Neurological Manifestation of Swine Flu: A Brief Note

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Abstract- Swine flu is currently a problematic emerging infectious disease, and has reached pandemic proportions. Neurological manifestations of swine flu have been reported, but there is not much documentation. This note briefly summarizes what is known about the neurological manifestation of swine flu.

Key Words: swine flu, neurological, manifestation

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The newly emerging H1N1 influenza virus infection, swine flu, has become a public health concern at a global level [1-3]. Beginning in Mexico, the swine flu pandemic has spread throughout the world [1-3]. Mainly, swine flu is a respiratory virus infection with several respiratory manifestations. Fever, coughing, malaise and fatigue are common clinical presentations of swine flu [1-3]. In severe cases, pneumonia can develop and has become the main cause of death. In addition to basic respiratory manifestations, there are also manifestations in other systems, including the neurological system. The neurological manifestations of swine flu have been mentioned, but have not gotten much documentation. Below is a brief summary of what is known about the neurological manifestations of swine flu.

Observation of Neurological Manifestations in Influenza

The neurological manifestations of classical H1N1 influenza virus infection have been discussed for a long time, and they can be direct or indirect. Indirect manifestations may have several causes. High fever in children infected with influenza might result in seizure, a severe manifestation in pediatrics[4]. In cases with severe pneumonia and hypoxemia, alteration of consciousness can be expected[5]. Bogolepov et al. suggested the role of acute general cerebral oxygen insufficiency due to disturbed respiration and concomitant acute cardiac insufficiency in the pathogenesis of nervous system changes in the pneumonia stage[6]. According to a recent study by Kawayama et al., of 68 patients with severe pneumonia due to influenza virus infection, 2 patients developed unconsciousness and 1 died[7].

The direct manifestations, however, are rarely addressed. Since the influenza virus is large in size, it rarely passes thorough the blood-brain barrier to cause direct neurological pathology. However, there might be a possibility of the influenza virus passing through in very young children whose blood-brain barrier is not completely developed or in cases with a congenital defect of the blood-brain barrier. The condition known as “influenza encephalopathy” should be mentioned.

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This is a specific disorder seen in young children infected with influenza. Yokota et al. proposed that replicated viruses at the nasopharyngeal epithelium might disrupt the olfactory mucosa in the olfactory nerve system, creating a starting point for the production of pro-inflammatory cytokines that consequently result in the disruption of the blood-brain barrier[8]. This hypothesis was proved in some animal model studies[9-10]. Ichiyama et al. reported in their study on serum markers in pediatric cases with and without neurological complications that "an imbalance between matrix metalloproteinase-9 and tissue inhibitors of metalloproteinases 1 damages the blood-brain barrier and promotes febrile seizure or encephalopathy in influenza virus infection" [11].

After the course of infection, post-influenza neurological complications, including dementia, epileptic disorders, cerebrovascular disease, febrile convulsions, toxic encephalopathy, encephalitis, meningitis, subarachnoid hemorrhages, lethargic encephalitis, psychosis or Parkinson's disease have also been mentioned[12-13]. In the recent Nagasaki outbreak, several cases of post-influenza neurological complications were revealed, as well as many cases with post-influenza encephalopathy in which the death rate was up to 50%[13].

In addition to the natural infection of the influenza virus, the scenario of neurological manifestations related to influenza vaccination should also be mentioned[14]. There have been sporadic reports on neurological complications due to influenza vaccine administration. Meningoencephalitis, due to the immunological response to foreign protein, is the common neurological adverse effect post-influenza vaccination[15]. With current advances in vaccine technology, this kind of complication has decreased in incidence, although the episode is usually severe and requires attention.

Neurological Manifestations of Swine Flu

As a member of the H1N1 influenza virus family, swine flu can be expected to have neurological manifestations. In a report from Texas, in the USA, neurological manifestations in pediatric patients with swine flu were observed; there were four indexed pediatric patients, aged 7-17 years, all of whom were admitted with signs of influenza-like illness and seizures or altered mental status, and three had abnormal electroencephalograms 16. In all four patients, swine flu viral RNA could be detected in nasopharyngeal specimens, but not in cerebrospinal fluid 16. However, there has been no other official report from other countries, so there is still a need for more knowledge on swine flu-induced neurological manifestations.

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