

C1

Cognitive Impairment in Patient with Meningitis Following Scrub Typhus

Dong seok Yang^{1†}, Ki hyun Byun^{1*}, Seong Wook Son¹

Ulsan University Hospital, Department of Rehabilitation Medicine¹

Introduction

A systemic infection, scrub typhus is caused by *Orientia tsutsugamushi*. Scrub typhus may involve central nervous system like meningitis. The pathologic mechanism of the cognitive impairment in patients following scrub typhus is not clear whether gray matter or white matter is involved. Diffusion tensor tractography (DTT) is an advanced MR tool and can show integrity of the Papez circuit in a 3 dimensional view. Using DTT, several studies reported the association between the integrity of the Papez circuit and cognitive impairment in patient with brain injuries. Herein, we demonstrate that scrub typhus causes injury of neural tracts in Papez circuit in patient with meningitis using DTT, which may help understand the underlying mechanism of cognitive impairment.

Method

A 70-year old male patient visited our clinics due to poor cognitive function. His medical history showed that he suffered meningitis following scrub typhus 30 years ago. We conducted cognitive function with min-mental status examination (MMSE) and computerized neuropsychological test. We investigated cause of cognitive impairment with probabilistic DTT. Diffusion-weighted imaging data were analyzed using Oxford Centre for Functional Magnetic Resonance Imaging of the Brain (FMRIB) Software Library. Fiber tracking was performed with probabilistic tractography method based on a multifiber model. The probabilistic tractography routines were implemented in FMRIB (diffusion for 5,000 streamline samples at 0.5 mm step length and curvature threshold of 0.2 corresponding to a minimum angle of 80°). The regions of interest (ROIs) for the Papez circuit were as follows [3]: thalamocingulate tract-the cingulate gyrus (ROI-1), anterior limb of the internal capsule (ROI-2), and the anterior thalamic nuclei (ROI-3); fornix-the mammillary body (ROI-1) and the crus of the fornix (ROI-2); mammillothalamic tract-the anterior thalamic nucleus (ROI-1) and the isolated mammillothalamic tract (ROI-2), and the mammillary body (ROI-3); cingulum-the middle (ROI-1) and posterior (ROI-2) of the cingulum. Neural tracts of the Papez circuit on DTT was shown reconstructed three-dimensionally.

Results

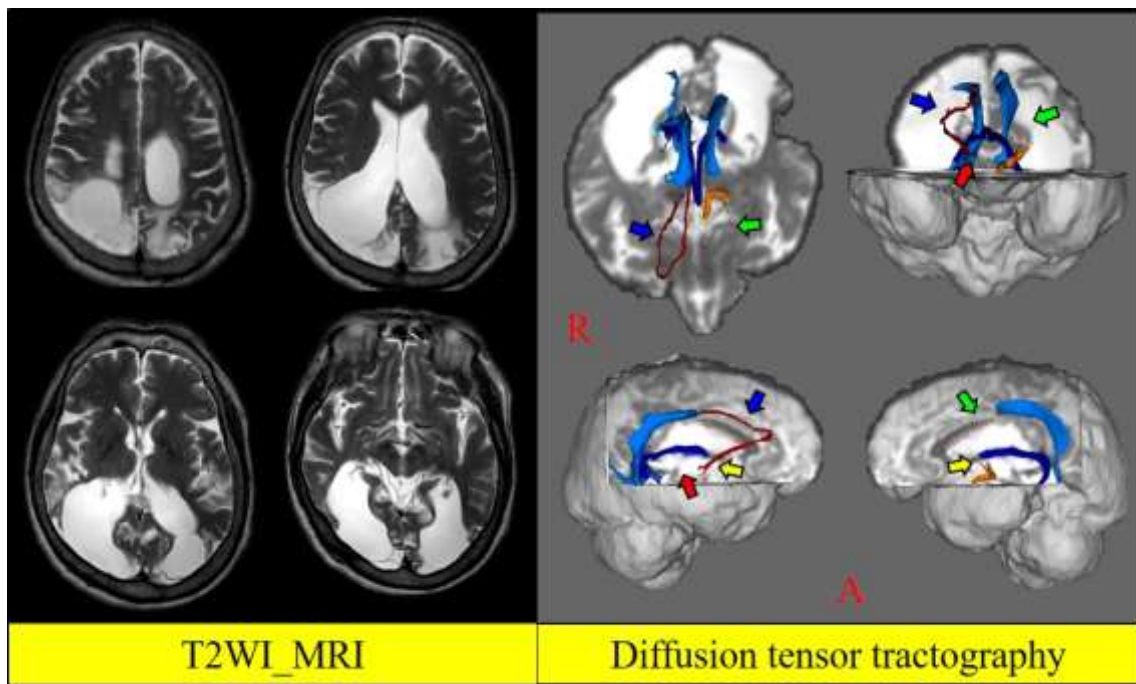
The score of MMSE was 12 and the neuropsychological results were as follows in table 1. The right thalamocingulate tract was thinned (blue arrow) and the left thalamocingulate tract was discontinued (green arrow). There was absence of the mammillothalamic tracts in the right hemisphere (red arrow). In addition, the anterior columns of the fornix (yellow arrow) in the both hemispheres were injured (Figure).

Conclusions

Our study demonstrate that DTT is a useful modality to identify injury of neural tract in the Papez circuit in patient with meningitis following scrub typhus. It may be helpful for mechanism of the cognitive impairment following meningitis.

Visual span		Digit span		Verbal learning		Visual learning	
Forward	Back	Forward	Back	Frist trial	Fifth trial	Frist trial	Fifth trial
3(0.5%)	2(0.5%)	3(0.5%)	2(0.5%)	0(0.5%)	5(0.5%)	6(18%)	7(50%)

results of computerized neuropsychological test in patient



Diffusion tensor tractography (DTT) image in patient