

Magnetic resonance spectroscopy in dysplastic lesions

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Background and Objective: Magnetic resonance imaging (MRI) of epilepsy patients often indicates lesions such as cortical dysplasia. Although closer examination is necessary, the conventional evaluations alone may pose certain difficulties, such as in assessing the degree of malignancy. The proton magnetic resonance spectroscopy (¹H-MRS) is a technique that identifies a spectrum of metabolites of the proton in vivo. Within this spectrum, decreases in N-acetylaspartate (NAA) have generally been associated with a decline in neuron function, while choline (Cho) is thought to increase, for example, in multiplying tumor. The creatinine (Cre) is often used as a standard index. We report herein measurements of the NAA, Cho and Cre distribution patterns of dysplastic lesions.

Methods: The study subjects were 2 patients with intractable partial epilepsy in whom dysplastic lesions were suspected on the 1.5-T MRI. MRS was conducted on the lesion and on the symmetrical portion of the equal voxel size as a control, using the ¹H single-voxel method at settings of: TR, 3000 ms; TE, 270ms; and voxel size, 2x2x2 cm³. Measurements of NAA/Cr and Cho/Cr ratios were compared with the data between normal and astrocytoma groups quoted from the monograph¹ written by one of our co-authors.

Results:

Case 1: A 4-year-old girl developed seizures at 3-months-old. Seizure frequency was weekly or greater, usually at bedtime. During the seizure, the patient suddenly opened her eyes, lifted both arms upward and exhibited automatism involving a swing-like motion of the left arm, while simultaneously flexing both legs. At the same time, the convulsion occurred in the left leg. Seizures lasted several tens of seconds. A lesion was identified in the left parietal lobe. Her mother rejected the surgical resection because of the potential postoperative neurological deficits.

Case 2: A 13-year-old boy developed seizures at 8-years-old. Seizure frequency ranged from daily to weekly. During seizures, which began with a warning sign of visual field constriction, he experienced numbness in the head in addition to leftward eye movement. By his own account, the patient remained aware of his surrounding environment up to a point in the eye movement seizure. However, the patient eventually experienced impairment of consciousness and subsequent eye turning. Seizures tended to occur episodically in clusters on days when the patient played too many video games. A lesion was found on the medial side of the right occipital lobe. Histological examination proved it Palmini IIb of the cortical dysplasia.

In the lesions NAA/Cr and Cho/Cr ratios were 1.21±0.06 and 1.60±0.47, respectively. In the normal group¹, they were 1.96±0.41 and 1.13±0.44. And in the astrocytoma group¹, they were 0.51±0.54 and 4.21±0.85. In comparison to the normal group, NAA/Cr ratio in the lesion was clearly lower, while increases in Cho/Cr ratio were not as significant. However, the decline in NAA/Cr ratio was not as significant as that in the astrocytoma group.

Conclusions: ¹H-MRS may contribute to diagnosis and treatment plans of epilepsy with dysplastic lesions.

Reference

1. Toshiro FUJIMOTO. MRS of the brain and neurological disorders (Noushinkeishikkan No MRS, in Japanese) 1st ed. Tokyo: Institute for advanced medical technology, 1997: 87