

SELECTIVE DAMAGE OF THE VISUAL PATHWAYS IN PATIENTS WITH MIGRAINE: A MR TRACTOGRAPHY STUDY AT 3 T.

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Introduction

Using diffusion tensor (DT) magnetic resonance imaging (MRI), subtle abnormalities have been disclosed in the normal-appearing brain tissue of patients with migraine (1). At present, however, the exact location of these abnormalities in specific brain pathways has not been investigated, yet. In this study, we used a 3T MRI scanner and MR tractography to quantify the involvement of selected brain pathways in patients with migraine and their relation with patients' demographic characteristics, clinical manifestations of the disease, and extent of T2-visible lesions.

Methods

Using a 3 Tesla scanner, dual-echo (DE) and diffusion tensor (DT) MRI (with diffusion gradients applied in 32 non-collinear directions) were acquired from 16 patients with migraine and 15 matched controls. Using DT MRI tractography, probability maps for the corticospinal tract, the corpus callosum and the optic radiation (OR) were constructed from healthy volunteers data and then applied to DT-derived maps of patients. Then mean diffusivity (MD) and fractional anisotropy (FA) histograms of these tracts were derived.

Results

Compared with healthy controls, migraine patients had significantly reduced average FA ($p=0.01$) and FA histogram peak location ($p=0.02$) and increased MD histogram peak location ($p=0.04$) of the OR. No abnormalities were found in the remaining pathways. Patients with aura had significantly lower average FA of the OR than both controls ($p=0.01$) and patients without aura ($p=0.05$). Compared with controls, they also had increased MD histogram peak location ($p=0.04$) of the OR. In migraine patients, no correlation was found between OR abnormalities, age and T2-visible lesions load.

Conclusions

DT MRI abnormalities in patients with migraine are likely to have a regional rather than a diffuse distribution. The demonstration that these abnormalities are more pronounced in patients with aura supports cortical spreading depression as their possible cause.

References

1. Rocca MA, Colombo B, Inglese M, et al. A diffusion tensor magnetic resonance imaging study of brain tissue from patients with migraine. *J Neurol Neurosurg Psychiatry* 2003;74:501-503.