Nipah virus Infection: A fatal Emerging disease

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Introduction

Nipah virus (NiV) infection is an emerging zoonotic disease endemic in Southeast Asia. Fruit bats of the genus Pteropus appear to be the natural reservoir of NiV. It emerges periodically to affect human, pig and occasionally other domestic animals. Disease in human is characterized by fever, constitutional symptoms and encephalitis, sometimes accompanied by respiratory illness. Encephalitis and seizures occur in severe cases, progressing to coma within 24 to 48 hours. The case fatality rate is estimated at 40% to 75%. Those who survive from acute encephalitis make a full recovery among them 20% are left with residual neurological consequences such as persistent convulsions and personality changes.[1]

Global scenario

NiV was first identified during an outbreak of disease that took place in Kampung Sungai Nipah, Malaysia in 1998 when pigs were found the intermediate host.[2] However, in subsequent NiV outbreaks, there were no intermediate hosts were found. This disease is endemic to South Asia, where sporadic outbreaks have been noted in Malaysia, Singapore, India and Bangladesh since the virus was first isolated in 1999. Less than 20 cases are typically reported per year worldwide, although systematic surveillance is lacking.[3]

In the 1999 outbreak, Nipah virus caused a relatively mild disease in pigs, but nearly 300 human cases with over 100 deaths were reported. In order to stop the outbreak, more than a million pigs were euthanized causing tremendous trade loss for Malaysia. Since this outbreak, no subsequent cases (in neither swine nor human) have been reported in either Malaysia or Singapore.[4]

Situation in Bangladesh

In Bangladesh Nipah virus was first identified as the cause of an outbreak of encephalitis in 2001.[5] Since then, 12 Nipah outbreaks have been identified in Bangladesh, involving 20 districts, all occurring between December and May. The Nipah outbreaks have been identified in Meherpur (2001), Naogaon (2003), Rajbari (2004), Faridpur (2004), Tangail (2005), Thakurgaon (2007), Kushtia (2007), Manikgong & Rajbari (2008), Faridpur (2010) and Lalmonirhat (2011). Till 30 April 2011, a total of 197 human cases of Nipah virus infection in Bangladesh were reported; 151(77%) died, indicating a very high mortality.[6] Nipah virus outbreak in northern Bangladesh has caused widespread panic throughout the country, with many residents deserting their homes for fear of contacting the virulent disease. Very recently as of 15 May 2013, 24 cases of Nipah virus infection have been reported in Bangladesh since beginning of 2013 of which 21 cases have died. These cases are from 13 different districts (Gaibandha, Jhinaidaha, Kurigram, Kushtia, Magura, Manikgong, Mymensingh, Naogaon, Natore, Nilphamari, Pabna, Rajbari, Rajshahi) of the country. The age distribution of cases is from 8 months to 60 years. Among them 16 cases were male and 8 were female.[7] As of 11 february 2014, 18 cases of Nipah virus infection have been reported in Bangladesh since the beginning of 2014, of which 9 cases have died. These cases are from 11 different districts Manikganj, Magura, Faridpur, Rangpur,

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In Bangladesh human became infected with NiV as a result of consuming date plam sap that had been contaminated by infected fruit bats. Human-to-human transmission has also been documented, including a hospital setting in India.[9] In 2004, after the death of a substantial number of patients due to un-explained illness, a United States laboratory detected Nipah virus as the causative agent. Currently, Bangladesh is the only country reporting the disease[3]. Unlike the Malaysian NiV outbreak, outbreaks occur almost annually in Bangladesh and have been reported several times in India.[3]

Etiology

Nipah virus is a member of the Paramyxo viridae family, genus Henipavirus. The virus appears to be maintained in fruit bats, may infect humans through direct exposure to their saliva or excreta, including through contaminated food and especially palm tree sap. Serologic evidence of infection has also been noted in cats, dogs and horses.[7]

Reservoir & Transmission

There are three known pathways of transmission of NiV from bats to people. In Bangladesh, a majority of people infected with the pathogen drinking of raw date palm sap (Khejurer rosh) contaminated with Nipah virus from bats.[10] The initial outbreak in Malaysia was characterized by the second mode of transmission: via domestic animals. Pigs were viable intermediate hosts, however, reports of infected cows, goats and even dogs have also documented. Third mode is person-to-person transmission of Nipah virus is also regularly noted in Bangladesh and India. This is most commonly seen in the family and care givers of Nipah-virus-infected patients.[11] Transmission is thought to have occurred via respiratory droplets, contact with throat or nasal secretions from the pigs or contact with the tissue of a sick animal.

Clinical Presentation

NiV manifests itself in a variety of ways, ranging from asymptomatic infection to severe encephalitis. The incubation period is typically 4-20 days. Patients usually present with fever, malaise, headache, myalgia, sore throat, nausea and vomiting, sometimes accompanied by vertigo and disorientation. Severe cases progress to encephalitis which may be complicated by seizures and coma. Atypical pneumonia, sometimes leading to the acute respiratory distress syndrome may be seen. Cases of relapse occurring weeks or even month after recovery have also been described. Neurologic sequlae occur in upto 20% of survivors of Nipah encephalitis and include persistent seizures and personality or mood changes. Latent infections with subsequent reactivation of Nipah Virus and death have also been reported months even years after exposure. The case fatality rate of NiV infection ranges from an average of 40 to 75% however, this can vary significantly.[9,12]

Diagnosis

Laboratory diagnosis of a patient with a clinical history of NiV can be made during acute convalescent phases of the disease by using a combination of tests. Virus isolation attempts and real time polymerase chain reaction (RT-PCR) from throat and nasal swabs, CSF, urine and blood should be performed in the early stages of disease. Antibody detection by ELISA (IgG & IgM) can be used later. In fatal cases, immunohistochemistry on tissues collected during autopsy may be the only way to confirm a diagnosis.[13]

Differential Diagnosis

Nipah virus disease is difficult to distinguish from a host of other febrile illness specially during its onset. More common causes of viral pneumonia, including adenovirus and influenza, and viral encephalitis, in particular Japanese encephalitis, which is also transmitted by swine, need to be excluded.[3]

Management

As there is presently no antiviral drug available for Nipah virus disease, treatment is limited to supportive care. Because Nipah virus encephalitis can be transmitted person-to-person, standard infection control practices and proper barrier nursing techniques are important in preventing hospital acquired infections (nosocomial transmission). The drug ribavirin has been shown to be effective against the virus in vitro, but human investigations to date have been inconclusive and the clinical usefulness of ribavirin remains uncertain. Passive immunization using a human monoclonal antibody targeting the Nipah G glycoprotein has been evaluated in the post-exposure therapy in the ferret model and found to be of benefit.[9]

Prevention

Nipah virus infection can be prevented by avoiding exposure to sick pigs and bats in endemic areas and not drinking raw date palm sap. Additional efforts focused on surveillance and awareness will help prevent future outbreaks. Research is needed to better understand the ecology of bats and Nipah virus, investigating questions such as the seasonal variation of disease within the reproductive cycles of bats. Surveillance tools

should include reliable laboratory assays for early detection of disease in the communities and livestocks, and raising awareness of transmission and symptoms, and important in reinforcing standard infection control practices to avoid human-to-human infections in hospital settings. A subunit vaccine, using the Hendra G protein, produces cross-protective antibodies against HENV and NiV has been recently used in Australia to protect horses against Hendra virus. This vaccine offers great potential for henipavirus protection in humans as well.[14]

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