ASSESSING THE PSMA-PET CT PREDICTIVE ABILITY OF EXTRAPROSTATIC EXTENSION OF PROSTATE CANCER

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ABSTRACT

Introduction and Objective: Accurate prediction of extraprostatic extension (EPE) can guide surgical treatment planning and maximize quality of life outcomes. We sought to analyze clinical and PSMA-PET CT EPE predictability.
Methods: Retrospective review of pre-op PSMA-PET CT and clinical parameters compared with histopathologic EPE data.
Results: EPE prediction with PSMA-PET CT: sensitivity (0.78), specificity (0.79), PPV (0.61), and NPV (0.90). After including Gleason grade, the ROC curve demonstrated an AUC of 0.82.
Conclusion: PSMA-PET CT has strong EPE rule-out accuracy. Gleason grade did not substantially improve predictive capacity.

INTRODUCTION

- New advancements in PSMA-PET CT has shown diagnostic utility in the management of prostate cancer.
- **Aim is to investigate clinical and PSMA-PET CT features that predict pathologic EPE.**

MATERIALS & METHODS

- 109 patients that underwent ^{68}Ga-PSMA-PET CT prior to robotic radical prostatectomy from 2017 to 2022 at Indiana University were reviewed based on right and left prostate.
- PSMA-PET variables with cutoffs (contact length>0.5cm, diameter>1.5cm) were compared with whole-mount pathological specimens to identify EPE predictability.
- Logistic regression models investigated a Gleason grade group threshold of >2 to further increase EPE predictability.

RESULTS

Table 1. Patient Demographics

Number of patients	109
Median Age at Surgery (IQR)	62 (57-66)
PSA at Surgery	7.4 ±2.1
Number of Regions (Right and Left Prostate)	218
Gleason Grade Group	
0	96 (44%)
1	3 (1%)
2	35 (16%)
3	21 (18%)
≥4	25 (21%)
^{68}Ga-PSMA-PET CT features	
Largest Lesion Diameter >1.5 cm	52 (24%)
Curvilinear Contact Length >0.5 cm	81 (37%)
Whole Mount Pathologic EPE	63 (29%)

Table 2. PSMA-PET ability to predict pathologic EPE

	Sensitivity	Specificity	PPV	NPV
PSMA-PET Extraprostatic Extension	0.78	0.79	0.61	0.90

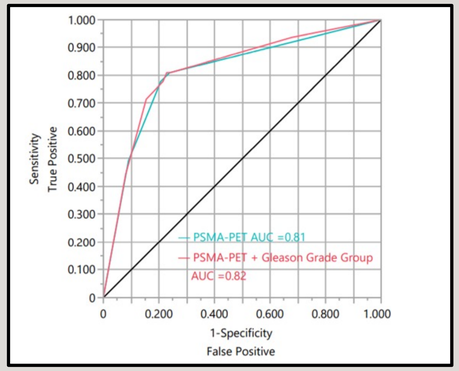

Figure 1. EPE prediction multivariate logistic models comparing 2 ROC curves

- PSMA-PET CT was shown to have reasonable sensitivity and specificity (0.78; 0.79) and a strong negative predictive value (0.90).
- A Gleason grade group cutoff of >2 raised the AUC from 0.81 to 0.82.
- Curvilinear contact length threshold of 0.5 cm was the primary predictive variable (Sn=0.78, Sp=0.79; AUC=0.79; *not shown*).
- 49/81 (61%) of contact lesions had pathologic EPE; of those 81, excluding diameter ≤1.5cm and Gleason grade ≤2 lesions resulted in 29/40 (73%) with pathologic EPE.

CONCLUSION

- PSMA-PET CT's low false negative findings are suggestive of a strong test to rule out EPE (NPV=0.90), thereby increasing surgeon diagnostic confidence when deciding to utilize a nerve-sparing approach.
- Evidence of tumor capsular contact on PSMA-PET was shown to be the strongest predictor of EPE. Largest diameter and Gleason grade group made miniscule improvements on the model.
- These identified predictive variables on PSMA-PET CT may further refine treatment planning.
- 39% of lesions labeled positive by the predictive model did not have pathologic EPE.
- To further enhance EPE predictive modelling using PSMA-PET CT, a more precise lesion-based method may be needed. Additional clinical variables should also be explored.

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