Magnetic resonance imaging and proton magnetic resonance spectroscopy in neuro-Behçet's disease

K-S. Park[1], H-J. Ko[1], C-S. Cho[1], W-U. Kim[1], H-Y. Kim[1], B-Y. Choe[2]

[1]Internal Medicine, The Catholic University of Korea, College of Medicine, Seoul, Korea, Republic of, [2]Biomedical Engineering, The Catholic University of Korea, College of Medicine, Seoul, Korea, Republic of

ABSTRACT

Neuro-Behçet's disease (NBD) is one of the most serious complications of Behçet's disease (BD). We tried to characterize the MRI findings in Korean patients with NBD and examine the usefulness of ^{1}H MRS in evaluating MRI-negative brain area of NBD patients. We performed brain MRI in 18 NBD patients. Eight NBD patients without thalamic lesions and 8 healthy controls matching in age and sex underwent brain ^{1}H MRS. Fifteen of the 18 NBD patients (83%) had brain lesions on MRI. Most lesions were of high signal intensity on T2-weighted images and located in the midbrain, pons, basal ganglia, and white matter. On ^{1}H MRS, thalamic area without gross abnormality on MRI showed significant lower levels of NAA/Cr ratio in NBD patients compared to healthy controls (1.09 ± 0.11 versus 1.54 ± 0.27, $P < 0.01$). In 2 NBD patients, the NAA/Cr ratios, monitored serially, were normalized along with clinical improvement 6 months after treatment with prednisolone and immune suppressive agents. MRI is a very sensitive diagnostic method for NBD, and ^{1}H MRS may be useful for the early detection and follow-up of MRI-negative NBD.

INTRODUCTION

Behçet's disease (BD) is a systemic inflammatory disorder characterized by recurrent oral and/or genital ulceration, and uveits. Other clinical features include skin lesion, vascular thrombosis, intestinal ulceration, arthritis, and central nervous system (CNS) involvement [1]. Among these, CNS involvement, which is known as neuro-Behçet's disease (NBD), is one of the most serious complications of BD and has been reported to occur in 4 % to 49 % of BD patients [2]. NBD shows various symptoms and signs including headache, stroke, aseptic meningitis, meningoencephalitis, and dementia. It is generally diagnosed based on neurologic manifestations and abnormal findings on brain MRI. Although MRI is known to be the most sensitive diagnostic test for NBD [3], some BD patients with neuro-psychiatric symptoms do not have abnormal MR images, and thus other diagnostic methods are required [4].

MATERIALS AND METHODS

Eighteen BD patients with neurologic manifestations were included for this study; there were 11 men and 7 women (mean age 38.6 ± 7.6 years, mean disease duration 34.4 ± 25.5 months). All patients fulfilled the criteria of the International Study Group for BD (1). We performed brain MRI in all patients and ^{1}H MRS in 8 BD patients (5 men and 3 women, mean age 38.5 ± 9.9 years). Also ^{1}H MRS was done in 8 healthy controls that matched in age and sex (4 men and 4 women, mean age 38.4 ± 8.6 months). Both MRI and ^{1}H MRS were performed using the 3 T MRI/MRS system. As for ^{1}H MRS, a 2x2x2 cm3 (8 ml) voxel was placed in the left thalamus on T2-weighted MR image (TE 90ms, TR 2500ms). ^{1}H-spectrum was obtained from the voxel using (STEAM sequence with water suppression by CHESS RF pulse. The spectral parameter was 20 ms TE, 2000 ms TR, 128 averages, 2500 Hz signal width, and 2048 data point.

RESULTS

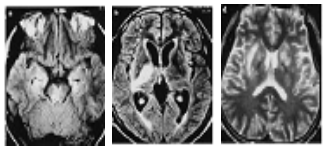

Fig.1. Axial T2-weighted images in NBD patients showing involvement of midbrain, internal capsule, thalamu, and basal ganglia.

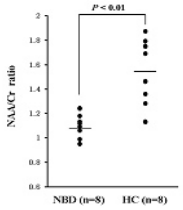

Fig.2. NAA/Cr ratio in patients with neuro-Behçet's disease (NBD) and healthy controls (HC).

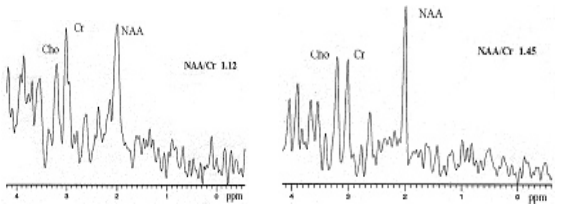

Fig.3. ^{1}H MRS in the typical patient of NBD before (A) and 6 months after (B) treatment with prednisolone plus cyclophosphamide, showing normalization of NAA/Cr ratio from 1.12 to 1.45..

The most frequent symptom was headache (61%) followed by memory impairment (22%), dizziness (22%), hemiparesis (17%), dysarthria (17%), seizure (11%), enuresis (6%), depression (6%), and tremor (6%). Eight NBD patients without thalamic lesions and 8 healthy controls underwent H^1 MRS. Because authors wanted to find out whether ^{1}H MRS could sensitively detect functional and metabolic abnormalities in the brain of NBD patients, an 8 ml voxel was placed in the left thalamus where any abnormal finding was not detected on MRI. Among 8 NBD patients, three had no brain lesion on MRI irrespective of definite neurologic symptoms such as memory impairment, headache, and seizure. We selected the thalamic area for ^{1}H MRS because the thalamus is reported as one of the frequently affected structures in NBD. In the analysis of MRS findings in this area, we observed that the NAA/Cr ratio was significantly lower in NBD patients compared to healthy controls (1.09 ± 0.11 versus 1.54 ± 0.27, $P < 0.01$).

DISCUSSION

In this study, we obtained spectra from the thalamus of NBD patients without thalamic lesions on MRI to examine whether ^{1}H MRS can detect neurometabolic abnormalities in MRI-negative brain area. In the analysis of MRS findings in this area, we observed that NBD patients had significant lower levels of NAA/Cr ratio compared to healthy controls. This suggests that metabolic abnormalities might be present in the normal-looking area of the brain in NBD patients. Therefore, the present study suggest that ^{1}H MRS might be a very sensitive tool for the detection of NBD and be useful to verify the onset of NBD earlier.

REFERENCES

[1] International Study Group for Behçet's Disease: Criteria for diagnosis of Behçet's disease. Lancet 1990; 335: 1078-80.

[2] Akman-Demir G, Serdaroglu P, Tasçi B, et al. Brain 1999; 122: 2171-81.

[3] Tali ET, Atilla A, Keskin T, et al. Neuroradiology 1997; 39: 2-6.

[4] Markus HS, Bunker CB, Kouris K, et al. J Neurol 1992; 239: 363-6