Detection of Recurrent Prostate Cancer After Radical Prostatectomy: Comparison of 11C-Choline PET/CT with Pelvic Multiparametric MR Imaging with Endorectal Coil.

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Abstract

The aim of this study was to compare (11)C-choline PET/CT with pelvic multiparametric MR imaging for detection of recurrent prostate carcinoma in patients with suspected recurrence after radical prostatectomy and to identify an optimal imaging method to restage these patients.

METHODS: This was a retrospective, single-institution study of 115 prostatectomy patients with suspected tumor recurrence who underwent both (11)C-choline PET/CT and multiparametric MR imaging with endorectal coil. The reference standard included histopathology, treatment change, and imaging follow-up for determination of locally recurrent tumor, lymph node (LN) metastases, and skeletal metastases. Two nuclear medicine and 2 genitourinary radiologists independently and in a masked manner reviewed PET/CT and multiparametric MR imaging, respectively. The reviewers assessed for local recurrence in the prostatectomy bed as well as LN and bone metastases, rating their diagnostic confidence with a 5-point scoring system for each location. Receiver-operating-characteristic analysis was used to compare the 2 modalities.

RESULTS: The standard of reference (either positive or negative) for the diagnosis of local recurrence and pelvic LN and bone metastases was met in 87, 70, and 95 patients, respectively. Documented local recurrence and pelvic LN and bone metastases was present in 61 of 87 (70.1%), 50 of 70 (71.4%), and 16 of 95 (16.8%) patients, respectively. Patient-based area under the receiver-operating-characteristic curves of multiparametric MR imaging versus PET/CT for the diagnosis of local recurrence and pelvic LN and bone metastases were 0.909 versus 0.761 (P = 0.0079), 0.812 versus 0.952 (P = 0.0064), and 0.927 versus 0.898 (P = 0.69), respectively. Among 61 patients with local recurrence, 32 patients (52.4%) were correctly diagnosed as having local recurrence by both multiparametric MR imaging and PET/CT, 22 (36.1%) were correctly diagnosed by multiparametric MR imaging only, 6 (9.8%) could not be diagnosed by either modality, and 1 (1.6%) was correctly diagnosed by PET/CT only. The patient-based sensitivity, specificity, and accuracy of multiparametric MR imaging for diagnosing local recurrence were 88.5% (54/61), 84.6% (22/26), and 87.4% (76/87) whereas those of PET/CT for detecting body LN or bone metastases were 92.3% (72/78), 100% (18/18), and 93.8% (90/96), respectively.

CONCLUSION: Multiparametric MR imaging with endorectal coil is superior for the detection of local recurrence, PET/CT is superior for pelvic LN metastasis, and both were equally excellent for pelvic bone metastasis. (11)C-choline PET/CT and pelvic multiparametric MR imaging are complementary for restaging prostatectomy patients with suspected recurrent disease.

KEYWORDS: 11C-choline PET/CT, biochemical failure, multiparametric MR imaging, prostate cancer,
prostatectomy

PMID: 24434294 [PubMed - in process]

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