Mapping of site-specific relapse in patients with biochemical recurrence following radical prostatectomy assessed by 68Ga-PSMA-11 or 11C-Choline PET/CT: Impact of postoperative androgen deprivation therapy and radiotherapy.

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Introduction

Despite the curative intent of radical prostatectomy (RP) for clinically localized prostate cancer, many patients experience biochemical recurrence (BCR). In the case of early BCR, conventional imaging such as computerized tomography and bone scintigraphy has limited value compared to hybrid PET/CT as the disease burden is low. We report site-specific relapse patterns of post-prostatectomy patients with BCR assessed by 68Ga-PSMA-11 or 11C-Choline PET/CT and investigated the impact of postoperative androgen deprivation therapy (ADT) and radiotherapy (RT) on the anatomic distribution of relapse.

Methods

We identified 243 patients with BCR after RP with a at least one positive lesion on 68Ga-PSMA-11 or 11C-Choline PET/CT between 2010 and 2017 at a single tertiary referral center. Positive lesions were mapped as local (prostatic fossa), nodal (distal to common iliac bifurcation, common iliac + presacral, retroperitoneal, inguinal, chest, neck and perirectal), skeletal (axial and appendicular) or visceral recurrence. Patients were categorized according to postoperative RT and ADT treatment in 3 subgroups (RT, ADT and RT+ADT) and compared with the reference group (no ADT or RT). Non-parametrical tests (Chi-square and Wilcoxon Rank-sum tests) were used and overall patterns of relapse were described using frequencies and percentages. Tests were performed using the statistical program Medcalc.

Results

Of the 243 included patients in the study 192 (79%) were evaluated with 68Ga-PSMA-11 PET/CT and 51 (21%) with 11C-Choline PET/CT. Of all patients, 7.8% had local, 69.1% nodal, 11.9% skeletal, 3.7% visceral and 7.4% mixed relapse. Median PSA at the time of imaging was 1.4, 2.9, 1.9 and 1.1 ng/ml in the RT, ADT, RT+ADT and reference group, respectively (p=0.17). Patients in the ADT group had less nodal recurrence compared with the reference group (53.1% vs 79.4%; p=0.02). No statistically significant difference in skeletal recurrence was found between any subgroups and the reference group, although patients treated with ADT had a greater tendency towards having bone metastases. Remarkably, no patients in the reference group had local relapse compared with 31.2% in the ADT group.

Conclusions

The relapse pattern of post-prostatectomy patients with BCR is significantly affected by postoperative ADT and/or RT. Patients with BCR following RP or RP+RT have a recurrence pattern which is predominantly nodal, mostly below the aortic bifurcation. Local recurrence is rare in this population. Therefore, many of these patients are amenable for locoregional salvage or metastasis-directed treatment. Patients who develop BCR following RP+ADT or RP+RT+ADT more often have local, skeletal and extrapelvic nodal recurrence. These patients are less likely to benefit from local salvage or metastasis-directed treatment.

	No ADT+ no RT (Reference group) N=34	RT only N= 91	ADT only N=32	RT+ADT (combination group) N=76
A. Local (prostate bed); (%)	**0**	**4(4.4%)**	**10(31.3%)**	**13(17.1%)**
Lymph node recurrence; (%)	**27(79.4%)**	**79(86.8%)**	**17(53.1%)**	**52(68.4%)**
B. Distal to common iliac bifurcation; (%)	21(61.8%)	53(58.2%)	12(37.5%)	19(25%)
C. Iliaca communis and presacral; (%)	7(20.6%)	21(23.1%)	3(9.4%)	13(17.1%)
D. Retroperitoneal; (%)	5(14.7%)	25(27.5%)	9(28.1%)	28(36.8%)
E. Perirectal;(%)	2(5.8%)	1(1.1%)	1(3.1%)	3(3.9%)
F. Inguinal; (%)	0	1(1.1%)	0	1(1.3%)
G. Thorax; (%)	0	1(1.1%)	2(6.2%)	6(7.9%)
H. Supraclavicular; (%)	0	2(2.2%)	2(6.2%)	9(11.8%)
Bone, (%)	**6(17.6%)**	**10(11%)**	**9(28.1%)**	**22(28.9%)**
I. Axial; (%)	6(17.6%)	8(8.8%)	8(25%)	16(21.1%)
J. Appendicular; (%)	1(2.9%)	2(2.2%)	5(15.6%)	11(14.5%)
K. Visceral; (%)	**1(2.9%)**	**5(5.5%)**	**1(3.1%)**	**3(3.9%)**