

Diffusion-weighted MR imaging in the evaluation of the seminal vesicle invasion of the prostate adenocarcinoma

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Purpose: To evaluate whether apparent diffusion coefficients (ADCs) calculated from diffusion-weighted echo-planar magnetic resonance images can be used to differentiate seminal vesicle invasion of the prostate adenocarcinoma from normal seminal vesicle and post hormone deprivation changes.

Material and methods: Diffusion-weighted echo-planar MR imaging ($b=1000\text{sec}/\text{mm}^2$) was performed with a 1.5T MR unit in 40 patients. The ADCs of seminal vesicle, bladder and pelvic fat were measured. The patients were divided into 4 groups: group 1, seminal vesicles invaded by prostate adenocarcinoma ($n=10$), group 2, seminal vesicles after hormone deprivation therapies ($n=9$), group 3, seminal vesicles in benign prostate hyperplasia (BPH) patients ($n=9$) and group 4, normal seminal vesicles ($n=12$). In group 1, 4 cases were proved by surgery, 3 by ultrasound guided biopsy and 3 by larcoscopic biopsy. All the patients had low signal on MR T2 images. In group 2, all the patients underwent endocrine therapy for at least 6 months, and their serum PSA level kept normal for at least 3 months. In group 3, there were no low signal on MR T2 images. In group 4, 12 male volunteers were examined without any symptom of prostate and seminal vesicle diseases after provided inform consent.

Results: Acceptable images for ADC measurement were obtained in 36 (90%) patients. The mean ADC of seminal vesicles invaded by tumor, $(0.30\pm 0.08 [\text{mean}\pm\text{SD}])\times 10^{-3}\text{mm}^2/\text{sec}$ ($n=8$), was significantly smaller ($P<0.001$) than that of seminal vesicles after hormone deprivation therapies. The mean ADC of seminal vesicles after hormone deprivation therapies, $(0.56\pm 0.17)\times 10^{-3}\text{mm}^2/\text{sec}$ ($n=8$), was significantly smaller ($P=0.003$) than that of seminal vesicles in BPH patients. The mean ADC of seminal vesicles in BPH patients, $(1.47\pm 0.32)\times 10^{-3}\text{mm}^2/\text{sec}$ ($n=8$), was not significantly different ($P>0.05$) from that of normal seminal vesicles, $(1.51\pm 0.37)\times 10^{-3}\text{mm}^2/\text{sec}$ ($n=12$). No significant differences were seen in the mean ADC of bladder and pelvic fat among the four groups.

Conclusion: Measurement of ADCs may be used to characterize seminal vesicle lesions.

Key Words: seminal vesicle, diffusion-weighted, magnetic resonance imaging

Table 1 ADC values ($\times 10^{-3}\text{mm}^2/\text{sec}$) of the bladder, pelvic fat and seminal vesicles in different patients

Group	Case number	Bladder	Pelvic fat	Seminal vesicle*
Group 1	8	1.68 ± 0.23	0.22 ± 0.04	0.30 ± 0.08
Group 2	8	1.66 ± 0.19	0.25 ± 0.09	0.56 ± 0.17
Group 3	8	1.69 ± 0.24	0.20 ± 0.07	1.47 ± 0.32
Group 4	12	1.64 ± 0.20	0.19 ± 0.07	1.51 ± 0.37
<i>F</i> value		2.01	2.92	59.70
<i>P</i> value		0.40	0.40	0.00

*statistically different. Group 1 □ seminal vesicles invaded by PCa. Group 2: post hormone deprivation therapy changes in seminal vesicles.

Group 3: seminal vesicles of BPH patients. Group 4: seminal vesicles in normal volunteers.

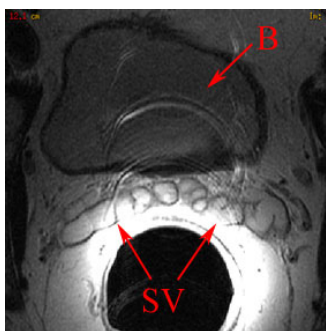


Fig. 1

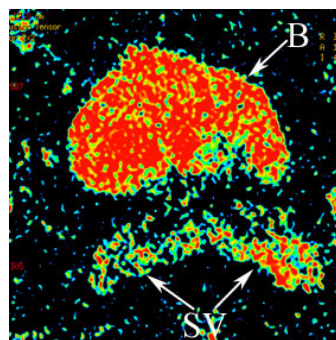


Fig.2

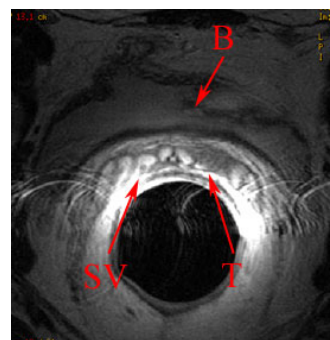


Fig.3

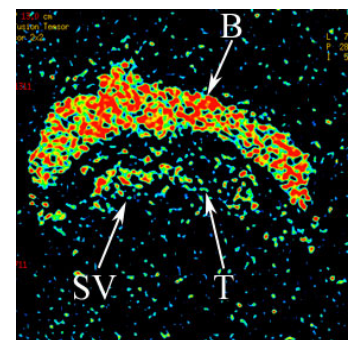


Fig.4

Fig.1 and 2 showed T2WI and ADC map of seminal vesicles in normal volunteer. Fig.3 and fig.4 showed T2WI and ADC map of seminal vesicle invaded by PCa.