Addition of Preoperative MRI to Clinical Variables Does Not Improve Prediction of Sexual Function Recovery in Patients with Prostate Cancer Undergoing Radical Prostatectomy: A Multi-Institutional Analysis

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INTRODUCTION AND OBJECTIVE: Limited tools are available to help predict sexual function recovery for patients undergoing radical prostatectomy (RP). We sought to determine whether inclusion of preoperative prostate MRI (mpMRI) improves the prediction of quality of erection at 12 months following RP over clinical factors alone.

METHODS: The Michigan Urological Surgery Improvement Collaborative (MUSIC) is a consortium of 46 diverse urology practices that maintains a prospective registry of men with CaP. Using multiparametric MRI data from 3 MUSIC practices linked to MUSIC registry data, we developed random forest models to predict patient reported quality of erections at 12 months following radical prostatectomy. We compared models using clinical predictors (e.g., baseline EPIC-26 sexual domain score, baseline quality and frequency of erection, baseline sexual satisfaction, age, clinical T-stage, PSA, biopsy Gleason group group), MRI predictors (e.g., membranous urethral length, PI-RADS score, lesion location, number of lesions, presence of EPE, SVI, or abnormal lymph nodes), and both. We assessed model discrimination using 5-fold cross-validated area-under-the-curve (AUC) and model calibration by comparing quintiles of predicted to observed risk. We assessed the global contribution of variables to the model using random forest variable importance measures.

RESULTS: We identified 359 patients with MRI and RP of whom 179 had poor quality of erection at 12 months. A random forest model including both clinical and MRI predictors had an AUC of 0.785, as compared to an AUC of 0.770 using clinical variables only (Figure 1A). The predictions for erectile dysfunction were generally well-calibrated but underestimated risk in the highest decile of predicted risk (Figure 1B). The 5 most important predictors in the combined model were baseline sexual domain score, body mass index, baseline erectile frequency, baseline sexual satisfaction, and prostate volume.

CONCLUSIONS: Addition of Preoperative MRI does not meaningfully improve the prediction of sexual function recovery at 12 months over clinical variables alone.

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