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Diagnostic performance and impact on management intent of 18F-PSMA-1007 PET/CT in newly diagnosed high-risk prostate cancer

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Introduction & Objectives: Prostate cancer (PC) is the most common cancer in men in Europe. High risk PC patients have increased risk of developing metastasis, especially in bones. ^{99m}Tc-bone scan has been the most widely used method for detection of bone metastases in PC. Recently, novel molecular diagnostic methods have been introduced. For instance, PSMA PET/CT has proven itself to be more sensitive than a conventional bone scan in detecting metastases, which could lead to a change in treatment in up to a fifth of patients with primary disease. The aim of this retrospective study was to compare the diagnostic performance of ^{99m}Tc-bone scan and ^{18}F-PSMA PET/CT regarding bone metastases and to estimate the impact of ^{18}F-PSMA PET/CT findings on the management intent of patients undergoing primary staging of high risk PC.

Materials & Methods: The data of high risk (D'Amico Risk Classification) PC patients who underwent both ^{99m}Tc-bone and ^{18}F-PSMA PET/CT scans between January 2018 and February 2019 were retrospectively evaluated. The impact of ^{18}F-PSMA PET/CT on the management intent was assessed by relying on the decisions of the multidisciplinary team documented before and after available ^{18}F-PSMA PET/CT results. The results of data analysis are presented using descriptive statistics and McNemar test. Sensitivity and specificity of ^{99m}Tc-bone scan in detecting bone metastases was calculated using ^{18}F-PSMA PET/CT as standard.

Results: The sample consisted of 27 men with newly diagnosed high risk PC. The median age of the patients was 67, ranging from 55 to 77. Their PSA values at the time of diagnosis ranged from 2.5 to 128.0 (median 23.1 ng/ml). Median time between performance of ^{99m}Tc-bone and ^{18}F-PSMA PET/CT scans was 30.5 days (range from 4 to 77 days). Bone metastases were detected in 4 (18.5%) patients by both scanning methods and in 6 (22.2%) patients only by ^{18}F-PSMA PET/CT. The difference in the scans diagnostic performance was statistically significant (p=0.0275). In comparison with ^{18}F-PSMA PET/CT, ^{99m}Tc-bone scan was 60% less sensitive and 6% less specific in detecting bone metastases. On the basis of ^{18}F-PSMA PET/CT scan results, the previously intended management was changed in 6 high risk PC patients (22.2%) including 1 case of treatment radicalization.

Conclusions: ^{18}F-PSMA-1007 PET/CT scan detects previously unsuspected spread of disease and could influence planned clinical management in a remarkable proportion of patients with PC. These results demonstrate the potential clinical value of ^{18}F-PSMA-1007 PET/CT in the management of high risk PC and highlights the likelihood of molecular diagnostic methods becoming the standard imaging modality in the staging of high risk primary prostate cancer.