Case Report

Human metapneumovirus associated pneumonia and severe bronchiolitis in a 9-month-old infant admitted to a Sri Lankan hospital

JAAS Jayaweera[1], F Noordeen[2], MLM Rayes[3]

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Abstract

Human metapneumovirus (hMPV) has been shown to cause acute respiratory tract infections (ARTI) in children since its first detection in 2001 in the Netherlands. Globally, hMPV accounts for 2-10% of childhood ARTI. hMPV associated ARTI has not been reported in Sri Lanka. We report a case of hMPV infection in a nine-month-old infant with respiratory illness admitted to the paediatric ward of the Anuradhapura Teaching Hospital.

Keywords: Human metapneumovirus, acute respiratory tract infection, bronchiolitis, pneumonia.

Introduction

Acute respiratory tract infection (ARTI) is one of the most common illnesses in childhood and viruses account for most ARTIs. Several viruses are associated with ARTI and associated respiratory diseases. The most frequently reported viruses in newborns and children under 5 years are respiratory syncytial virus (RSV), parainfluenzavirus types 1, 2 and 3, adenovirus, influenza virus types A and B, corona viruses, human Boca virus (hBoV) and human metapneumovirus (hMPV).[1,2,3,4]

hMPV is the first member of a new genus called *Metapneumovirus* of the family *Paramyxoviridae* that infects humans. RSV that infects humans belongs to a separate genus within the same family.[5] hMPV was first isolated in 2001 in the Netherlands using the RAP-PCR, from children suffering from bronchiolitis.[6] Since then, hMPV has been identified in nasopharyngeal aspirates (NPA) of children and adults with ARTI in various parts of the world. hMPV is one of the common respiratory pathogens detected in temperate countries and its prevalence is less in countries with tropical climates. Apart from climatic reasons, low levels of screening and limited diagnostic facilities for

[1]*Department of Microbiology, Faculty of Medicine and Allied Sciences, Rajarata University of Sri Lanka*
[2]*Department of Microbiology, Faculty of Medicine, University of Peradeniya, Sri Lanka*
[3]*Department of Paediatrics, Faculty of Medicine and Allied Sciences, Rajarata University of Sri Lanka/ Teaching Hospital, Anuradhapura, Sri Lanka*

Address for correspondence: Dr. Faseeha Noordeen, Department of Microbiology, Faculty of Medicine University of Peradeniya, Peradeniya, Sri Lanka Telephone: +94812396530
Email:faseehan@pdn.ac.lk or faseeha.noordeen12@gmail.com

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detecting respiratory viruses in the tropics might also contribute to the low prevalence in the tropics as most tropical countries are resource limited developing countries.

Compared to RSV, infection with hMPV tends to occur in slightly older children and causes less severe respiratory disease.[8,9] hMPV associated respiratory illness has not been reported in Sri Lanka, although there has been one study in 2005/2006 that tested 100 NPAs collected from patients with a 4 day history of ARTI for hMPV with negative results.[10] Here we report a case of hMPV infection in a nine-month-old infant with respiratory illness admitted to a Sri Lankan Hospital.

Case report

A previously healthy, nine-month-old girl presented to the Outpatient Department (OPD) of the Teaching Hospital, Anuradhapura, with fever and productive cough of 1 day. Her mother reported that the patient had not been drinking or eating well for the past 36 hours and had a minimally wet diaper that morning. She did not have vomiting or diarrhoea.

This baby girl was a full term baby with a birth weight of 2.6 kg (5.73 lb). Her growth and development matched her age. Her height, weight and head circumference were at the 50th percentile. Her immunizations were up to date for 9 months. She lived with her married parents, a 4-year-old sister and a pet dog in an apartment. She and her sister attended day care 5 days a week. There were no smokers at home.

General examination showed a tachypneic infant with respiratory distress, slightly sunken anterior fontanelle, injected conjunctiva and bilateral mild erythema of the tympanic membranes. Bilateral coarse lung sounds were present with fair aeration. Wheezing, mild to moderate sub-costal and inter-costal retractions and nasal flaring were also noted. Tachycardia with regular rhythm without murmurs and adequate perfusion without cyanosis was noted on cardiovascular examination. Examination of the nervous and gas-tro intestinal systems did not reveal any abnormal findings.

Her axillary temperature was 38.1 ºC (100.6 ºF) with a pulse rate of 132 / minute, respiratory rate of 46 / minute, blood pressure of 74/46 mm Hg and SpO_2 of 91% on room air with the absence of peripheral cyanosis.

Based on the examination findings, the infant was treated with 2 L oxygen per nasal cannula to correct the desaturation. A fluid bolus was given through a peripheral intravenous (IV) catheter to rehydrate the infant. Initially a bronchodilator (highly selective β2-adrenergic receptor agonist) was given via the nebulizer as the child's wheezing did not respond to steroid (Budesonide) nebulization. After the fluid bolus, the infant's physical findings improved and the bolus was repeated until the child's hydration became adequate. The oxygen saturation improved up to 96%. The infant had wheezing but the efforts for breathing became less after repeated nebulization with the bronchodilator and steroid. Empirical IV clarithromycin 7.5 mg/kg twice daily was also begun on admission.

Investigations
Full blood count showed a WBC of 10,000/mm^3 with 34% neutrophils and 62% lymphocytes. Her C reactive protein was <3 mg/L. Her chest radiograph showed perihilar streaky opacities, hyper expansion and bilateral lower lobe consolidation. A diagnosis of bilateral lower lobe pneumonia with moderate bronchiolitis was made on the basis of her x-ray findings.

Specific investigations
Nasopharyngeal aspirate (NPA) collected on day 2 of the admission using a mucus aspirator was sent to the laboratory for testing for respiratory viruses including RSV, parainfluenza virus types 1, 2 and 3, adenovirus, influenza virus types A and B and hMPV by indirect and direct fluorescence assay (IFA/DFA), (Dako, Imagen, UK). Subsequently, the NPA was subjected to viral RNA extraction using the QiagenRNeasy mini kit (Hilden, Germany) followed by a conventional hMPV Reverse Transcription-PCR (RT-PCR) using specific primers to detect hMPV.

IFA was positive indicating that one or more of the tested viruses were present in the NPA. The presence of hMPV was confirmed by DFA and RT-PCR.

The therapeutic plan for this patient included IV fluids for hydration, breast feeding, oxygen support, cardiac, respiratory and ventilation monitoring with a non-invasive device, anti-pyretic treatment until fever subsided and nebulization with a bronchodilator. On day 3 the results of the respiratory viral panel was positive for hMPV and the IV clarithromycin was discontinued.

Approximately 48 hours after admission (day 3) the patient developed marked tachypnea (74/min), tachycardia (182/min), fever (39.4 ºC/102.9 ºF) and a drop in oxygen saturation to 90%. Although supplemental oxygen was increased, she was lethargic with continued exertion on breathing with an oxygen saturation of 88%. Examination of her respiratory system demonstrated wheezing with poor aeration inspite of further increase of supplemental oxygen. Hypertonic saline nebulizer treatment was given with some improvement of her respiratory distress.

Due to continued respiratory distress, the patient was transferred to the paediatric intensive care unit (PICU), where she was connected to the cardio-respiratory monitor, pulse oximetry and ventilation measurement device. Her arterial CO_2 was 54 mmHg. She was placed on continuous positive airway pressure (CPAP) via a nasal mask at 5 cmH_2O pressure. The patient continued to require CPAP with heliox for several days before clinical improvement was noted. She responded to the nebulization with hypertonic saline for several days and was able to tolerate enteral food. She was weaned from supportive therapies and transferred from the PICU to the paediatric ward on day 8. She was weaned from supplemental oxygen and discharged without medication from the hospital on day 10. Her parents were asked to bring her for a review to the paediatric clinic in 14 days.

Follow up
Chest radiography was repeated at the 2nd and 6th week follow up visits to assess the degree of healing of bilateral lower lobe consolidation. Lung fields were normal and the bilateral lower lobe consolidation had cleared fully at the second visit.

Learning points

This is the first laboratory confirmed case of childhood ARTI with hMPV in Sri Lanka. hMPV infection in infants causes severe respiratory disease similar to RSV and is known to cause acute exacerbation of bronchiolitis. hMPV infection in this infant is within the peak hospitalization age (6-12 months) for hMPV infections in the world.[8,9] Use of diagnostic respiratory screening to detect the aetiology of ARTI will be helpful to clinicians to minimize empirical use of antibiotics in ARTI in children. Since no antiviral treatment is currently available for hMPV infection, respiratory precautions including hand washing prior to and after nursing children will be helpful to prevent transmission in healthcare facilities as well as in the community.

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Ethics
NPA was collected using the recommended mucus aspirator by the paediatrician. Consent for testing was obtained from the parents after explanation.

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