MRI-TRUS fusion prostate biopsies: learning curve experience with a multidisciplinary team approach

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Introduction: Image guided targeted prostate biopsy (IGTpbx) using MRI/US fusion software is becoming standard of practice within many practices. This biopsy approach requires a multidisciplinary cooperative effort beginning with the MRI technicians, interpreting radiologists, image segmentation, and the urologist. At any point in this process variability can have a compounding effect on the targeting accuracy. Here, we evaluated the temporal learning curve of a single IGTpbx team.

Methods: The single center, tertiary care, IGTpbx team consisted of MRI dedicated radiology technicians on a 1.5T MRI with endocavity detection coil and two dedicated GU diagnostic radiologists providing image interpretation (PI-RADS scoring) and segmentation (Profuse Software, Eigen, Grass Valley, CA). A single urologic oncologist performed all IGTpbx’s transrectally using the Artemis robotic guidance system (Eigen, Grass Valley, CA) while patients received Total intravenous anesthesia (TIVA). For this study we assessed over time the positive biopsy rates per MRI region of interest. Referrals came from >10 multidisciplinary faculty at the center.

Results: From 2012-2017, 728 patients underwent IGTpbx by this team. There was an average of 2.5 ROI per patient (range 1-6) and total of 1650 ROIs. The median patient age and PSA was 65 years and 6.7ng/mL, respectively. The overall cancer detection rate within the ROI’s is 42% (697/1650 ROIs). We assessed the positive ROI rate temporally every 50th patients as an approximation of experiential learning improvement (Figure 1). The teams’ ROI positivity rate improved from 41% at the beginning of the program to 66% later in the team’s experience (Trend test p<0.001). Significant variation is seen throughout the time period.

Conclusion: Image guided targeted prostate biopsy requires a multidisciplinary team approach that incorporates a continuous feed-back loop amongst members to improve targeted biopsy rates. This study demonstrates a statistically significant learning process over time. Variability within the learning process is likely related to variations in patient selection and prostate biopsy indications not associated with a team learning process. Additional studies controlling for biopsy indication and ROI malignancy risk are underway.

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Figure 1: MRI-TRUS Fusion Biopsy Learning Curve