Tumefactive Myelinoclastic Diffuse Sclerosis
—Case Report—

Soichi OBARA, Hideo TAKESHIMA, Ryuji AWA, Hajime YONEZAWA, Tatsuki OYOSHI, Tetsuya NAGAYAMA, Hirofumi HIRANO, Masaki NIIRO, and Jun-ichi KURATSU

Department of Neurosurgery, Faculty of Medicine, Kagoshima University, Kagoshima

Abstract
A 6-year-old boy presented with mental disturbance and progressive left hemiparesis. Magnetic resonance imaging demonstrated large intracranial mass lesions with ring-like enhancement. His neurological condition deteriorated rapidly. Open biopsy via craniotomy was performed under the suspicion of tumor. Histological examination showed massive demyelination and axon preservation, but no tumor cells. The diagnosis was myelinoclastic diffuse sclerosis (MDS). He was treated with high-dose methylprednisolone and improved dramatically. MDS is a rare demyelinating disorder of the central nervous system that affects mainly children and may mimic a brain tumor. MDS must be included in the differential diagnosis in young patients with a brain tumor with atypical radiological appearance.

Key words: Schilder's disease, children, myelinoclastic diffuse sclerosis, brain tumor

Introduction
Myelinoclastic diffuse sclerosis (MDS), also known as inflammatory diffuse sclerosis and Schilder's disease, is a rare demyelination disorder of the central nervous system that usually presents as an intracranial mass lesion. MDS is more common in children than adults. MDS has variable presentations and imaging findings, and can involve an area large enough to simulate the radiological appearance and clinical course of a brain tumor. Consequently, patients have been subjected to brain biopsy or surgery under the suspicion of tumor, whereas focal demyelination was found. We treated a young patient with MDS who suffered rapid neurological deterioration associated with radiological findings suggestive of tumor.

Case Report
A 6-year-old boy had a 1-month history of behavioral change and a 1-week history of altered gait. He was admitted to our hospital on May 30, 2002. His mother's pregnancy and delivery had been uneventful and his family history was unremarkable. He had no prior significant illnesses.

On admission, physical examination revealed that he was febrile with hypersalivation. Neurological examination disclosed that he was drowsy and flaccid, with left hemiplegia affecting the arm and face more severely than the leg. He had bilaterally hyperactive reflexes and bilaterally positive Babinski signs. Routine blood tests, including erythrocyte sedimentation rate, showed serum levels of very long chain fatty acids and lactic acid were within normal limits. Cerebrospinal fluid (CSF) analysis showed no abnormalities and no oligoclonal bands. No antibodies were detected in the serum or CSF against Borrelia, Toxoplasma, Brucella, measles, mumps, Epstein-Barr virus, cytomegalovirus, or human immunodeficiency virus.

Electroencephalography revealed generalized slowing, more marked in the right hemisphere, with diffuse polymorphic slow waves in the right frontal-to-temporal area. Magnetic resonance (MR) imaging showed a large hyperintense lesion on fluid-attenuated inversion recovery images in the right frontal lobe. Mass effect was minimal for a tumor (Fig. 1A), but gadolinium-diethylenetriaminepenta-acetic acid administration showed peculiar ring-like enhancement (Fig. 1D, E) with ill-defined margins.
Furthermore, multiple lesions without contrast enhancement were identified in the left temporal and parietal lobes (Fig. 1B, C). Proton MR spectroscopy revealed reduced N-acetylaspartate/creatine ratio (0.9) and increased choline/creatine ratio (2.7) and lactate/creatine ratio (1.2) (Fig. 1F).

Medical treatment was instituted including intravenous administration of dexamethasone (8 mg/day) and glycerol. However, his condition deteriorated rapidly, he became drowsier, and he manifested almost complete paresis. Repeat MR imaging showed the right frontal and left parietal lesions had enlarged. Open biopsy via craniotomy was performed to obtain a histological diagnosis.

Histological examination showed the white matter was characterized by intense astrogliosis, and abundant eosinophilic cytoplasm. There were many CD68-positive macrophages, and all vessels were surrounded by an infiltrate composed of CD8-positive T lymphocytes (Fig. 2A). The axons traversing the lesion were almost completely devoid of myelin, but the axons were spared (Fig. 2B, C). No neoplastic cells were found. These findings were indicative of MDS.

Intravenous methylprednisolone (500 mg/day) was administered for 3 days. The dose was slowly tapered to oral prednisolone 7.5 mg/day over 5 months. He returned to normal consciousness 7 days after the start of treatment with prednisolone. Two months later, his left hemiparesis and neurological status improved progressively. Follow-up MR imaging showed that all lesions were dramatically decreased in size (Fig. 3). Six months after undergoing treatment, his neurological complaints had resolved.

Discussion

MDS presents with a wide spectrum of symptoms and signs, but the most common are hemiparesis, memory impairment, personality change, and dementia. Our patient presented with mental deterio-
Fig. 2 Photomicrographs of the biopsy specimen from the right frontal lobe showing (A) perivascular chronic inflammatory infiltrates surrounded by a mixture of foamy macrophages and reactive astrocytes against a loose, edematous background within the lesion (HE stain, original magnification × 200), (B) relatively good preservation of the axons (Bodian stain, original magnification × 200), and (C) no stainable myelin within the lesion (Klüver-Barrera stain, original magnification × 200).

Fig. 3 T1-weighted magnetic resonance images with gadolinium obtained 5 months after admission showing the size of all lesions was dramatically decreased.

tumor or abscess. Indications for the exclusion of tumors or abscesses include a smooth contrast-enhanced rim with little surrounding edema and the “open ring” sign. MR spectroscopy profiling and “physiologic” MR imaging (i.e. diffusion- and perfusion-weighted sequences) are valuable for obtaining the correct diagnosis.

The following restrictive diagnostic criteria have been proposed for MDS: Subacute or chronic demyelinating disorders with one or two symmetric bilateral lesions measuring at least 3 × 2 cm and involving the centrum semiovale of the cerebral hemispheres; absence of other lesions demonstrated by clinical or imaging studies; no involvement of the adrenal glands or the peripheral nervous system; and histological findings identical to those of multiple sclerosis.

The possibility of demyelinating disorder should be considered in a patient with an atypical brain tumor syndrome. The presence of incomplete contrast-enhanced ring with ill-defined margins on neuroimaging is an indicator of atypical demyelinating lesions.

References

Neurol Med Chir (Tokyo) 43, November, 2003