Patterns of failure after radical prostatectomy in prostate cancer - implications for radiation therapy planning after 68Ga-PSMA-PET imaging.

Schiller K, Sauter K, Dewes S, Eiber M, Maurer T, Gschwend J, Combs SE, Habl G.

Abstract

BACKGROUND: Salvage radiotherapy (SRT) after radical prostatectomy (RPE) and lymphadenectomy (LAE) is the appropriate radiotherapy option for patients with persistent/recurrent prostate cancer (PC). 68Ga-PSMA-PET imaging has been shown to accurately detect PC lesions in a primary setting as well as for local recurrence or for lymph node (LN) metastases.

OBJECTIVE: In this study we evaluated the patterns of recurrence after RPE in patients with PC, putting a highlight on the differentiation between sites that would have been covered by a standard radiation therapy (RT) field in consensus after the RTOG consensus and others that would have not.

METHODS AND MATERIALS: Thirty-one out of 83 patients (37%) with high-risk PC were the subject of our study. Information from 68Ga-PSMA-PET imaging was used to individualize treatment plans to include suspicious lesions as well as possibly boost sites with tracer uptake in LN or the prostate bed. For evaluation, 68Ga-PSMA-PET-positive LN were contoured in a patient dataset with a standard lymph drainage (RTOG consensus on CTV definition of pelvic lymph nodes) radiation field depicting color-coded nodes that would have been infield or outfield of that standard lymph drainage field and thereby visualizing typical patterns of failure of a "blind" radiation therapy after RPE and LAE.

RESULTS: Compared to negative conventional imaging (CT/MRI), lesions suspicious for PC were detected in 27/31 cases (87.1%) by 68Ga-PSMA-PET imaging, which resulted in changes to the radiation concept. There were 16/31 patients (51.6%) that received a simultaneous integrated boost (SIB) to a subarea of the prostate bed (in only three cases this dose escalation would have been planned without the additional knowledge of 68Ga-PSMA-PET imaging) and 18/31 (58.1%) to uncommon (namely presacral, paravesical, pararectal, preacetabular and obturatoric) LN sites. Furthermore, 14 patients (45.2%) had a changed TNM staging result by means of 68Ga-PSMA-PET imaging.

CONCLUSION: Compared to conventional CT or MRI staging, 68Ga-PSMA-PET imaging detects more PC lesions and, thus, significantly influences radiation planning in recurrent
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