

Diffusion-weighted Magnetic Resonance Imaging of Nasopharyngeal Carcinoma

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Purpose

Diffusion weighted imaging (DWI) has been shown to be useful in the characterization of head and neck lesions such as lymphomas (1, 2). The aim of this study was to further document the in-vivo characteristics of nasopharyngeal carcinoma (NPC) on DWI by measuring the apparent diffusion coefficients (ADCs) of the primary tumor and malignant nodes.

Methods and Materials

Ethics committee approval and informed consent were obtained. Patients with NPC underwent conventional MR imaging and diffusion-weighted MR imaging on a 1.5 T system. T1-weighted sequences were performed in the axial plane before and after administration of a bolus injection of contrast material (Gadoterate meglumine, 0.1 mmol/kg). The matrix size was 249×512, two signals acquired, section thickness 4mm with no intersection gap. Before contrast material injection, MR DWI was performed using balanced pairs of pulse gradients in the axial plane with the single-shot spin-echo EPI sequence (repetition time [TR]/echo time [TE], 2000 ms/75 ms; four signals acquired; section thickness, 4 mm; acquisition matrix, 112×112; reconstruction matrix, 256×256) in all patients. Fat suppression technique was used to reduce chemical shift artifacts. The values of b factor were set at 0, 100, 200, 300, 400 and 500 sec/mm². The ADC of the cancer was calculated by drawing a region of interest around the primary tumour and/or metastatic node on the ADC map (figure 1 and 2). The ADCs of the primary and nodal metastases were compared using the Mann-Whitney U non-parameters test.

Result

Fifty-seven patients (43 men, 14 women; age range, 26-80 years; mean age, 51 years) were studied and DWI was successfully obtained in 45 primary tumours and 26 malignant nodes. 14 of these patients underwent successful DWI at both the primary and nodal sites. The mean ADC for the primary tumours was $0.984 \pm 0.161 \times 10^{-3}$ mm²/sec and for the malignant nodes was $0.852 \pm 0.117 \times 10^{-3}$ mm²/sec. There was a statistically significantly difference ($p \leq 0.0001$) in the ADC values between primary tumours and malignant nodes but this difference disappeared when examining a subgroup of patients who had cancers at both sites.

Conclusion

DWI is a feasible technique for examining NPC, not only in neck nodes, but also in the primary tumour, which lies at the challenging site of the skull base. The ADC values of the primary tumour and nodal metastases have been documented and in those patients with both sites of involvement there was no significant difference in the ADC values.

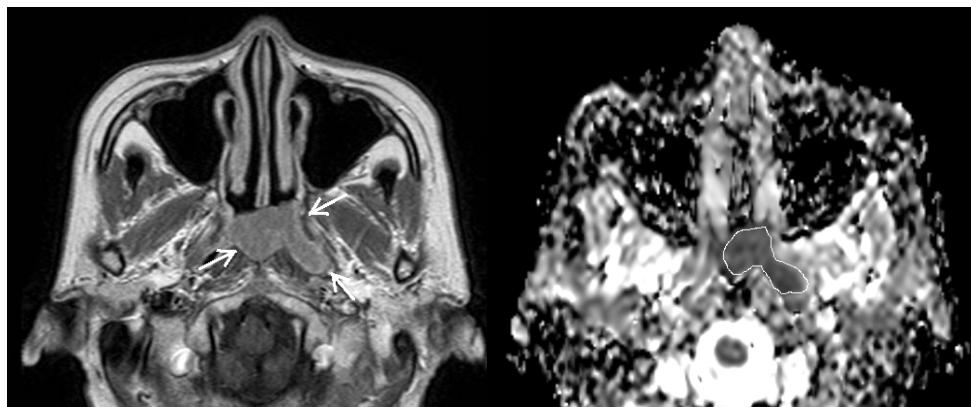


Fig. 1: Post-contrast T1-weighted image (left) shows the primary tumor (arrow) and ADC map (right) shows the region of interest drawn around the primary tumor.

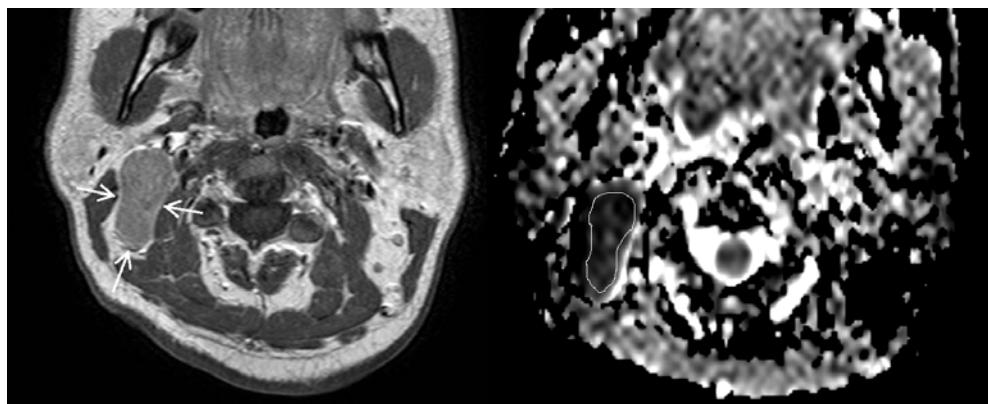


Fig. 2: Post-contrast T1-weighted image (left) shows the malignant node (arrow) and ADC map (right) shows the region of interest drawn around the malignant node.

Reference

- [1] Wang J et al. Radiology 2001; 220: 621-630.
- [2] King AD et al. Radiology 2007; 245:806-813.