

Human Metapneumovirus Causing Pertussis-like Syndrome

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Abstract

Human metapneumovirus (hMPV), a common cause of respiratory illness in children, typically presents with clinical symptoms resembling that of respiratory syncytial virus. The unusual aspect in this case is the presentation of pertussis-like syndrome due to sole hMPV infection. To our knowledge, a case of pertussis-like syndrome caused by hMPV without concomitant *Bordetella pertussis* infection has not been reported.

Keywords: Human metapneumovirus; Pertussis-like syndrome; Pertussis; Whooping cough

Introduction

Human metapneumovirus (hMPV), a recently emerging pathogen within the Paramyxoviridae family, is a common cause of respiratory illness in children [1]. The virus has a role to play in pediatric upper and lower respiratory infections, typically presenting with similar clinical features to respiratory syncytial virus (RSV) and influenza virus [2]. Studies show that hMPV not only shares a clinical presentation with RSV and influenza, but it shares a seasonal distribution as well [2]. Human metapneumovirus is classified within the same sub-family as RSV; however hMPV contains a slightly different gene order and varies in protein makeup [2]. Human metapneumovirus has quickly become a main player in RSV-negative respiratory tract infections in young children worldwide, most commonly affecting children between 2 and 3 years of age [3]. Significant morbidity and mortality has been seen in children presenting with hMPV who have a history of underlying clinical conditions or were born prematurely [2].

Another causative agent commonly seen in respiratory tract infections of infants and children is *Bordetella pertussis*. This infection often presents with the classic “whooping cough,” characterized by severe, spasmodic, coughing episodes during the paroxysmal phase. Similarly, manifestations of pertussis-like syndrome, which include characteristic “whooping cough” episodes without a positive *B. pertussis* infection, have been encountered in presentations of *Chlamydia pneumoniae*, *Chlamydiae trochomatis*, *Mycoplasma pneumoniae*, adenoviruses, and *Bordetella bronchiseptica* [4]. In literature to date, no cases have been reported of pertussis-like syndrome with Human metapneumovirus infection alone. We report a case of Human metapneumovirus infection in an infant presenting with pertussis-like syndrome.

Case Presentation

A 9-week-old male presented to the hospital with worsening cough and respiratory distress. The illness started 19 days prior to hospital admission with upper respiratory tract infection (URTI) symptoms including nasal congestion, runny nose, and mild cough. His

respiratory symptoms progressed in severity over the next seven days and he was subsequently diagnosed with lower respiratory tract infection (LRTI) disease; acute bronchiolitis. After several visits to primary and urgent care centers, along with multiple trials of nebulized bronchodilators without clinical improvement, the patient was seen in the emergency department. Upon presentation, the mother reported decreased feeding, worsening cough, and increased breathing difficulties over the previous few days, along with brief periods of apnea that followed the cough episodes. The patient was observed to have a paroxysmal cough, coinciding with a decrease in oxygen saturation to 84-86 percent on room air. A thorough medical history indicated the patient was a full-term infant born via uncomplicated cesarean section. The infant lived in a home with nine other family members, all of whom had self-reported recent respiratory illness.

Upon hospital admission, chest radiography showed normal results. Initial laboratory investigations showed leukocytosis with reactive lymphocytes; total white blood cell was 19.4 k/cmm with a differential of 39% neutrophils, 45% lymphocytes (29% reactive lymphocytes), and 13% monocytes. C-reactive protein was mildly elevated at 1.33 mg/dl (normal 0.00-0.6 mg/dl). A nasopharyngeal specimen was obtained and examined through a FilmArray Respiratory Panel (FARP), which serves to detect 17 common respiratory viruses and 3 bacterial targets through a variety of Polymerase Chain Reaction (PCR) techniques [5]. This panel showed a sole positive result for human metapneumovirus. A routine nasopharyngeal culture, including aerobic and anaerobic variety, was performed, along with gram staining. The culture and gram staining all yielded negative results.

Throughout the eight-day admission the patient had brief and low-grade febrile periods, which were controlled with acetaminophen. Periodically, the patient continued to experience paroxysmal coughing episodes coinciding with oxygen desaturation. On day six of care the coughing episodes worsened, producing moderate retractions, tachypnea, and tachycardia with wheezing and coarse breath sounds. Each paroxysmal cough episode lasted 3-5 minutes, ending with cyanosis, generalized loss of muscle tone, and apnea of approximately 25 seconds. The patient was subsequently admitted to the pediatric intensive care unit and placed on high-flow nasal cannula oxygen therapy. A nasopharyngeal specimen was collected to perform a repeat FARP. The test yielded identical findings of a sole infection with hMPV. The coughing episodes continued to produce brief muscle tone loss,

cyanosis, apnea, and significant desaturation with no improvement. Additionally, each cough episode was now followed by a characteristic “whoop”. Due to the pertussis-like symptomatology, the patient received Azithromycin while awaiting results of subsequent studies. A short course of steroids (Prednisolone) was added to decrease the inflammation brought on by the LRTI. Additional nasopharyngeal specimens were collected to specifically culture for *Bordetella pertussis* and to perform *Bordetella pertussis/parapertussis* PCR, utilizing traditional technique.

Over the next two days, the patient’s cough, breathing, and feeding improved with supportive treatment. The patient was gradually weaned off supplemental oxygen with no desaturations. The cough persisted, but had no accompanying cyanosis, whooping, or paroxysm of more than 45 seconds in duration. The patient was discharged with instructions to finish the five-day course of Azithromycin and Prednisolone. Following discharge, cough frequency and severity decreased and subsided entirely by the end of the first week. The *B. pertussis* culture and PCR testing yielded negative results. This further confirmed the new presentation of pertussis-like syndrome in concordance with negative *B. pertussis* testing and a sole positive human metapneumovirus infection.

Discussion

Human metapneumovirus (hMPV) is becoming an increasingly common causative agent in childhood respiratory infections [1]. Typically, this virus is spread by direct contact or close contact with secretions [6,7]. Animal models with hMPV have shown a similar pathogenic process to RSV, demonstrating viral replication in the upper respiratory tracts and prolonged airway inflammation with a continuously detectable viral RNA load. In addition, epithelial hyperplasia and increased mucous production with the sequelae of airway hyper-responsiveness and obstruction were observed in animal lungs [7]. These associations are consistent with the clinical observation of hMPV infection and later development of wheezing, as was demonstrated in our patient. However, in our case we see the addition of the unique development of a “whooping cough” [7].

In a typical *B. pertussis* case, most children present as fairly healthy with multiple sick contacts. Between episodes of paroxysmal coughing their physical appearance may appear normal, with only mild leukocytosis seen in lab workup. Coughing episodes may cause brief periods of harmless apnea. Fever is not typically seen with pertussis infections, but gasping, gagging, and cyanosis are common [6]. While this patient did present with a similar paroxysmal cough, including

apnea and gasping, fever was also present intermittently, setting it apart from a typical pertussis clinical vignette. In this case, we see human metapneumovirus presenting in a never-before-seen manner resembling that of *B. pertussis* infection with the classic paroxysmal “whooping cough,” yielding a diagnosis of pertussis-like syndrome.

Conclusion

Preventative measures should be the primary focus when dealing with an hMPV infection. Focusing on eliminating further spread of the virus will be the most effective means of care, as there is no current antiviral treatment for the illness [7]. Primary treatment for a patient with active hMPV infection focuses on supportive care, as seen with our patient, most commonly requiring supplemental oxygen. When evaluating an infant for suspected respiratory disease, it is of the utmost importance to maintain a broad differential of causative agents, including those that may be considered rare or that are not previously associated with the clinical presentation at hand, to achieve an accurate early diagnosis. Our case further demonstrates the importance of prompt diagnosis, using a vast differential, due to the identification of the first case of pertussis-like syndrome caused by human metapneumovirus infection.

Conflict of Interest

None declared.

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