CASE REPORT

Transient Splenial Lesion of the Corpus Callosum in H1N1 Influenza Virus–Associated Encephalitis/Encephalopathy

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Abstract

A 26-year-old man was admitted to our hospital because of high fever, drowsiness, memory disturbance, and disorientation due to H1N1 influenza virus-associated encephalitis/encephalopathy. All of his symptoms rapidly improved following methylprednisolone pulse therapy. The diffusion-weighted image of brain magnetic resonance imaging (MRI) revealed a large transient hyperintense signal lesion on the central splenium of the corpus callosum. This MRI finding in conjunction with a complete clinical recovery has been previously observed in cases of clinically mild seasonal influenza-associated encephalitis/encephalopathy, and can be also a useful clue for the diagnosis of new type of influenza, H1N1 influenza virus infection complicated by encephalitis/encephalopathy.

Key words: encephalitis, encephalopathy, MRI, DWI, H1N1, influenza


Introduction

Pandemic outbreak of H1N1 influenza virus was spread all over the world and therefore much attention was given to the early diagnosis and treatment for this new type of flu. H1N1 influenza virus-associated encephalitis/encephalopathy is one of the critical complications, and it has been reported in child cases (1, 2). These studies have clearly indicated that MRI abnormalities are well correlated with various clinical courses (1, 2). On the contrary, no previous reports have been available concerning the characteristics of MRI findings in adult patients complicated by H1N1 influenza virus-related encephalitis/encephalopathy. In this report, we describe an adult case of H1N1 influenza virus infection associated with a rapid development of encephalitis/encephalopathy with successful treatment with steroid pulse therapy. Moreover, we found a reversible MRI lesion on the central splenium of the corpus callosum which was well correlated with a full recovery of clinical manifestations.

Case Report

A 26-year old man developed high fever, followed by drowsiness, memory disturbance, and disorientation. His past history did not reveal any specific disorders. He was transferred to our hospital on the following day. He had already received oseltamivir medication without NSAIDs prescribed by a family physician.

On admission, he was drowsy. Neurological examination revealed no focal signs. Physical examination on admission revealed the following: temperature, 37.9°C; blood pressure, 136/79 mmHg; pulse rate, 99 beats per minute, regular; respiration rate, 18 per minute; and SpO2, 91% on room air. Test for polymerase chain reaction of nasopharyngeal swab proved to be positive for novel influenza A (H1N1) virus genome as well as for the rapid influenza A antigen detection assay. The serum C-reactive protein level was elevated (6.9 mg/dL; normal <0.3 mg/dL), but leukocytosis was not found (white blood cell count of 8,800/μL; normal 4,000-9,400). Blood chemistry examination showed an elevation of creatine phosphokinase (2,805 IU/L; normal 62-287), aspartate aminotransferase (126 IU/L; normal 13-33), alanine
aminotransferase (144 IU/L; normal 6-30), lactate dehydrogenase (490 IU/L; normal 119-229), and γ-glutamyl transpeptidase (64 IU/L; normal 10-47). Serum creatinine level (1.30 mg/dL; normal 0.60-1.10) was elevated slightly, but blood urea nitrogen (11.9 mg/dL; normal 8.0-22.0) was within the normal range. There were no serological abnormalities suggesting metabolic or autoimmune disorders. Analysis of cerebrospinal fluid disclosed mild pleocytosis (38/3 mm$^3$) with normal protein (30 mg/dL) and glucose (108 mg/dL) levels. Electrocardiogram and the chest radiographic examination showed no significant findings. Electroencephalogram showed symmetrical normal basic activity without paroxysmal discharges.

The initial brain magnetic resonance imaging (MRI) revealed a marked hyperintense signal lesion on the central splenium of the corpus callosum by diffusion-weighted imaging (DWI) (Fig. 1).

The clinical course of the present case is shown in Fig. 2. His drowsiness, disorientation, and memory disturbance rapidly and completely improved following methylprednisolone pulse (1 g/day for 3 days) therapy with a continuous medication of oseltamivir. Treatment with hydration over 3,000 mL/day was initiated for CPK elevation caused by suspected rhabdomyolysis, and his urinary output had been maintained at more than 2,000 mL/day during the course of disease. However, he suddenly complained of myalgia in the proximal lower extremities on day 6. His blood creatine phosphokinase (CPK) level was markedly increased (27,505 U/L) with hypermyoglobulinuria (17,000 μg/L; normal 0-10). The myalgia faded away on day 9, and CPK level was normalized on day 35.

Follow-up MRI examination performed on day 11 re-
Follow-up MRI taken on day 11 revealed no abnormal findings on axial diffusion-weighted (A), T2-weighted (B), or fluid-attenuated inversion recovery (C) imaging.

**Discussion**

This is the first report on the MRI finding of H1N1 influenza virus-related encephalitis/encephalopathy in an adult case. Previous reports on child cases have disclosed that MRI findings of H1N1 influenza virus-associated encephalitis/encephalopathy are variable and suggested that these MRI findings are well correlated with their clinical courses (1-3). In severe cases, MRI examination demonstrated a similar finding to that seen in acute necrotizing encephalopathy (ie: symmetric thalamic lesions) (1, 2). On the contrary, as in the bulletin about clinically mild cases by Centers for Disease Control and Prevention (CDC), one patient exhibited scattered T2 hyperintense foci within the cerebral white matter, and another two patients showed no parenchymal abnormal findings on MRI examination (3).

The reversible central splenial lesion of the corpus callosum on MRI examination has been observed in patients with various infectious encephalitis/encephalopathy, such as rotavirus (4), measles virus (5), and *Salmonella enteritidis* (6). Furthermore, a similar transient splenial lesion of the corpus callosum on MRI has been also demonstrated in both child and adult patients with seasonal influenza complicated by encephalitis/encephalopathy (7-9). These characteristic MRI findings were only found in clinically mild cases (10), and they were correlated with the minimal to absent pleocytosis in cerebrospinal fluid just like the present case.

The molecular mechanisms for these reversible MRI findings on the corpus callosum have been speculated by the intramyelinic edema caused by a cytokine storm in these patients, which are resolved by the steroid pulse therapy (9).

Thus, a marked hyperintense signal on DWI in the splenium of the corpus callosum (SCC) is thought to be a useful indicator for a good prognosis in H1N1 influenza virus-associated encephalitis/encephalopathy.

Finally, we have to make a comment on the complication of rhabdomyolysis in the present case. Influenza virus-associated rhabdomyolysis with myoglobinuria can be one of the serious complications in all age brackets, and it can occur during the peak and convalescent stage of illness. The incidence of rhabdomyolysis in influenza A virus infection is known to be higher than that of type B (11, 12). The clinical courses including the prognosis of renal function and motor weakness had been variable (11). Rhabdomyolysis complicated by H1N1 influenza virus is relatively rare. Therefore, only a few reports of such cases have been available, most of these previous cases had good recoveries from this type of complications (13-15).

**The authors state that they have no Conflict of Interest (COI).**

**References**


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