

Evaluation of cervical carcinoma of the uterus with high b diffusion-weighted imaging: A comparison with normal uterine cervix

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Introduction

Diffusion-weighted imaging (DWI) can detect the Brownian motion of water molecular in vivo and has been recently used to improve the detection and characterization of ischemic lesions of the brain [1]. DWI has also been attempted in the organs of body such as liver, kidney and prostate, and can supply useful information for the evaluation of diseases [2-4]. However, few papers about DWI of the uterine have been reported [5]. In this study, we evaluate cervical carcinoma of the uterus with high b value DWI sequence in comparison with normal uterine cervix.

Methods

15 female patients with suspected cervical carcinoma and 11 female volunteers formed the study population. Cervical carcinoma was confirmed in 15 patients by surgery (6 cases) or biopsy (9 cases). All MR images were obtained at a 1.5 T MR scanner (GE, Twin Speed), and an 8-element phased array pelvis coil was used to receive MR signal. The conventional pulse sequences included axial fat saturated FSE T2WI, coronal fat saturated FSE T2WI, sagittal FSE T2WI and axial SE T1WI. Axial and sagittal DWI was performed in all patients and volunteers using a SE-EPI sequence with the following parameters: TR 2000 ms, TE 76ms, section thickness 6 mm with a gap of 1.5 mm, and b values of 0 and 1000 s/mm². Apparent diffusion coefficients were measured for every case.

Results

All cervical carcinomas showed mildly or moderately hyperintense on FSE T2WI (Fig A, B, C) and SE-EPI T2WI (b=0 s/mm²) (Fig D). The normal uterine cervix was dark, while malignant lesion kept significant hyperintensity on high b value DWI (Fig E). The mean ADC value of the cervical carcinoma lesions was $0.87 \times 10^{-3} \text{mm}^2/\text{s}$, and that of the normal uterus cervix was $1.61 \times 10^{-3} \text{mm}^2/\text{s}$ (P<0.01).

Discussion and Conclusion

Cervical carcinoma is a common gynecologic malignant tumor. Vaginal access makes detection and biopsy of cervical carcinoma easy. Imaging examinations have played important roles in the diagnosis of tumor spread and the staging of tumor. Conventional T1WI, T2WI, and dynamic enhanced imaging can provide excellent information of anatomic details. However some cervical carcinoma lesions showed similar signal changes to tissue around lesions, which will make it difficult to distinguish malignant tissue from normal tissue.

DWI has recently been used to evaluate tumors of the body, and most malignant tissues have showed relatively decreased ADC values, although the mechanism is still unclear. In this study, the mean ADC value of the cervical carcinomas was significantly higher than that of normal uterus cervix. On high b value DWI, malignant tissue showed more significantly high signal intensity than the normal tissues around the lesions, which makes it easy to distinguish them each other.

In Conclusion, our preliminary study indicates that high b value DWI and ADC measurement has the potential ability to differentiate cervical carcinoma lesion from normal tissues, and to promote the validity of MRI in the staging of cervical carcinoma of the uterus. However, due to our small study population, further evaluation is needed to confirm our conclusion.

References

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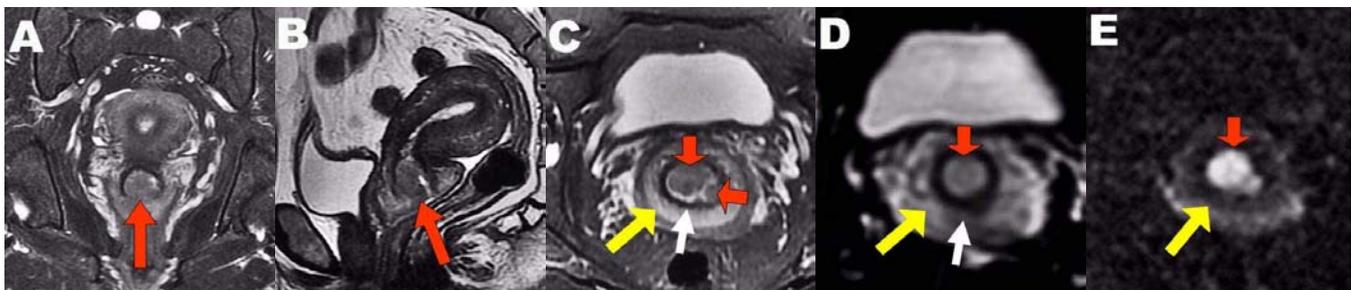


Figure A-E. Cervical squamous cell carcinoma of the uterus in a 54 year-old woman. The tumor showed mildly hyperintense (red arrows) on coronal (Fig A), sagittal (Fig B) and axial (Fig C) FSE T2WI. On axial FSE T2WI (Fig C) and SE-EPI T2WI (b=0 s/mm²) (Fig D), the dark circle stripe (white arrows) represented normal fibrous stroma zone, which was surrounded by smooth muscle strand of medium signal (yellow arrows). On DWI with b value of 1000 s/mm², the malignant tissue showed significantly high signal intensity (red arrow), while the normal tissue around the lesion became dark (yellow arrow). The ADC value of malignant lesion was $0.85 \times 10^{-3} \text{mm}^2/\text{s}$, and that of the normal tissue around the lesion was $1.62 \times 10^{-3} \text{mm}^2/\text{s}$. A tumor of Stage I a was confirmed by surgery.