

Prostatic lesion of low ADC value: evaluation by using targeted biopsy

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Purpose

To investigate whether ADC map of diffusion-weighted MR imaging in combination with T2-weighted imaging and dynamic contrast-enhanced imaging would be useful to detect and localize prostatic cancer.

Introduction

Prostatic MR imaging has been mainly used to identify malignant lesions detected by systematic biopsy and to define its extent such as extracapsular invasion etc. However, the detectability of prostate cancer by using systematic biopsy has not been very high and, extended biopsy or template biopsy has come to be performed. ADC map has been reported to be useful in the detection of prostatic cancer. Therefore, we postulate that if biopsy is performed to target at lesions suspected of cancer by ADC map, detectability of prostate cancer could increase. In this study, lesions less than 1.3×10^{-3} mm²/sec of ADC value have been sampled by targeted biopsy and evaluated histologically.

Materials and methods

This study included 68 prostatic lesions in 52 patients (average age: 72 years old) with PSA level of 4.0 or higher. Prostatic MR imaging was performed using cardiac synergy coil. Transaxial and coronal T2-TSE, diffusion-weighted imaging (b value 800) and dynamic contrast-enhanced FS-T1 TSE images were obtained. The MR criteria used for the diagnosis of cancer were lesion of ADC value less than 1.3×10^{-3} mm²/sec in combination with T2-hypointensity or intense enhancement on early phase of dynamic MR imaging. Targeted biopsy was performed to obtain two or three samples of each lesion.

Results

Among 68 lesions examined by targeted biopsy, total 35 lesions (52 %) proved to be adenocarcinoma. The location of the malignant lesions included 7 lesions (20 %) in the peripheral zone and 28 lesions (80 %) in the transitional zone. The positive ratio was 50 % of the lesions in the peripheral zone and 52 % in the transitional zone. The other benign or border-lined lesions included prostatitis, prostatic intraepithelial neoplasia, hyperplasia in the peripheral zone, and hyperplastic nodule, atypical adenomatous hyperplasia and PIN in the transitional zone.

Conclusion

Low ADC values in combination with targeted biopsy can provide higher detectability of prostate cancer not only in the peripheral zone but also in the transitional zone.

Figure 1
Prostate cancer in the transitional zone



a: ADC b: T2 c: dynamic
The lesion in the left apical transitional zone showed low ADC value (0.62) and intense contrast enhancement, and identical intensity to that of surrounding transitional zone on T2-weighted image.

Figure 2
Granulomatous prostatitis in the left peripheral zone



a: ADC b: T2 c: dynamic
The lesion in the left peripheral zone showed T2-hypointensity, low ADC value (0.80) and intense contrast enhancement. It was very difficult to differentiate this benign lesion from malignancy.