Apparent Diffusion Coefficient of Squamous Cell Carcinomas and Malignant Lymphomas in Head and Neck

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SYNOPSIS

The aim was to determine whether apparent diffusion coefficient (ADC) can differentiate between squamous cell carcinomas (SCC) and malignant lymphomas (ML) in head and neck regions by line scan diffusion-weighted imaging (LSDWI). LSDWI was performed in 38 SCC and 14 ML. Images were obtained with b factors of 5 and 1000 s/mm^2. The mean ADC was 0.96 $\pm$ 0.11 x 10^{-3} mm^2/s in SCC, and 0.65 $\pm$ 0.09 x 10^{-3} mm^2/s in ML. There was a significant difference between the two ($p < 0.01$). The ADC may be useful for differentiating between SCC and ML in head and neck regions.

METHODS

Subjects

A total of 52 patients with 38 squamous cell carcinomas (SCC) and 14 malignant lymphomas (ML) were included in this study. In all cases, the final diagnoses were histologically confirmed by biopsy. The maximum diameters of the tumors on MR images were 35.5 $\pm$ 12.4 mm (20-60 mm) in SCC, and 37.1 $\pm$ 16.7 mm (20-70 mm) in ML.

MR Imaging Sequences

MR imaging was performed on a 1.5-T MRI system (Signa, General Electric Medical Systems, Milwaukee, WI). A neurovascular coil was basically used because in most cases neck lymph nodes were asked to examine. Line scan diffusion-weighted imaging (LSDWI) was performed to obtain the DWI images. The LSDWI method has been described previously [1, 2]. Neither cardiac gating nor respiratory triggering was used. We did not use any anti-susceptibility devices on the neck to reduce susceptibility artifacts. Images were acquired with a field of view (20 x 20 or 22 x 22 cm), a matrix size of 128 x 128 columns, and a bandwidth of 3.91 kHz. The effective section thickness was set at 5 mm, with an intersection gap of 1 mm. Diffusion images were obtained in different two b values, as the maximum b value applied along with the three orthogonal directions, one with a low diffusion weighting (b factor) of 5 sec/mm^2 and the other with a high (maximum) b factor of 1000 sec/mm^2. Other parameters were as follows: TR = 2376-3124 msec, TE = 57.1-70.7 msec, and one excitation. The scan time per slice was 30-45 seconds, and a total of three or five slices were obtained in the axial plane according to the lesion size. Echo-planar DWI (9999/69.2, b=0, 1000) was also performed in 5 patients with head coil.

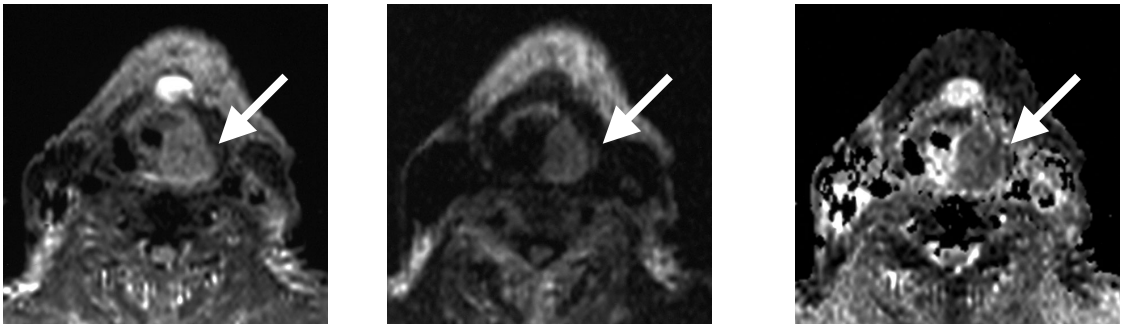
Imaging Data Analysis

The mean apparent diffusion coefficient (ADC) was obtained in each tumor. In the region of interest (ROI) measurements of tumors, special care was taken to include the solid-appearing portions for the tumors and to exclude the obvious necrotic regions demonstrated by T2-weighted images and contrast-enhanced MR images. The two-sided unpaired Student's *t* test was applied to detect any significant differences in mean ADC values between SCC and ML.

RESULTS

LSDWI could depict all lesions without significant susceptibility artifacts (Fig. 1) and enabled the measurement of the ADC. Mean ADC value for SCC (0.96 $\pm$ 0.11 x 10^{-3} mm^2 / sec) was significantly greater than that for ML (0.65 $\pm$ 0.09 x 10^{-3} mm^2 / sec) ($p<0.01$). All but one patient with ML showed smaller ADC values than the smallest ADC value in SCC.

Fig. 1 Hypopharyngeal cancer (SCC)



LSDWI (b=5 sec/mm^2) **LSDWI (**b=1000 sec/mm^2) **ADC map**

CONCLUSION

LSDWI is insensitive to susceptibility artifacts and permits the evaluation of head and neck tumors with excellent image quality. The ADC of ML was significantly lower than that of SCC. This result may be due to the difference of tumor cellularity between SCC and ML in head and neck regions. LSDWI may be a useful adjunct in the differential diagnosis of SCC and ML.

REFERENCES

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