Aseptic meningitis in a child due to 2009 pandemic influenza A (H1N1) infection

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Neurologic manifestations of seasonal influenza 2009 pandemic influenza A (H1N1) are now known to include encephalitis, acute disseminated encephalomyelitis, Guillain-Barré syndrome, transverse myelitis, and acute necrotizing encephalopathy. We report a case of 2009 pandemic influenza A (H1N1) meningitis in a previously healthy six-year-old girl who presented with fever, headache, abdominal pain, and vomiting. The infection was confirmed via nasopharyngeal and throat swabs. She was treated with oseltamivir successfully. To our knowledge, she is the first child diagnosed as pandemic influenza A (H1N1) meningitis.

Key words: child, H1N1, influenza, meningitis.

Neurologic complications of influenza have been well described in the literature and date back to the diagnosis of encephalitis lethargica during the 1918 influenza pandemic. Neurologic manifestations of influenza are now known to include encephalitis, acute disseminated encephalomyelitis, Guillain-Barré syndrome, transverse myelitis, and acute necrotizing encephalopathy (ANE)[1]. However, there are only a few previous reports describing the association of 2009 pandemic influenza A (H1N1) virus with neurologic complications such as encephalitis and ANE in children[2,3]. To our knowledge, we are reporting herein the first case of pandemic influenza A (H1N1) meningitis in a child aged six years.

Case Report

A previously healthy six-year-old girl was admitted to our hospital due to fever (39°C), headache, abdominal pain, and vomiting on 19 November 2009. Her complaints had started within the last 24 hours. She had not been vaccinated for seasonal influenza, and she had not received the H1N1 vaccine. Furthermore, children infected by the 2009 pandemic influenza A (H1N1) virus were present in her school. On physical examination, she was febrile and exhausted. Her vital signs included a temperature of 39.1°C, heart rate of 108 beats/minute, respiratory rate of 30 breaths/minute, and a blood pressure of 100/67 mmHg. The oropharynx was hyperemic. In neurologic examination, she was fully conscious and Glasgow Coma Scale was 15, but meningeal irritation findings (stiff neck, Kernig and Brudzinski signs) were positive. The rest of the physical examination was normal.

Initial whole blood count revealed a hemoglobin level of 12.8 g/dl, a white blood cell (WBC) count of 14,800/mm^3 (76% neutrophils, 6% lymphocytes and 18% neutrophil bands), and a platelet count of 309,000/mm^3. Erythrocyte sedimentation rate was 20 mm/h and C-reactive protein was 6.1 mg/dl. Biochemical and urine analysis were normal. We performed lumbar puncture for possible central nervous system (CNS) infection. High opening cerebrospinal fluid (CSF) pressure and opalescent appearance were noted. The CSF test revealed a WBC count of 1310/mm^3 (98% lymphocytes and 2% neutrophils), protein level of 59 mg/dl, and glucose level of 49 mg/dl (simultaneous blood glucose level was 99 mg/dl). We initiated intravenous ceftriaxone for possible bacterial meningitis until CSF and blood culture results were obtained.

Blood, throat, urine, and CSF cultures did not demonstrate any infectious agent; the only positive tests were the 2009 pandemic

influenza A (H1N1) real time reverse-transcriptase polymerase chain reaction (RT-PCR) via nasopharyngeal and throat swabs. The diagnosis of aseptic meningitis due to 2009 pandemic influenza A (H1N1) virus was established, ceftriaxone therapy was discontinued, and oseltamivir was initiated on the 3rd day of her hospitalization. The patient's fever decreased within 24 hours of beginning oseltamivir. Her clinical findings recovered fully, and she was discharged on the 5th day of admission, and oseltamivir therapy was completed to five days.

Discussion

Influenza virus can cause common respiratory tract infections and rarely multiorgan system disorders, resulting in mild infection, severe respiratory disease, or systemic disease and complications. Symptoms of mild influenza infection usually include fever, headache, cough, sore throat, myalgia, and sometimes diarrhea or vomiting. In general, it is usually self-limited and not serious. However, certain patients, especially children, the elderly, pregnant women, and people with certain diseases, have a higher risk of incurring pneumococcal pneumonia and CNS complications[4].

Febrile seizure is the most common complication, the symptoms of which tend to resolve without neurological sequelae. However, influenza infections may also be associated with severe acute CNS dysfunction such as encephalitis[2]. Amin et al.[5] showed that 5% of acute childhood encephalitis was associated with influenza. In Japan, the epidemiology of influenza-associated acute encephalopathy has been extensively evaluated. The clinical course of ANE is rapidly progressive; patients present with fever and nonspecific symptoms, such as cough, emesis and/or diarrhea, and quickly develop neurologic dysfunction. Approximately 18% of cases of ANE in Japan have been associated with influenza A infection. The strain most frequently associated with ANE is influenza A, H3N2 subtype, although cases associated with H1N1 and influenza B have also been described. The disease is associated with significant morbidity and mortality, and survivors usually exhibit at least short-term neurologic sequelae[1]. However, several other North American and European studies noted a lower mortality rate than that observed in Japan[2]. Influenza-associated encephalopathy/encephalitis is especially seen among young children, and nearly 80% of affected people were under five years old[4].

In the literature, there are only a few previous reports describing the association of 2009 pandemic influenza A (H1N1) virus with neurologic complications. To our knowledge, only 13 children with encephalopathy/encephalitis-associated 2009 pandemic influenza A (H1N1) virus were reported[1-4,6,7]. However, our patient is the first reported case of aseptic meningitis due to H1N1. Interestingly, although she had no respiratory symptom of influenza infection, we took samples to detect H1N1 infection by nasopharyngeal and throat swabs, but we did not give antiviral therapy initially. The CSF analysis revealed an aseptic meningitis, because 98% of WBCs were lymphocytes and the protein and glucose levels were in normal ranges. However, we gave ceftriaxone for possible bacterial meningitis until CSF and blood culture results were obtained, because she had no viral symptom or sign and the acute phase reactants were positive. The diagnosis of aseptic meningitis due to 2009 pandemic influenza A (H1N1) virus was established by detecting the 2009 pandemic influenza A (H1N1) RT-PCR via nasopharyngeal and throat swabs, but not via CSF specimen. In only one of the previous 13 cases could the virus be demonstrated in CSF[2]. Additionally, we strengthened our diagnosis with the patient becoming afebrile soon after initiating oseltamivir therapy.

In conclusion, clinicians should consider possible neurologic complications like aseptic meningitis associated with novel influenza A (H1N1) virus in children who present with only meningismus signs without respiratory symptoms during the pandemic influenza periods.

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