

The Utility of Diffusion-weighted MR Imaging for Differentiating Uterine Sarcomas from Benign Leiomyomas

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Introduction:

Diffusion weighted image (DWI) is recently prevailing technique, reflecting diffusion motion of water protons in the tissues, and also enables quantitative measurement of apparent diffusion coefficient (ADC) (1). A variety of malignant tumors have been reported to show increased signal on DWI, and decreased ADC value, compared with benign tumors (1, 2). However, the role of DW imaging for the diagnosis of uterine myometrial lesions has not been fully investigated. The purpose of this study is to investigate the usefulness of DWI in differentiating malignant uterine sarcomas from benign leiomyomas by evaluating the signal intensity and ADC values.

Materials and Methods:

Our study population included 61 myometrial lesions in 46 female patients (age; 22-69 years, mean; 48), which were evaluated on preoperative MR imaging with diffusion, and were surgically treated. MR imaging was performed with a 1.5T unit (Symphony; Siemens) utilizing a phased-array coil. Following conventional T1WI and T2WI, DWI were obtained in the sagittal plane with single-shot echo-planar sequence (TR/TE = 2500/80 msec) with a matrix of 128 x 64, SENSE factor of 2, three excitation, and b-factors of 0, 500, and 1000 sec/mm². All sagittal images were uniformed with 5 mm thickness with 1.5 mm intersection gap and FOV of 260 mm. Two radiologists blinded to histologic diagnoses initially evaluated T2WI, regarding the presence, location and intensity of myometrial lesions larger than 1cm. SI on DWI (b=1000) was ranked with a 5-point scale (1: none -5: bright) on fusion images with DWI onto T2WI created by the fusion software (Aquarius Net Viewer, Terarecon, Inc.). One of the readers also measured the ADC values of the lesions on ADC map. Finally, the ADC values were compared with pathologic results.

Results:

The histologic diagnoses were 54 benign leiomyomas and 7 sarcomas, including 5 leiomyosarcomas and 2 endometrial stromal sarcomas. On DWI, all sarcomas and 9 benign leiomyomas exhibited increased intensity, with the mean SI score of 4.14 and 2.78, respectively ($P<0.05$) and ADC value of 1.17 ± 0.15 and 1.44 ± 0.28 ($p<0.05$). All of these sarcomas and leiomyomas showed heterogeneously increased intensity on T2WI. Histologically, these benign leiomyomas had increased cellularity ($n=4$) or degeneration of variable degree ($n=5$). The remaining 45 leiomyomas, which did not showed signal on DWI, had significantly lower ADC value of 0.89 ± 0.29 ($p<0.05$) and exhibited distinct low intensity on T2WI. All of these were pathologically leiomyomas with abundant collagen matrix and hyalinization.

Conclusion:

Uterine sarcomas show high intensity on DWI. Although some benign leiomyoma with cellular or degenerative changes may also show increased intensity on DWI, additional evaluation of the ADC value of the tumor may be helpful for differentiation.

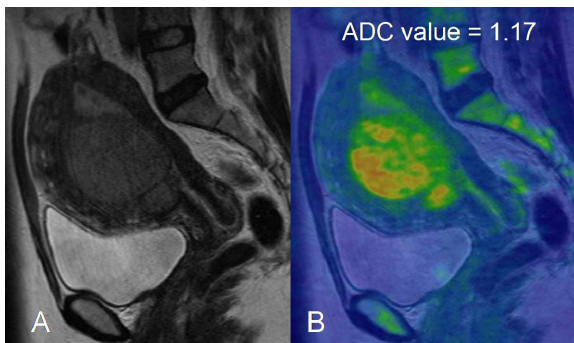


Figure 1. Leiomyosarcoma in a 47-year-old female. Sagittal T2WI (A) shows an ill-defined myometrial mass of slightly increased intensity, invading into the endometrial cavity. On DWI fused onto T2WI (B), the tumor show heterogeneously high intensity.

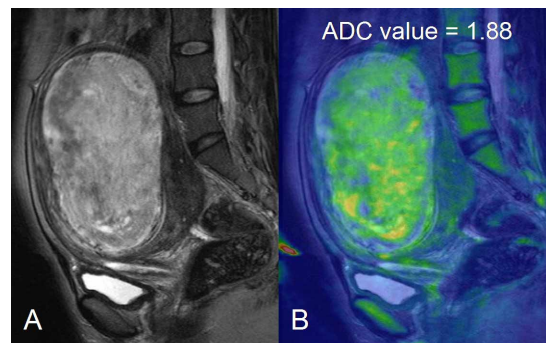


Figure 2. Cellular leiomyoma in a 52-year-old female. Sagittal T2WI (A) shows an well-defined mass of increased intensity in the posterior myometrium. On DWI fused onto T2WI (B), the tumor show slightly increased intensity.

References

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