Delineating sites of failure following post-prostatectomy radiation treatment using 68Ga-PSMA-PET.


Abstract

PURPOSE: To identify sites of failure with 68Ga-PSMA-PET (PSMA-PET) imaging in patients who have Biochemical Failure (BF) following post-prostatectomy radiotherapy.

MATERIAL AND METHODS: Between June 2006 and January 2016, 409 men received post prostatectomy intensity modulated radiation treatment (IMRT) with protocolised planning. 310 patients received radiation treatment (RT) to the Prostate Fossa (PF) alone and 99 patients received RT to PF and pelvic lymphatics (PF + LN) usually in combination with androgen deprivation (AD) therapy. Any failure not detected on conventional imaging was delineated with PSMA-PET scanning. Sites of failure were characterised as in-field (PF ± LN), or out of field (nodal alone, distant metastatic alone (visceral or bone) or multi-site failure). Nodal failure was further divided into pelvic failure and/or distant failure.

RESULTS: 119 men developed BF, defined as a PSA rise of >0.2 or greater, above post-RT nadir. Freedom from BF was 71% in the PF group and 70% in the PF + LN group, with median follow up of 52 and 44 months respectively. AD was used concomitantly in 13% of the PF group and 92% of the PF + LN group. 81 patients with BF (68%) had PSMA-PET imaging performed as per study intent, 67 (80%) of whom had PSMA avid disease identified. PSMA-PET delineated in-field failure occurred in 2/50 (4%) of the PF group and 1/17 (6%) in the PF + LN group. Nodal failure alone was 33/50 (66%) for the PF group vs 7/17 (41%) for the PF + LN group. For the nodal only failure patients, 18/33 (55%) had pelvic-only nodal failure in the PF group compared to 1/7 (14%) in the PF + LN group (p = 0.03). 16 (32%) of the PSMA avid failures in the PF group would have been encompassed by standard pelvic lymphatic radiotherapy volumes.

CONCLUSION: Post-prostatectomy radiation treatment resulted in excellent in-field control rates. Isolated pelvic nodal failure was rare in those receiving radiotherapy to the prostatic fossa and pelvic nodes but accounted for one third of failures in those receiving PF alone treatment.

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KEYWORDS: Biochemical failure; PSMA-PET; Post-prostatectomy; Prostate cancer

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