
Nipah virus infection: Autopsy of a clinical challenge

Dear Editor,

Nipah virus (NiV) is a zoonotic infection endemic to Southeast Asia, first reported from an outbreak that occurred in Sungai Nipah village, Malaysia and subsequently in Singapore, Bangladesh, India, and Philippines.^[1] An autopsy study done on 32 NiV victims from Malaysia is the sole data available in medical literature on histopathology of NiV.^[2] Hence, we consider it appropriate to contribute our observation on autopsy of a NiV victim from our institution.

An outbreak of a zoonotic infection occurred in Calicut, Kerala (presently Kozhikode) and its outskirts in May 2018.^[3] Autopsy was performed on the index case referred to our institution from a leading private hospital in the same city. The deceased was a 27 year old, robust young man who was treated for an acute

febrile illness with features suggestive of encephalitis, pneumonia and myocarditis. His brother had died of a very similar illness a couple of weeks ago in the Govt. Medical College hospital in whom no autopsy study was done.

At autopsy, on external examination, the deceased was well built and nourished. Slight froth was present in the nasal passages. There was no pallor, edema, or lymph node enlargement.

Internal examination revealed the following: Minimal fluid collection was present in the pleural cavities. Lungs weighing 835 gm (left) and 735 gm (right) were intensely congested, edematous and hemorrhagic, more on the left which also was adherent to the rib cage (upper lobe). Slight froth was present in the bronchial passages.

Brain weighed 1320 gm and also showed edema to a lesser degree. No petechial spots detected.

Adrenals and spleen (150 gm) were also congested. There was only one kidney which was on the left side, weighing 310 gm, with no special features on the gross or cut section, other than its larger size.

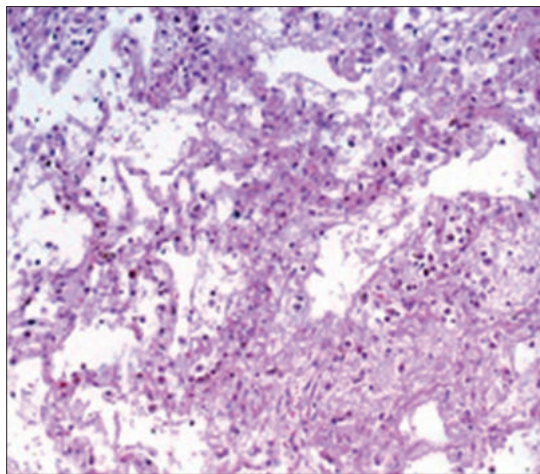


Figure 1: Diffuse alveolar damage. Alveoli appear deformed, swollen and with sparse inflammatory cell infiltrate and nuclear dust. H and E, x100

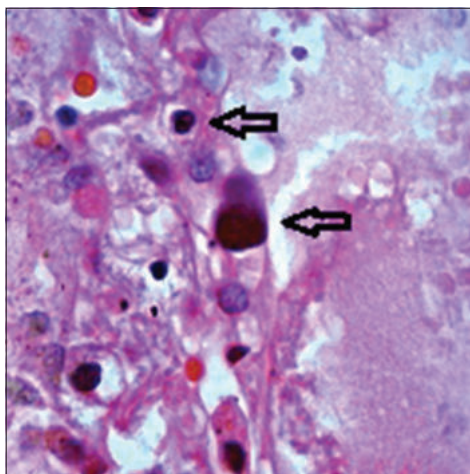


Figure 2: Lung in NiV showing nuclear viral inclusions in pneumocytes (arrows). Some of the cells also show apoptosis. H and E, x400

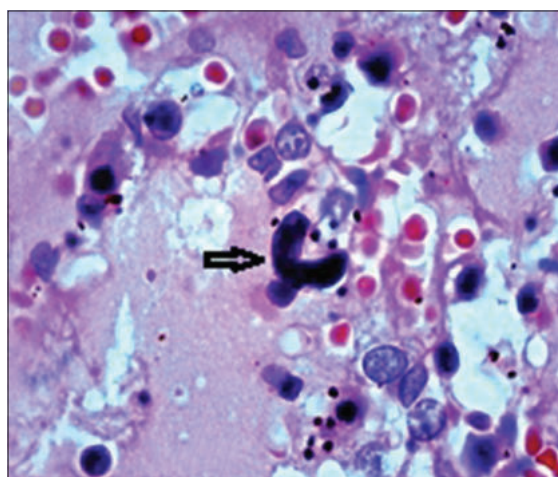


Figure 3: Lung with prominent syncytial giant cell (arrow) and smudgy nuclei of pneumocytes. H and E, x400

Other viscera --- heart (250 gm), liver (1350 gm), gall bladder, and pancreas were grossly unremarkable. There was no fluid

collection in the peritoneal or pericardial cavities. Tissue samples were taken from all these viscera and bone marrow for histopathological examination. Various tissue and fluid samples were also taken for viral demonstration and sent to the Manipal Centre for Virus Research from where the etiological agent was identified as Nipah virus, reconfirmed later by the ICMR National Institute of Virology, Pune.^[4] Electron microscopy or immunohistochemistry was not done in any of the samples.

On microscopic examination, lungs showed the most characteristic changes. There was diffuse alveolar damage with patchy hyaline membranes inside the alveoli in most of the lung tissue [Figure 1]. Hemorrhagic edema was present in about 50% or more of lung tissue. Although unapparent initially, after extensive search, many of the alveolar epithelial cells showed smudgy nuclei probably a result of viral inclusions, some of which were enlarged and forming syncytia by fusion [Figures 2 and 3]. Inflammatory infiltrate was only minimal, mainly lymphocytes. Adrenal cortex and gall bladder mucosa showed coagulative necrosis.

There were no significant changes in the myocardium, brain, liver, pancreas, spleen, kidney, and bone marrow.

NiV was originally reported from Malaysia in 1998 when an epidemic of fatal encephalitis was investigated among pig handlers which led to the discovery of a zoonotic novel paramyxovirus as the etiological agent.^[1] A pioneer autopsy study done on 32 patients during this epidemic has thrown light into the pathology of the infection in various organs in which blood vessels, central nervous system, lungs, and myocardium dominated.^[2] The characteristic changes quoted were vasculitis of small- and medium-sized vessels in one or more organs, thrombosis, and microinfarcts in Central nervous system (CNS) and fibrinoid necrosis in pulmonary alveoli, renal glomeruli, etc. Cytoplasmic and nuclear viral inclusions were reported in the neurons and syncytial giant cells in different organs including blood vessels, neurons, glomeruli, and alveolar epithelium. This series is characterized by greater neurological involvement as compared to subsequent outbreaks that occurred in Bangladesh and India in which respiratory involvement was more;^[5] however, no autopsy data are available in any of the latter.

In the present case, the salient features observed were in the lungs, comprising diffuse alveolar damage, hemorrhagic pulmonary edema, syncytial giant cells, and nuclear inclusions in alveolar epithelial cells. Whether vascular endothelial cells are also involved by similar nuclear changes is not clear although vasculitis or thrombosis was not apparent. These changes are comparable to the autopsy series of Malaysia which additionally states the diagnostic importance of syncytial giant cells seen in endothelia whereas it is not specific for NiV if seen in pneumocytes.^[2] Immunohistochemistry for the virus could not be done due to lack of antibody availability and hence histopathological confirmation was not possible. Coagulative necrosis of the adrenal cortex and gall bladder mucosa were

the other features which are probably not primarily related to the infection since they can be easily explained by the shock state the patient might have gone through. Unlike the Malaysian cases, neuronal, vasculitic and myocardial changes could not be seen even after extensive search in our case which showed almost exclusively pulmonary pathology despite the clinical manifestations of encephalitis and myocarditis.

Autopsy in our case was done before establishing a definite diagnosis of NiV. As no further autopsies were done subsequently in patients who died of the disease as part of the preventive protocol adopted for such a high risk infection, this remains, to the best of our knowledge, the only available data from India on NiV pathology. Clearly, lack of noticeable pathological changes in other organs in this case cannot be taken as a generalization.

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Conflicts of interest

There are no conflicts of interest.

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