Prostate Cancer: Added Value of Subtraction Dynamic Imaging in 3T Magnetic Resonance Imaging with a Phased-array Body Coil

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PURPOSE

To determine the added value of dynamic subtraction magnetic resonance (MR) imaging for the localization of prostate cancer with a 3T unit using a phased-array body coil.

MATERIALS AND METHODS

We examined twenty-one consecutive patients who underwent MR imaging and then had radical prostatectomy within 60 days. After obtaining T2-weighted fast spin-echo images, we performed a contrast-enhanced dynamic gradient echo imaging consisting of one precontrast and three-phased postcontrast series followed by automatic subtraction of precontrast images from corresponding postcontrast images. MR imaging interpretations by two independent readers were compared with the histopathological results.

RESULTS

On ROC analysis, the overall accuracy (A_z value) of the dynamic imaging combined with subtraction imaging was higher than T2-weighted imaging ($P=0.001$) or conventional dynamic imaging alone ($P=0.074$) for localization of the canc er foci regardless of their zonal locations. Among the pathologically verified 81 lesions, the mean volume of the detected lesions with the subtraction dynamic imaging (n=49, 0.69cm^3) was smaller than with T2-weighted imaging (n=14, 1.05cm^3) or conventional dynamic imaging (n=43, 0.71cm^3).

CONCLUSION

Additional subtraction for the dynamic imaging with 3T MRI could be superior to both T2-weighted imaging and conventional dynamic imaging for prostate cancer localization regardless of zonal location or lesion size.
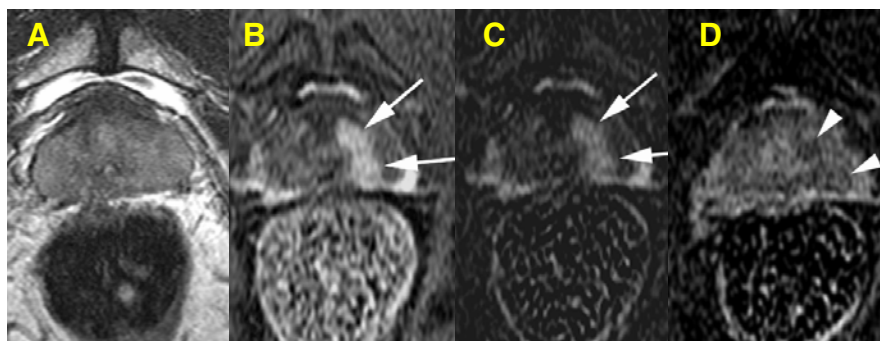
Prostate cancer of the left mid-gland in a 51-year-old man. **A:** An axial T2-weighted image shows no focal lesion. **B:** Early phase contrast-enhanced image shows a dumbell-shaped increased signal intensity area involving central gland and posterior portion of peripheral zone (arrows). **C:** Subtraction images of precontrast image from **B** shows the same hypervascular portion (arrows). **D:** Five-minute delayed subtraction image shows relatively hypointense area (arrowheads) suggesting washout of contrast material from the tumor at the same site distinguished from surrounding parenchyma.
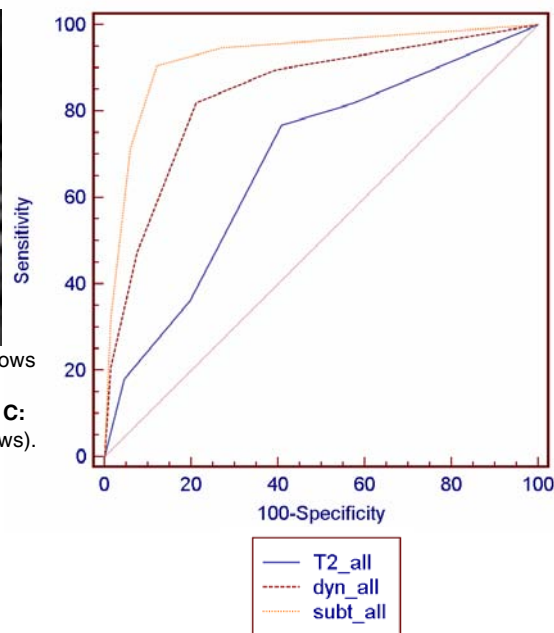

Table Detection Rate of the 81 Histologically Verified Lesions of Prostate Cancer Depending on Their Volume Range by Lesion-by-lesion Analysis of MR Imaging in Conjunction with the Mapping Slides of Pathologic Specimen

Tumor volume (cm^3)	T2w	DYN	SUBT
> 0.5 (n = 26)	9 (35%)	21 (81%)	23 (88%)
0.5 ~ 0.05 (n = 30)	5 (17%)	14 (47%)	17 (57%)
< 0.05 (n = 25)	0	8 (32%)	9 (36%)

T2w = T2-weighted imaging, DYN = dynamic imaging, SUBT = combination of conventional and subtraction dynamic imaging

References
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