prostate cancer may have a significant impact on treatment decision and/or surgical planning. Multiparametric magnetic resonance imaging (MP-MRI) has emerged as a potential tool to predict the presence of ECE with variable results. Our objective was to define the accuracy of MP-MRI for detection of ECE in relation to its radial and circumferential extent.

METHODS: We prospectively enrolled 70 patients to undergo prostate MP-MRI prior to radical prostatectomy. All MRIs were performed with a 3T scanner using an endorectal coil and T2, diffusion weighted imaging (DWI), and dynamic contrast enhanced (DCE) sequences were used. An expert genitourinary radiologist reviewed each MP-MRI and assigned a score of diagnostic certainty between 1-3 (1-absent, 2-suspicious, 3-definite) regarding the presence of ECE on each sequence (T2, DWI, and DCE, in that order). Prostatectomy whole-mount specimens were reviewed by a genitourinary pathologist and the radial and circumferential extent of ECE was measured. The accuracy of each MRI sequence was determined, as well as its association between circumferential and radial extent of ECE.

RESULTS: 70 enrolled patients underwent MP-MRI of the prostate followed by radical prostatectomy. Mean preoperative PSA was 8.4 ng/dL and 50 patients (71%) had Gleason 7 or higher on final pathology. Sensitivity and specificity of MP-MRI for suspicious or definite ECE was 92.9% and 63.4%, respectively. Sensitivity and specificity of definite ECE was 78.6% and 68.3%. Area under the curve for T2, DWI, and ECE sequences was 0.79, 0.76, 0.76, respectively. Radial extent of ECE was not associated with its detection on any sequences. Circumferential extent of ECE was positively associated with suspicious or definite detection on DCE imaging (p=0.04).

CONCLUSIONS: Preoperative 3T MP-MRI of the prostate with endorectal coil interpreted by a 3-point scale is highly sensitive for predicting ECE. The radial extent of ECE is not associated with its detection on MP-MRI, however the circumferential extent is associated with its detection on DCE sequences.

Source of Funding: none

MP20-12
PREDICTIVE VALUE OF TUMOR CONTACT LENGTH ON MAGNETIC RESONANCE IMAGING FOR EXTRACAPSULAR EXTENSION OF PROSTATE CANCER
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INTRODUCTION AND OBJECTIVES: Tumor contact length (TCL) is defined as the amount of prostate cancer in contact with the prostatic capsule. We evaluated the ability of magnetic resonance imaging (MRI) determined tumor contact length to predict pathological extracapsular extension (pECE) compared to existing predictors of pECE.

METHODS: We retrospectively analyzed the records of 128 consecutive patients with MRI/ultrasound fusion targeted, biopsy proven prostate cancer who underwent robotic-assisted radical prostatectomy from April 2013 to July 2016. Median patient age was 67 years and median prostate specific antigen was 7.11 ng/ml. Clinical stage was cT1 in 71 cases (55%) and cT2 in 53 (41%). Postoperative pathological analysis confirmed pT2 in 90 patients (70%) and pT3 in 38 (30%). We evaluated 1) the relationship between pECE and pathological TCL and Gleason score, 2) the correlation between pECE and MRI determined TCL and Likert score, 3) the correlation between pECE and MRI determined TCL, and 4) the correlation between pECE and MRI determined TCL.

RESULTS: Logistic regression analysis revealed that pathological TCL correlated better with pECE than the predictive power of pathological cancer volume (0.822 vs 0.659). The Spearman correlation between pathological and MRI determined TCL was r = 0.873 (p < 0.0001). ROC AUC analysis revealed that m MRI determined TCL outperformed cancer core involvement on targeted biopsy and the Partin tables to predict pECE (0.84 vs 0.70 and 0.57, respectively). The best TCL thresholds for predicting pECE was 13.5 mm (sensitivity 71%, specificity 80%) and the predictability of pECE outperformed comparing conventional MRI criteria (MRI-TCL: odds ratio of 10.0, p=0.0001, and MRI criteria: odds ratio of 1.15, p=0.0867).

CONCLUSIONS: MRI determined TCL could be a promising quantitative predictor of pECE. The best TCL threshold of 13.5mm might predict pECE with higher accuracy, although PI-RADSv2 reported tumor-capsule interface of greater than 1.0 cm as cut-off value for staging of pECE.