Prostate cancer on computed tomography: A direct comparison with multi-parametric magnetic resonance imaging and tissue pathology

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Abstract

Objectives: Multi-parametric prostate magnetic resonance imaging (MRI) is considered the current imaging standard for detection and staging of prostate cancer. The combination of anatomical and functional imaging provided in this exam significantly increases the accuracy of prostate cancer detection. Computed tomography (CT) imaging has so far been found to be lacking in this regard, however observations at our academic institution as well as evidence present in the literature support the proposition that CT could indeed be helpful in detecting prostate abnormalities that correspond to neoplasm. The purpose of this study was to prove that areas of focal mass-like enhancement on CT imaging directly correlate with prostate neoplasms as revealed on multi-parametric MRI and follow-up targeted biopsy.

Materials and methods: This was a single institution retrospective study with 27 male subjects. Inclusion criteria required subjects to have a multi-parametric MRI of the prostate between January 1, 2014 and June 1, 2015 and a pelvic venous phase contrast-enhanced CT study between January 1, 2000 and June 1, 2015. Two blinded Radiologists read subjects' CT scans for any abnormalities of the prostate. CT and multi-parametric MRI results were compared and were considered concordant if focal or mass like enhancement to a greater degree than the background parenchyma was detected in the same areas of the prostate on CT scan as areas of decreased T2 signal, perfusion abnormalities, and restricted diffusion on multi-parametric MRI.

Results: CT results were directly compared to multi-parametric MRI findings and biopsy results. The overall agreement of MRI and CT is 85.19% (95% CI: 67.52-94.08%). The positive percent agreement is 78.95% (95% CI: 54.43-93.95%) and the negative percent agreement is 100.0% (95% CL: 63.06-100.0%). When CT results are directly compared to

biopsy results, sensitivity and specificity of CT are 63.64% (95% CI: 30.79-89.07%) and 100.0% (95% CI: 47.82-100.0%). The positive predictive value (PPV) is 100.0% (95% CI: 59.04-100.0%) and the negative predictive value (NPV) is 55.56% (95% CI: 21.2-86.3%). When compared to MRI, CT has a lower sensitivity and a higher specificity, as well as a higher PPV and NPV. Logistic regression analysis did not show a significant relationship between concordance of MRI and CT and Gleason score, time between studies, age, and Prostate-specific antigen (PSA) level.

Conclusion: Incidental focal areas of mass-like enhancement in the peripheral prostate detected on venous phase contrast-enhanced CT imaging may indeed correlate with prostate neoplasm and it would be prudent to suggest further work-up with PSA and perhaps multi-parametric MRI, especially in high-risk patients.

Keywords: CT; Computed tomography; Diagnosis; MR; Magnetic resonance imaging; Prostate cancer; Prostate carcinoma; Prostate neoplasms.