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Case Report

Nipah Virus Infection Complicated with Encephalitis and Pneumonia Leading to Fatal Outcome: A Case Report from Bangladesh, January 2024

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Abstract

Nipah virus (NiV) has been a major cause of encephalitis out-breaks with high mortality, primarily in the Indo-Bangladesh regions. Clinical presentations range from asymptomatic infection to acute respiratory infection and fatal encephalitis. Diagnosis can be confirmed by isolation from nucleic acid amplification in the acute phase or antibody detection during the convalescent phase. Treatment is mostly limited to supportive care and syndromic management of acute encephalitis syndrome. Here we discuss a case of middle-aged man from Manikganj district who presented with features of bilateral pneumonia and encephalitis. He progressed to rapid deterioration with development of type 2 respiratory failure of central origin and drop down of GCS to 7/15. Series of investigations revealed encephalitis but causative organism remained undetectable. Clinical suspicion carried out CSF IgM and IgG against NiV. Positive report and ultimate delayed revealed history of raw palm date sap consumption aided in confirmation of diagnosis. Patient was managed in ICU setting with mechanical ventilation, broad spectrum antibiotics, antiviral and steroid. Unfortunately, patient died on 28 January 2024 at infectious disease hospital.

Key words: *Nipah virus, encephalitis, pneumonia.*

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Introduction

Nipah virus infection is a bat-borne zoonotic disease with outbreaks in Malaysia, Singapore, Bangladesh and India. Since 2001, Bangladesh has been reporting seasonal outbreaks of Nipah virus infection primarily in twenty districts in central and north-western Bangladesh (the 'Nipah belt'), between December and May, corresponding with the harvesting season of date palm sap (DPS)[1]. Reported cases are very variable from zero in 2002, 2006 and 2016 to 67 in 2004[1]. However, between 4 January to 13 February 2023, a total of 11 cases of Nipah virus infection including eight deaths (CFR 73%) were reported from seven districts across two divisions in Bangladesh[1]. Overall mortality from NiV is 40% to 70% of cases[2], Bangladesh having a higher death rate 73%[1]. The aim of present report is to show the first case of fatal outcome in 2024 from Bangladesh.

Case summary

Mr. X, thirty eight-year-old, Muslim male, traditional drama actor by profession hailing from Manikganj district with no known previous comorbidity got admitted in the ICU of Popular Medical College Hospital on 18.01.2024 as a referred case from Manikganj Sadar Hospital with the complaints of fever for 8 days, breathlessness for 2 days and single episode of convulsion 1day back from the date of present admission. He developed high grade fever, initially not associated with any systemic symptom. With time he developed insomnia and altered sensorium along with fever;

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and was admitted to forementioned local hospital. During his hospital stay, he gradually developed dry cough and shortness of breath. There was no associated chest pain or orthopnea. In addition, he suffered from an episode of convulsion and was referred to the present hospital. His attendant denied recent travelling history to malaria endemic zone or any significant drug history. On physical examination at time of admission, he was conscious but drowsy, (E3V4M6), there was no active convulsion. He was dyspneic, respiratory rate was 33 breaths/min, SpO2 was 75% with 15L O2/min, pulse 145 b/min, BP-160/110 mmHg, temp was 101^0F. Auscultation of chest from back revealed bilateral bronchial breath sound along with crepitations. On neurological examination pupils were normal, there were no sign of meningeal irritation neither any focal neurological deficit. Fundoscopic examination was normal. Within few hours of admission, he developed type-2 respiratory failure and his GCS dropped to 7/15 (E1V2M4); he was intubated. Clinically he was labeled as a case of bilateral pneumonia with type-2 respiratory failure. Among the series of investigations significant ones are showing in table below.

Table 1. *Important investigations done during hospital stay*

Investigation	During admission	Subsequent significant value
CBC	WBC: 16.11 k/µl,	WBC: 9.32 k/µl,
	Hb-15.30 g/dl,	Hb-11.60 g/dl,
	PLT-150 k/ µl,	PLT-275k/ µl,
	ESR- 107 mm in 1st hour	ESR-107 mm in 1st hour
CRP	17 mg/dl	
Procalcitonin	0.23 ng/ml	0.36 ng/ml,
S Creatinine	1.19 mg/dl	
S. electrolytes	Na+ 129 mmol/l, K+ 4.51 mmol/l,	
SGPT	77 U/L	
S. bilirubin	0.60 mg/dl	2.67mg/dl
D-dimer	4.21	
Trop-I-	5.54 ng/ml	0.32 ng/ml
NT-ProBNP	2865 pg/ml	
S. lipase	384 U/L.	
Dengue NS1Ag,	Negative	
Dengue IgM, IgG	Negative	
RT-PCR for SARS-CoV-2	Negative	
ICT for Malaria	Negative	
Blood culture	No growth	
Urine culture	No growth.	
ANA	Negative	
p-ANCA	Negative	
c-ANCA	Negative	
Sputum test	Sputum for AFB& Gram stain -NegativeGene Xpert-	
	not detected. Sputum culture showed-Staphylococcus aureus.	
Respiratory panel for Virus	Negative	
Neuro 9 panel for Virus	Negative	
IgM &IgG for NiV	positive	
CxR	Bilateral pneumonia	
Echocardiography	EF 50%,RWMA present.	

His CSF study showed glucose 85.68 mg/dl, protein 60.50 mg/dl, WBC count 02/cu mm, MRI of brain was normal, HRCT showed patchy ground glass opacities with thickening of intra and inter lobular septae in both lungs, predominantly at left perihilar region. Investigation findings were consistent with viral encephalitis, bilateral pneumonia, myocarditis and ischemic hepatitis. Causative organism was not identified. On clinical suspicion CSF sample was sent to Institute of Epidemiology Disease Control and Research (IEDCR) and Nipah IgM and IgG became Positive on 24.01.24. After repeated query on 3rd day of admission patient attendants revealed that patient and his 2 associates allegedly drunk date juice 4-5 days prior to his illness. Patient was treated with broad spectrum antibiotic, acyclovir, anti-convulsant and corticosteroid. After confirmation of NiV encephalitis he was referred to infectious disease hospital, Mohakhali, Dhaka and patient died on 28.01.24 and expised on the same day.

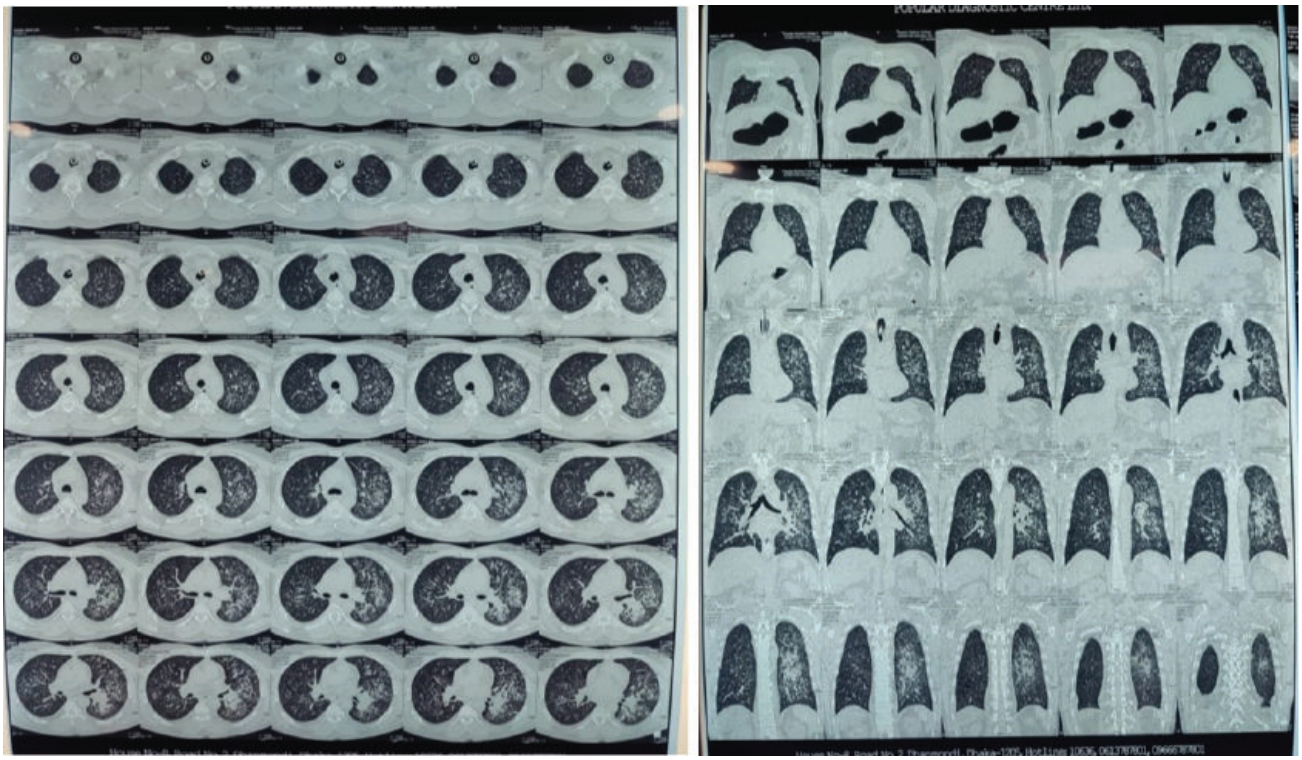

Figure 1. HRCT of chest

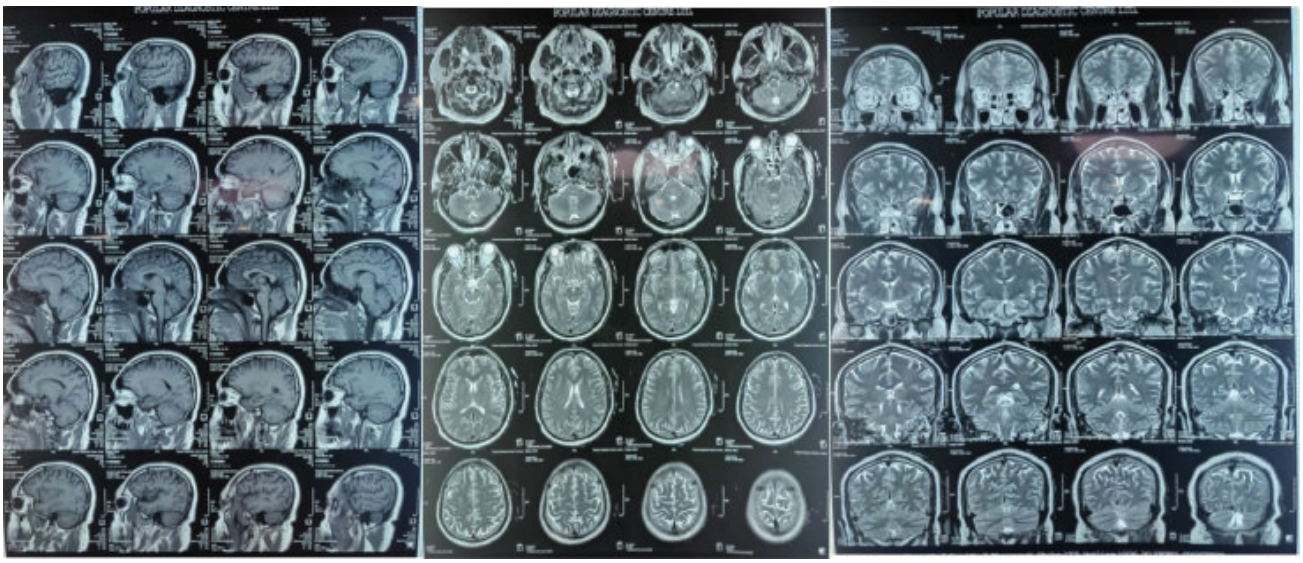

Figure 2. MRI of brain

Discussion

Nipah virus is highly pathogenic enveloped RNA virus from paramyxovirus family[3]. transmission occurs from exposure to contaminated secretions or tissues of infected bats or pigs[2]. Human-to-human transmission of Nipah virus occurs via close contact or exposure to NiV-infected body fluid (e.g., blood, urine, nasal secretions)[2]. The Primary modes of transmission in Bangladesh have been found to be date palm sap consumption and person-to-person transmission[4]. The incubation period is from 4 to 14 days but an incubation period as long as 45 days has been reported[2]. NiV primarily causes acute encephalitis and respiratory illness and is highly fatal. A small percentage of infected people are asymptomatic[5]. Prodromal signs and symptoms are fever headache and myalgia[6]. Features of encephalitis develop within a week, with the most common symptoms being altered mental status, areflexia, hypotonia, segmental myoclonus, gaze palsy and limb weakness. A case series of four outbreaks from Bangladesh shows altered mental status (90%), headache (73%), severe weakness (67%) and seizures (23%) as common neurological manifestation[7].Patients deteriorate rapidly and coma and death follow within a few days. Residual neurological deficits are seen in 20% of survivors and range from fatigue to focal neurological deficits and depression[8]. Some cases of relapsing or late-onset NiV encephalitis have been described[9]. People can also experience atypical pneumonia and severe respiratory problems, including acute respiratory distress. Respiratory illness is seen in 70% of patients in India and Bangladesh[10]. Risk factors for poor prognosis include old age, comorbidities, thrombocytopenia and raised aminotransferases on admission, brainstem involvement and seizures[11]. The main pathology appeared to be widespread ischemia and infarction caused by necrotizing vasculitis-induced thrombosis, although direct neuronal invasion may also play a major role in the pathogenesis of the encephalitis[12]. Alveolar hemorrhage, pulmonary edema and aspiration pneumonia were often encountered in the lungs[12]. These may lead to pneumonia and acute respiratory distress syndrome (ARDS). During early stages of the illness, laboratory testing can be conducted using real time polymerase chain reaction (RT-PCR) from throat and nasal swabs, cerebrospinal fluid, urine, and blood. Later in the course of illness and after recovery, testing for antibodies is conducted using an enzyme-linked immunosorbent assay (ELISA). IgM antibody in serum or CSF is used for diagnosis. Detection of IgG antibodies is a good test for surveillance in humans It has also been used for diagnosis in humans during outbreaks. IgM antibodies have been found to be detectable in 50% patients on day 1 of illness, while 100% of patients show IgG positivity after day 18. IgG positivity persists for several months[13]. Common hematologic abnormalities in NiV infection include thrombocytopenia (30%) and leukopenia (11%). Elevated liver enzymes have been seen in 40% of patients[14]. Treatment of NiV infection is primarily supportive. Patients must be isolated and rigorous infection control practices implemented. Patients with severe pneumonia and acute respiratory failure must be supported by mechanical ventilation, invasive mechanical ventilation is preferred. The effectivity of antiviral Ribavirin is inconclusive. However, in the absence of effective antivirals, the National Center for Disease Control (NCDC) recommends the use of oral or parenteral Ribavirin for all confirmed cases[15]. Our patient was a referred case from Manikganj district which is within Nipah belt. He presented with the features of bilateral pneumonia and encephalopathy. His GCS rapidly dropped down to 7/15 and developed type 2 respiratory failure. His CSF finding was consistent with viral encephalitis. In viral encephalitis there is typically a CSF pleocytosis (>5 white cells x 10^9/L), comprising predominantly lymphocytes. However, early in the illness neutrophils can predominate, or occasionally the white cell count may be normal[16]. Protein is normal to moderately raised and glucose is normal. But even after massive investigation no specific virus could be identified. A case from Nipah belt in this winter season presenting with the features of bilateral pneumonia and encephalitis raised the suspicion of NiV infection. IgM and IgG for NiV were positive in CSF. Repeated query revealed the history of raw palm date consumption. The unusual feature was normal MRI. Advanced diffusion weighted (DW) magnetic resonance imaging (MRI) of the brain can give useful radiological evidence of Nipah encephalitis. Lim *et al*. suggested that MRI pattern may be useful in differentiating Nipah from its closely differential related Japanese encephalitis/other encephalitis in most cases[17]. MRI in acute Nipah encephalitis shows multifocal discrete lesions probably due to areas of micro-infarction. These discrete high-signal-intensity lesions usually measure about 2-7 mm and are disseminated throughout the brain, mainly in the subcortical and deep white matter of the cerebral hemispheres. Mass effect or edema is not usually seen. In relapse or late onset Nipah encephalitis, MRI characteristically shows multiple areas of patchy and confluent cortical involvement[18,19]. However the patient was documented as confirmed case of NiV infection as guided by our national guideline [19]. Despite full supportive management including antiviral drug and mechanical ventilation patient died on 28.1.24. It was first reported death from NiV infection in 2024 as declared by IEDCR, Bangladesh.

Conclusion

The high mortality rate, broad species tropism, multiple plausible modes of transmission, risk of person-person transmission and documented cases of health care workers being affected during outbreaks of NiV has left the medical community perplexed. NiV infection is a fatal disease with very high case fatality rate and the only treatment is supportive management, so early diagnosis and management has paramount importance. During the winter season we have to be very vigilance for the detection of NiV and other prevailing causes of encephalitis and pneumonia and all possible samples should be tested even in the absence of any history consumption of date palm juice.

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