Patterns of Recurrence After Postprostatectomy Fossa Radiation Therapy Identified by C-11 Choline Positron Emission Tomography/Computed Tomography.

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Abstract

PURPOSE: To evaluate C-11 choline positron emission tomography/computed tomography (CholPET) in staging and determining patterns of recurrence in prostate cancer patients with rising prostate-specific antigen levels after prostatectomy radiation therapy (RT).

METHODS AND MATERIALS: The study includes patients with biochemical failure after postprostatectomy RT who underwent CholPET between 2008 and 2015. Patient and disease characteristics were examined in relation to sites of recurrence. All RT dosimetry records were reviewed, and recurrences were mapped on a representative computed tomography dataset with their relationship relative to the irradiated fossa field as out of field (OOF), edge of field (EOF; recurrence within <45-Gy isodose lines), or in field (IF; recurrence within ≥45-Gy isodose lines).

RESULTS: Forty-one patients were identified with 121 sites of recurrence (median 2 sites; interquartile range [IQR], 1-4). The median prostate-specific antigen level at CholPET was 3.1 (IQR, 1.9-5.6) ng/mL. Median interval from RT to biochemical failure was 24 (IQR, 10-46) months, with recurrence identified on CholPET at a median of 15 (IQR, 7-28) months from biochemical failure. Histologic confirmation of recurrence was obtained in 20 patients (49%), with the remainder confirmed by treatment response. Five patients (12%) had IF recurrences, 10 patients (24%) had EOF recurrences (median dose 10 Gy; IQR, 5-30 Gy), and 36 patients (88%) had OOF recurrences. Ten patients had combination failures: 6 (15%) EOF/OOF and 4 (10%) IF/OOF. Fifty-seven recurrences (47%) were pelvic nodal sites inferior to the L5-S1 interspace, of which 52 (43%) were within a pelvic RT field. Eighty-one recurrences (67%) were nodal and inferior to the aortic bifurcation.

CONCLUSIONS: Using CholPET, we found that the majority of patients evaluated for biochemical failure recurred outside of the postprostatectomy RT field. Furthermore, most
recurrence sites were nodal and inferior to the aortic bifurcation. These results provide data that may be useful for examining strategies that include elective lymph node irradiation in postprostatectomy patients.

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