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Diagnostic value of sentinel lymph node biopsy for nodal staging before radiotherapy in prostate cancer patients with clinically localized disease on PSMA PET/CT versus conventional imaging

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De Barros H.A.[1], Duin J.J.[1], Schaake E.E.[2], Grivas N.[1], Van Leeuwen F.W.B.[3], Van Leeuwen P.J.[1], Van Der Poel H.G.[1]

[1]The Netherlands Cancer Institute-Antoni van Leeuwenhoek Hospital, Dept. of Urology, Amsterdam, The Netherlands, [2]The Netherlands Cancer Institute-Antoni van Leeuwenhoek Hospital, Dept. of Radiation Oncology, Amsterdam, The Netherlands, [3]Leiden University Medical Center, Interventional Molecular Imaging Laboratory, Leiden, The Netherlands

Introduction & Objectives: Sentinel lymph node biopsy (SLNB)-based selection of pN1 primary prostate cancer (PCa) patients for whole pelvis radiotherapy has been associated with favorable oncologic outcomes in patients with clinically localized disease on conventional imaging. Nowadays, more accurate imaging techniques, such as prostate-specific membrane antigen positron emission tomography/computed tomography (PSMA PET/CT), are increasingly used for high-risk PCa staging. Therefore, we determined the diagnostic value of SLNB for nodal staging prior to radiotherapy in PCa patients with clinically localized disease on PSMA PET/CT (miN0) versus conventional imaging.

Materials & Methods: We retrospectively included 355 clinically node-negative PCa patients with a Briganti-nomogram estimated nodal risk >5% who underwent SLNB for nodal staging prior to radiotherapy between 2007-2021. Staging was performed with PSMA PET/CT in 125 (39%) patients and with conventional imaging in 230 (61%) patients. Patients without PSMA expression in the primary tumor on PSMA PET/CT were excluded from analysis. The primary outcome was the prevalence of lymph node metastasis at final histopathology.

Results: Compared to conventional imaging-staged patients, PSMA PET/CT-staged patients had a lower rate of ≥cT3 tumors (33% vs 67%, $p < 0.001$) and a lower nomogram-estimated risk of nodal metastases (29% vs 44%, $p = 0.022$). The rate of patients with nodal involvement on histopathological examination was 35% in the PSMA PET/CT group and 37% in the conventional imaging group ($p = 0.817$). The median metastasis size did not differ significantly between PSMA PET- versus conventional imaging-staged patients (3 mm [IQR 1-4 mm] versus 2 mm [IQR 1-4 mm], $p = 0.142$).

Table 1. Patient characteristics

Characteristic	Conventional imaging (n=230)	PSMA PET/CT (n = 125)	P-value
Age, median (IQR), y	65 (61-68)	68 (63-73)	<0.001
Initial PSA, median (IQR), ng/ml	13 (9-27)	12 (7-22)	0.095
Clinical tumor stage, n (%)			
cT1c	23 (10%)	15 (12%)	<0.001
cT2	53 (23%)	67 (54%)	
cT3	143 (62%)	39 (31%)	
cT4	11 (5%)	3 (2%)	
Missing	0 (0%)	1 (1%)	
EAU risk group, n (%)			
Low	1 (1%)	0 (0%)	<0.001
Intermediate	26 (11%)	25 (20%)	
High	49 (21%)	58 (46%)	
Locally advanced	154 (67%)	42 (34%)	
Briganti-assessed risk of nodal metastases, median (IQR), %	44 (17-68)	29 (14-52)	0.022
pN-stage, n (%)			
pN0	145 (63%)	81 (65%)	0.817
pN1	85 (37%)	44 (35%)	
SNs removed, median (IQR)	2 (2-3)	2 (2-4)	0.026
SNs positive, median (IQR)	0 (0-1)	1 (1-2)	0.662
Median metastasis size (mm)	2 (1-4)	3 (1-4)	0.142

Conclusions: Although the estimated risk of nodal metastases was significantly lower in PSMA PET/CT- versus conventional imaging-staged patients, the percentage of pN1 patients remained nearly constant. These results suggest a valuable role for SLNB to detect histologically node-positive PCa patients, even in the case of miN0 disease on PSMA PET/CT.