CHAPTER 9

Viral pneumonia

The committee for The Japanese Respiratory Society guidelines for the management of respiratory infections

The Japanese Respiratory Society

Viral pneumonia is caused by a variety of viruses such as influenza, measles, varicella, and adeno and RS viruses. These guidelines outline some common types of viral pneumonia one of which is influenza viral pneumonia, for which rapid diagnosis and specific treatment are possible. The other two outlined are the currently topical SARS and avian influenza virus pneumonia.

Influenza viral pneumonia

Influenza viral pneumonia is a type of viral pneumonia caused by the influenza virus itself. It is called primary or pure influenza viral pneumonia. There are 3 types of pneumonia that occur associated with influenza:
1. Viral pneumonia caused by influenza virus,
2. Bacterial pneumonia that occurs after influenza, and
3. Co-morbid condition of viral and bacterial pneumonia.

Most cases of pneumonia combined with influenza are bacterial pneumonia occurring after the development of influenza, with Streptococcus pneumoniae, Haemophilus influenzae, and Staphylococcus aureus generally being the aetiological agents.

Frequency: The accurate frequency of viral pneumonia is difficult to calculate because definite diagnosis of viral pneumonia is difficult. Viral pneumonia appears to account for approximately 20% of pneumonia cases that occur during the epidemic season of influenza; and in recent years with no outbreak of influenza, severe influenza viral pneumonia has rarely occurred.

Underlying condition: Heart/hepatic disease, particularly heart disease including mitral stenosis, pregnancy and early childhood.

Symptoms: Symptoms of pneumonia, particularly progressive dyspnoea, appearing at an early stage (about 3 days) after the development of influenza.

Diagnosis: Definite diagnosis is difficult. Diagnostic clues include isolated influenza virus, positive antigens and increased serum antibody levels in the absence of increased WBC, purulent sputum, and aetiological bacteria. Also, if an ARDS-like (acute respiratory distress syndrome) shadow or a poor-consolidated ground-glass pattern is found, influenza viral pneumonia should be suspected. Diagnosis will be made based on overall clinical assessment of these factors.

Differentiation: Bacterial or atypical pneumonia, or pneumonia caused by other viruses. Heart failure, ARDS, viral myocarditis, etc.

Treatment: Anti-influenza virus agents (oseltamivir, zanamivir, amantadine). Antimicrobial agents or immunoglobulin are often used concomitantly.

Prognosis: The prognosis is generally poor, but has been improved with use of anti-influenza virus agents.

Images of influenza viral pneumonia: Figure 9.1 shows the images of a severe and typical case, and Figure 9.2 displays the images of a localized case.

Severe acute respiratory syndrome (SARS)

Type: The following 2 types of pneumonia are known to be due to the SARS virus:
1. Viral pneumonia caused by the SARS virus, and
2. Pneumonia that occurs secondarily to SARS.

Most of the cases with this type of pneumonia are first diagnosed with type 1 above. Secondary bacterial pneumonia may develop resulting from the immunosuppressive state of the patient due to the use of steroids, etc. in patients who have a prolonged course of disease.

Frequency: From winter 2002 through March 2003, there was an outbreak of SARS in Guangzhou, China, which spread to Hong Kong, and subsequently various countries across the world. It was followed by secondary infection occurring at high frequency, mainly in healthcare professionals. This unknown new type
of pneumonia has shaken the entire world. In 2004, a few cases of SARS were reported; however, the spread to regions outside Guangzhou was prevented. Morbidity is at least twice as high in males than in females. The primary routes of infection are droplet infection and contact infection. There are also some cases of air-borne (droplet nuclei) infection. The aetiological agent is a new type of coronavirus named SARS coronavirus, Type 1.

**Risk factor:** Close contact with infected patients in epidemic areas. Therefore, the infection rate is high in healthcare professionals, family members and caregivers. The N95 mask is considered to be effective for the prevention of infection.

**Symptoms:** After an incubation period of 2 to 7 days on average, SARS appears with initial symptoms such as sudden fever (in 100% of patients), chills (75%), myalgia (60%), dry cough (58%), dizziness
(42%), sputum (30%), vomiting and diarrhoea (both 20%), followed by manifestation of dyspnoea, hypoxemia, and a shadow of pneumonia within a few days. Other clues include normal peripheral neutrophil count, prominently decreased lymphocytes (both CD4 and CD8), high level of CK, increased ALT and AST, and decreased platelets. Eighty percent or more patients recover within 1 week, and 10% to 20% of patients proceed to ARDS (acute respiratory distress syndrome).

**Diagnosis:** Nasopharyngeal swab, and genetic testing by RT-PCR using species of sputum, urine, and faeces are first performed in the National Institute of Infectious Diseases or at local health institutes. Virus isolation and determination of serum antibody levels (ELISA, immuno-enzymatic assay, and neutralizing antibody assay) are also performed.

**Differentiation:** Influenza and other viral pneumonia, *Mycoplasma* pneumonia, *Chlamydia* pneumonia, etc.

**Treatment:** There are no effective drugs against SARS coronavirus. Symptomatic therapy is mainly provided.

**Prognosis:** Mortality in young people is extremely low, 1% or less; however, the fatality rate in elderly people aged 65 years or older is 50% or more. The average fatality rate is approximately 10%.

**Prophylaxis:** Standard prophylaxis. There is still no prophylactic vaccine.

**Images of SARS:** The images of infection at an early stage, ARDS, and fibrosis after recovery are shown below.

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**Highly pathogenic avian influenza pneumonia**

**Type:** Only pure viral pneumonia caused by the avian influenza virus (A-type influenza virus) has been reported to date.

**Frequency:** There are no clinical cases of avian influenza in Japan; however, avian influenza outbreaks occurred among poultry in Yamaguchi, Oita, and Kyoto Prefectures during the period from January through to March 2004. H5N1-caused human infection in Hong Kong in 1997, and humans, particularly children were infected in Hong Kong, Vietnam, Vietnam.
and Thailand in 2004. Infection among poultry and wild birds was widespread among Southeast Asian nations. H7N7-caused human infection has also been reported in the Netherlands, Belgium, and Germany.

The known route of infection is close contact with infected birds; however, human-to-human infection has been observed in 3 of 89 H7N7-infected patients. Once pneumonia associated with this type of influenza develops, mortality is high, approaching 30% to 68%. The last large-scale outbreak of avian influenza is known to have been attributable to A-type influenza viruses such as types of H5N1, H5N2, H7N1, H7N3, and H7N7. The Infectious Disease Law in Japan designates highly pathogenic avian influenza viruses as type 4 infections.

**Risk factor:** Close contact with infected birds or their body fluid, or with infected patients in epidemic areas. To date there is no prophylactic vaccine.

**Symptoms:** H5N1-type patients in Hong Kong in 1997, and in Vietnam and Thailand in 2004 developed more diverse symptoms from those generally observed in human patients with influenza-like symptoms such as fever and cough to ARDS. Meanwhile, the common symptom was conjunctivitis in H7N7-type patients in the Netherlands in 2003, and patients with pneumonia died.

**Diagnosis:** A rapid diagnostic kit that is used for detection of type A influenza viruses in humans allows for diagnosis, but not for differentiation between the two. For detecting the virus subtype, determination of blood antibody levels, virus isolation, or genetic testing (RT-PCR performed for detecting the H5 (gene) virus by the National Institute of Infectious Diseases) is necessary.

**Differentiation:** Influenza and other viral pneumonia, *Mycoplasma* pneumonia, *Chlamydia* pneumonia, etc.

**Treatment:** Anti-influenza virus agents used for the treatment of type A influenza in humans are believed to be effective; however, the details of their effects are unknown due to the paucity of use.

**Prognosis:** Once this type of pneumonia develops, mortality is high, approaching 30% to 68% according to the data during the epidemic period of 2004. The prognosis of H7N7-caused conjunctivitis is favourable.