Transient Bilateral blindness due to mild encephalopathy with reversible splenial lesion (MERS): a case report

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Abstract

Background: Mild encephalitis/encephalopathy with a reversible splenial lesion (MERS) is a rare clinical-radiological being defined by the magnetic resonance imaging (MRI) finding of a reversible lesion in the corpus callosum. The most significant neurological symptoms are disturbance of consciousness and abnormal and delirious behavior.

Case presentation: A seven-year-old male patient with a history of fever and cough was admitted to our hospital due to sudden-onset bilateral blindness. His physical examination showed confusion, fever, and delirious behavior with no focal neurological and meningeal irritation signs. The electroencephalogram showed diffuse slowing in favor of mild encephalopathy. Magnetic resonance imaging of the brain showed a signal alteration in the splenium of the corpus callosum and Magnetic Resonance Angiography (MRA) was normal. This finding was suggestive of a reversible cytotoxic lesion. Empiric antiviral treatment was initiated and the symptoms improved completely.

Conclusion: Sudden blindness was reported as an initial symptom of MERS in a few children. Until now, there is no evidence of effective treatment methods. Nevertheless, MERS diagnosis provides pediatricians with beneficial prognostic information in order to convince patients and their families about the good outcome of this disease.

Keywords: Reversible encephalopathy, Bilateral blindness, Corpus callosum

Introduction

Tada et al. first determined the concept of mild encephalopathy/encephalitis with a reversible splenial lesion (MERS) as an uncommon clinical-radiological syndrome in 2004[1, 2] which is mostly reported in East Asian populations [3]. It usually develops in children below sixteen-years-old and only occasionally in adults [4]. Infections are considered as the main trigger of the disease; the major pathogens associated with MERS are viruses, such as influenza virus (A and B) [3]. Non-infectious conditions related to reversible splenial lesions are seizures, antiepileptic drug withdrawal, metabolic disturbances, and renal or hepatic dysfunction [5]. To date, a common pathophysiological mechanism explaining selective splenial involvement has not been found. However, there are several hypotheses on MERS pathogenesis, including intramyelinic edema, hyponatremia, axonal damage, and oxidative stress [6]. MERS is typically characterized by a prodromal illness consisting of fever, cough, and digestive tract symptoms followed one to seven days later by encephalopathy [7, 8]. The neurological features of MERS include disturbance of consciousness, abnormal speech, delirious behavior, headache, agitation, disorientation, seizures, facial nerve paralysis, and nuchal rigidity; however visual

disturbances are rare symptoms of this syndrome. The most common neurological symptom described in the literature is delirious behavior with altered consciousness, which may present as akinetic mutism [5, 9]. On MRI, MERS is almost always associated with a transient splenial lesion that is slightly hyperintense on T2- weighted images and isointense to slightly hypointense on T1-weighted images, and that shows reduced diffusion without contrast enhancement during the acute period of the disease. A classification of MERS based on MRI data was proposed; In MERS type 1, the lesions are limited to the splenium (ovoid or band shaped), as observed in our case report, whereas in MERS type 2 the lesions are not limited to the splenium [10, 11]. Clinical and radiological outcome is usually favorable with clinical improvement occurring within one to two days, while radiologic improvement within 10 days-4 months. Usually, raised serum inflammatory markers (white cell count and C-reactive protein) in the absence of CSF inflammation can be found in children diagnosed with MERS, supporting the hypothesis that this syndrome is an infection-associated encephalopathy rather than an encephalitis [7]. At the moment, No high-level evidence on the therapeutic approaches is available. Methylprednisolone pulse therapy and intravenous immune globulin (IVIG) are recommended for patients with infectious encephalopathy, regardless of pathogen or clinical-radiological syndromes [8]. Here we describe a case of MERS in an Iranian seven-year-old male patient, with a cytotoxic lesion in the SCC11Splenium of the corpus callosum detected by MRI and the unusual clinical presentation of acute bilateral blindness.

Case presentation

A previously healthy seven-year-old child was admitted to our hospital due to sudden-onset bilateral blindness. One day prior to admission, he suddenly developed a fever of 39 °C, cough, and loss of appetite. He was examined by his pediatrician and azithromycin and intravenous fluid therapy was prescribed due to suspected streptococcal pharyngitis. Although treatment with azithromycin and oral antipyretics was started, he still had a fever of 38 °C. On the day of admission, he experienced all at once a non-episodic bilateral blindness and delirium. The symptoms were continuous and therefore, he was admitted to the hospital emergency department. His family history was unremarkable. On physical examination, the patient was agitated associated with encephalopathy feature and his general condition was not good. The boy was collaborative during the medical evaluation, although his responsiveness was slightly impaired. Neither focal neurological signs nor meningeal irritation signs were observed.

Chemistry panel and urine analysis showed no abnormalities except for a highly elevated level of CPK22Creatine phosphokinase (569 U/L), slightly elevated level of AST33Aspartate aminotransferase (47 U/L), and mild hyponatremia (134 mEq/L). The presence of blindness prompted an ophthalmologic evaluation, including a fundus oculi examination that was negative.

On the following day, the electroencephalogram (EEG) showed diffuse slowing waves in favor of mild encephalopathy. The child's neurologist observed mild increase in deep tendon reflex (DTR) but no significant focal neurological deficit was detected.

The child was then admitted to perform a brain MRI and a lumbar puncture, in order to exclude acute cerebral vascular accident and the presence of viral encephalitis, cerebral abscesses, or other cerebral inflammatory lesions, such as acute disseminated encephalomyelitis (ADEM).

Brain MRI was done four hours after admission and restriction in the corpus callosum was seen in diffusion-weighted imaging(DWI), with correlation in Apparent Diffusion Coefficient (ADC MAP), suggesting an abnormal diffusion restriction and a reversible cytotoxic lesion (Figure 1) Without any abnormal intensity in other views and T1-W.

Treatment against suspected meningitis with intravenous ceftriaxone (100 mg/ Kg once a day), vancomycin (15 mg/ Kg every 6 h), acyclovir (10 mg/ Kg every 8 h) and dexamethasone (0.2 mg/Kg every 8 h) was initiated, while waiting for the results of the polymerase chain reaction (PCR) search for neurotropic viruses, bacteria and fungi in the cerebral spinal fluid (CSF) and peripheral blood. Antibacterial therapy was suspended because the blood and CSF44Cerebrospinal fluid culture was negative. A nasal swab for metapneumovirus virus was positive but this data did not change patient's management.

Collateral findings detected by MRI were arachnoid cyst in the posterior fossa and abnormal signal intensity in the maxillary and ethmoid sinuses. The child was in good general condition without apraxia. As a result, he was discharged after 6 days of admission and treatment with acyclovir and dexamethasone. After four days, a follow-up brain MRI was repeated, showing a complete normalization of the signal alteration in the SCC (Figure 2). The EEG was also repeated, showing a complete normalization of the pattern. The child was in good general condition, without neurological deficits.

Discussion and conclusions

In our case, the unusual main neurological symptom was acute bilateral blindness, which appeared after one day with symptoms suggestive of viral infection (low-grade fever, nonproductive cough). The slight metapneumovirus positivity detected by PCR in the oropharynx and nasopharynx remains a result of uncertain interpretation within the clinical picture of this patient.

In this case, there are several reasons why metapneumovirus was not strongly considered in the etiology. Sometimes, a slight metapneumovirus positivity by PCR may also be found in patients without related symptoms. The seven-year-old child presented with non-specific symptoms, which could be attributed to a variety of viruses, and metapneumovirus disease usually occurs in winter and autumn. Furthermore, in this case, the PCR search for metapneumovirus in the CSF was not done.

EEG abnormality was diffuse slowing in favor of mild encephalopathy and MRI imaging showed lesions limited to the splenium, which was restriction in DWI with correlation in ADC map (MERS type 1).

With regard to laboratory findings, our patient had highly elevated level of CPK, slightly elevated level of AST and mild hyponatremia at hospital admission. However, this result only provides a limited contribution to the clinical presentation.

Our patient was treated with intravenous therapy against suspected meningitis and herpes virus until the culture and viral PCR search for neurotropic in the blood and CSF was found to be negative. In addition, the patient received corticosteroid therapy for five days with low dose of dexamethasone. To date, there is no evidence of an effective treatment for patients with MERS, and the prognosis.

In children, MERS shows a wide spectrum of clinical presentations however, visual disturbances are rare symptoms of this syndrome. Most of the MERS cases show a favorable outcome regardless of treatment. The early recognition of this condition in children with encephalopathy may limit unnecessary and potentially toxic treatments. Moreover, MERS diagnosis allows pediatricians to reassure patients' families about the good outcome of this disease.

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5. **Patient consent statement:** Informed consent was taken from the patient and his family, that information about him would be published in a journal.

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