# A (H1N1) Influenza Pneumonia with Acute Disseminated Encephalomyelitis: A Case Report*

JUN YANG[1,#], YU-GUANG WANG[2,#], YUN-LIANG XU[1], XIAN-LING REN[1], YU MAO[2], AND XING-WANG LI[2]

*[1]Department of Radiology, [2]Center of Infectious Disease, Beijing Ditan Hospital, Beijing 100015, China*

**Key words**: Influenza; Pneumonia, Viral; ADEM (acute disseminated encephalomyelitis); Tomography, X-ray computed; MRI

## INTRODUCTION

A 56-year-old Chinese female patient with A (H1N1) influenza pneumonia accompanied by acute disseminated encephalomyelitis (ADEM) of the Central Nervous System (CNS) is described in this article. The patient had typical clinical manifestation, and the diagnosis was reached after MRI and other examinations. From this case, we can conclude that the virus of A (H1N1) influenza can infect CNS, and we should pay more attention to patients of A (H1N1) influenza pneumonia with neurological complications.

## CASE PRESENTATION

A 56-year-old Chinese female, had a history of 9 days of fever, 6 days of being short of breath , and a highest temperature of 39.3 ℃. After falling ill, the patient suffered from poor appetite, sore back, debility, myasthenia of limbs, retention of urine, positive pathological reflex in the lower limb and dyspnoea at the same time. These symptoms aggravated 2 days later, and Type Ⅰ respiratory failure was diagnosed. After admission, she was treated with antibiotic and mechanical ventilation was applied. A (H1N1) influenza virus nucleic acid was positive in this patient. The results of the physical examination at admission were as follows: temperature 36 ℃, pulse 92/min, respiratory rate 22/min and blood pressure 190/102 mmHg. The blood pressure was labile, fluctuating between 100/60 mmHg and 213/133mmHg; muscle strength was 4 Classification in the lower extremity and 5 Classification in the upper extremity. Results of the blood serum examination was $Na^+$ 110.6 mmol/L, $K^+$ 3.49 mmol/L, Glu 8.98 mmol/L, Cr 37 μmol/L, TG 1.86 mmol/L, CHO 8.18 mmol/L, and LDL 7.09 mmol/L. Lumbar puncture was made and the results of cerebrospinal fluid pressure were 255 mm $H_2O$, colorless and clearing. Pandy test(+), it was found that the total number of cell was $10\times10^6$/L, WBC 8, polykaryocyte 2, mononuclear cell 6, and protein 78 mg/Dl. After examination of MRI, focus of demyelination in the white matter and spinal cord, and acute disseminated encephalomyelitis were diagnosed. Thoracic images showed pneumonia and interstitial changes in both lungs. Examinations of electromyogram showed the motor fiber at the end of left and right posterior tibial nerve conducted normal, and myelin sheath damage in sensory fiber of the nerve. After treatment, the symptoms were relieved and the patient left the hospital.

## DISCUSSION

A (H1N1) influenza was an acute respiratory infectious disease caused by a novel influenza virus, type of A (H1N1). The first case in the world was reported in Mexico in March 2009, and in May 2010, the first case was reported in China. Till now, more than 100 counties had reported cases, and thousands of patients died of the disease[1-2]. Associated neurologic symptoms were first reported from Dallas, Texas, USA: 4 children experienced unexplained

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#Equal contributions to this paper.

Correspondence should be addressed to: Dr. Xing-Wang LI, Center of Infectious Disease, Beijing Ditan Hospital, No.8 Jingshun Dongjie, Chaoyang District, Beijing 100015, China. Tel: 86-10-8432-2585; E-mail: ditanlxw@yahoo.com.cn

Biographical note of the first author: Jun YANG, male, born in 1968, Doctor of Department of Radiology, Beijing Ditan Hospital, majoring in diagnosis of imaging. E-mail: yangjun6806@yahoo.com.cn

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seizures or had an alteration of consciousness level that was associated with this virus[3]. In this paper, we reported a case of A (H1N1) influenza pneumonia with acute disseminated encephalomyelitis in our hospital.

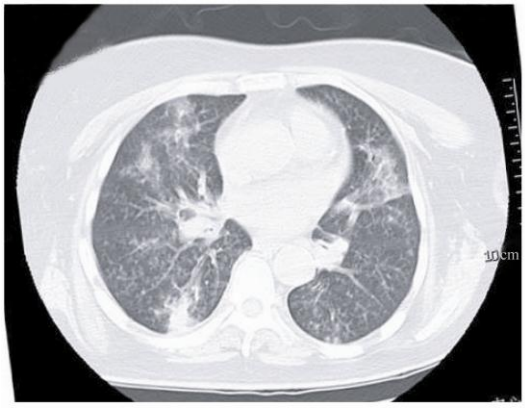

FIG. 1

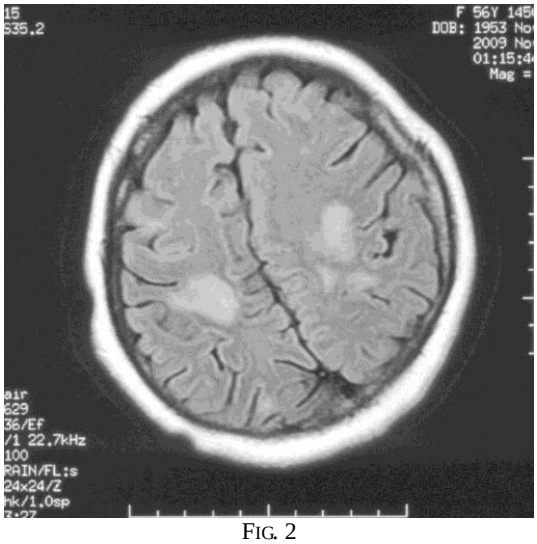

FIG. 2

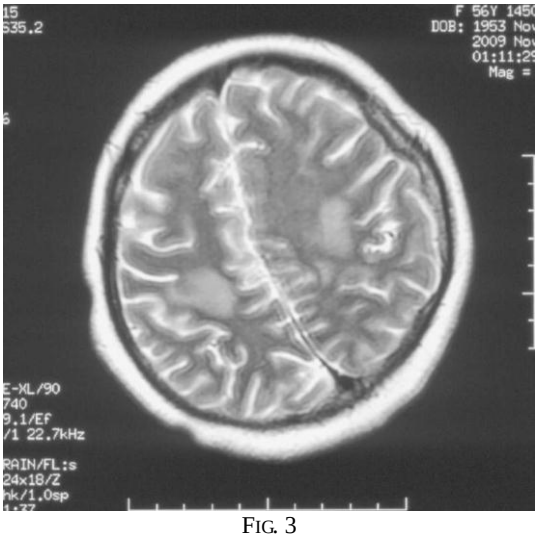

FIG. 3

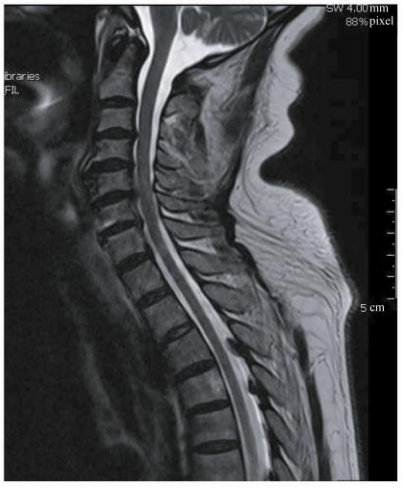

FIG. 4

FIG. 1: CT examination of chest show peripheral and lower-lungpredominant ground-glass opacities and consolidation in subpleural and peribronchovascular distribution. Note fibrotic changes in both field.

FIG. 2, Fig. 3, Fig. 4: MRI revealed large, irregular lesion with round hyperintensity of varying sizes in subcortial white matter in T1-weighted and T2-weighted axial imaging. T2-weighted sagittal MR image shows long segmental high-signal-intensity lesion with swelling of cervical spinal cord.

When the first two cases of novel influenza A (H1N1) infection were identified in southern American counties in April 2009, novel influenza A (H1N1) cases have been documented throughout the world. Clinically, patients with influenza had symptoms such as fever, cough, pharyngalgia, myosalgia and fatigue. In laboratory examination, most white blood cells were normal or a few depressed and granulocyte depressed. The final diagnosis could be made when the nucleic acid of A (H1N1) influenza virus was positive[4-8]. Influenza virus infection usually involved the upper respiratory tract of children and young adults. Although the pneumonia was usually mild, it could be overwhelming and fatal within 24 h. Predisposing conditions for the infection included children, pregnancy, diabetes, old age, obesity, and immunosuppression[9]. The radiological feature of the disease in the early stage was consolidation or patchy infiltrating shadow, and ground-glass opacity, mainly expressing lesion in one side, both side lesions could also be found. In the advanced stage, it was manifested as unilateral or extensive bilateral ground-glass opacities with or without associated focal or multifocal areas of consolidation. On MDCT, the ground-glass opacities and areas of consolidation had a predominant subpleural and peribronchov ascular distribution that resembles the appearance of organizing pneumonia[10-13]. According to the

diagnosis criteria, this patient was a typical case of A (H1N1) influenza with typical signs and symptoms and with typical radiological manifestation.

Acute disseminated encephalomyelitis (ADEM) was an uncommon inflammatory disorder that might occur following a viral illness or vaccination, or without recognized antecedent. The clinical course was that of an acute or subacute illness in which fever, headache convulsions, and meningeal signs might be prominent. There was usually obtundation and evidence of multiple, widespread sites of central nervous system dysfunction, notably myelitis, optic neuritis, hemiparesis, cranial nerve palsies and ataxia. Pathologically, ADEM was characterized by mononuclear cell infiltrates involving arterioles, capillaries, and venules, and a variable degree of perivenous and confluent demyelination. ADEM had been thought to result from delayed hypersensitivity to myelin basic protein, but immune-mediated cerebral small injury might play an important role in its pathogenesis. The diagnosis of ADEM was usually made in retrospect and by exclusion, because the clinical findings were variable, there were no specific laboratory abnormalities, and the disorder was seldom fatal. ADEM could be particularly difficult to distinguish from acute viral encephalitis and multiple sclerosis. ADEM was more common in children than in adult, with no predilection for either sex, and predominantly involves white matter, while that with deep gray matter involvement is not uncommon[14].

MRI was becoming the imaging modality of choice for detecting the lesions of ADEM, as the value of CT was limited[15]. The MRI findings, however, were nonspecific for this disease. The lesions of ADEM were best seen on MRI images, and the typical MRI findings were asymmetrical bilateral multiple patchy areas of homogeneous or slightly homogeneous increased signal intensity on T2-weighted and proton-density weighted images, and fluid-attenuated inversion recovery sequence. On T1-weighted images, sometimes it was low-signal intensity lesions in the white matter that are seen. Bilaterally symmetrical white matter lesions had been reported too. The ADEM-related lesions might be large confluent, and occupying almost all of the white matter, but smaller lesions resembled those of multiple sclerosis. Some authors reported that presence of multiple complete ring-enhanced lesions in the cerebral white matter on contrast T1-weighted images could indicate ADEM[16-18]. DWI showed hyperintense to isointense signal intensity in acute lesions, with increased ADC, and initial DWI and ADC imaging might predict outcome of this disease, particularly the extension of lesions and brainstem involvement[19]. In this case of A (H1N1) Influenza Pneumonia with ADEM, diagnosis was based on the clinical syndromes and course, the imaging results and positive serology of A (H1N1). In the follow-up examinations, there were no new lesions found in the central nervous system in MRI images.

On review of the current literature, there were few case reports on A (H1N1) influenza pneumonia with Acute Disseminated Encephalomyelitis, like other cases of A (H1N1) influenza pneumonia; this patient has a typical manifestation in thoracic image and a typical manifestation of ADEM in the white matter. This case study suggests that A (H1N1) Influenza viruses may induce diseases in both the peripheral and central l nervous system.

## LIST OF ABBREVIATIONS

ADEM, acute disseminated encephalomyelitis; MRI, magnetic resonance imaging.

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