



Parechovirus Neonatal Meningitis: A Case Report

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Abstract

Neonatal meningitis is a serious, potentially life-threatening condition that requires prompt diagnosis and treatment. Bacterial pathogens are usual suspects; however, viral cause should not be overlooked. We report a case of *Parechovirus* neonatal meningitis in an 8 days old male infant, emphasizing the importance of considering uncommon viral pathogens in the diagnostic work up. Human *Parechovirus* belongs to the family of *Picornaviridae* virus. It is very uncommon and has been associated with a benign clinical course of respiratory and gastrointestinal infection in most cases, however, it is emerging as one of the causes for emergency admission of neonates in hospital due to certain serotypes. The HPeV type 3 has been found mostly in children and young infants presenting with meningitis and sepsis like illness. Infants with severe Central Nervous System (CNS) infections are at an increased risk of long-term sequela. In this case we describe the clinical presentation, diagnostic challenges, management, and outcome of this rare infection. An 8 days old baby presented to our emergency department with sepsis like illness. He was admitted in neonatal unit for further investigations and management. Despite initial presentation the inflammatory markers were normal. Symptomatic-supportive treatment was given till baby made full recovery. Antibiotics were discontinued after 48 h as culture was negative for bacteria.

This case highlights the importance of considering *Parechovirus* as possible cause of neonatal meningitis when inflammatory markers are normal and plan the management appropriately.

Keywords: HPeV; Human *Parechovirus*; Infants; Neonatal meningitis; Picornavirus; Sepsis

Introduction

Human *Parechovirus* (HPeV) is member of *Picornaviridae* family. It is an RNA virus with many subtypes. HPeV is commonly causes benign illness but recently type 3 variant has been found to cause more serious illness in newborn and small infants including sepsis like illness, meningitis, encephalitis. Severe disease with a presentation of a “hot, red, angry baby” is commonly associated with HPeV-3 infection. They may present with seizures or significant neurological impairment while having normal or modestly increased levels of inflammatory markers and minimal Cerebrospinal Fluid (CSF) pleocytosis. HPeV is a part of *Enterovirus* family which is mostly associated with respiratory and gastrointestinal infections and transmitted *via* fecal-oral route or respiratory tract. HPeV1 has been found in young children presenting with mild gastrointestinal or respiratory symptoms. HPeV type 2 has been isolated in children presenting with gastrointestinal symptoms. According to recent studies, incidence is 0.04/1000 live births and one of the main causative viruses for sepsis like illness in young infants in Europe.

The use of molecular diagnostic methods has enabled the early recognition of HPeV infections. Identifying the pathogen early is important as it may reduce the use of antibiotics and shorten the duration of hospital admissions for patients with mild to moderate disease. It is also likely to lead to appropriate investigations and follow-up for potential complications in infants who are severely affected.

Case Presentation

Eight days old male neonate from middle east country was brought in our pediatric emergency with complaints of high fever, irritability, high pitch cry and poor feeding in preceding 3 h. Temperature recorded 39°C in emergency room. Baby's temperature in emergency department was 39°C. Parents deny any history of cough, breathing difficulty, vomiting or diarrhea. One family member was suffering from fever and flu symptoms. Baby was admitted in isolation room of neonatal unit for further work up to ascertain the cause of fever. Antenatal and birth history - No significant history found, Maternal serologies negative, GBS negative, baby Born by caesarean section due to failure to progress with meconium-stained liquor at 38 weeks of gestation, Birth Weight: 3.022 kg,

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stayed with mother in post-natal ward for 48 h and discharge home in good condition. Physical examination at admission time revealed febrile infant with irritability, Vitals sign – HR -170/min, RR- 52/min, well perfused, capillary refilling time less than 3 sec, good volume peripheral pulse, anterior fontanel at level, normal muscle tone, no abnormal eye movement, no rashes, clear chest, no heart murmur. Rest physical examination normal.

Laboratory work up: Initial work up was normal. White cells count 6500/mm³, platelets- 22400/mm³, Hb- 16.8 g/L, CRP- 2.3 mg/L., Procalcitonin- 0.17 ug/L. Respiratory panel, COVID swab, Influenza A & B, throat swab for strep, RSV swab all were negative. Due to persistent symptoms and normal initial work up, a lumbar puncture was performed. CSF analysis result shown low Glucose, normal protein, no cells. CSF PCR Detected Human *Parechovirus*. Although the bacteriological examination of blood, urine and CSF were negative, PCR testing of CSF confirm the presence of *Parechovirus*.

Case discussed with pediatric neurologist; no additional treatment was advocated. MRI of brain before discharge was advised to detect if there are any lesions as those lesions may affect future neurodevelopmental outcome. Baby improved within 24 h and fever subsided after 3 days of symptomatic supportive treatment and baby was discharged home on 5th day. Baby been followed discharge. MRI brain reported normal. Hearing test done in follow up were normal. Growth and development normal till date.

Discussion

Neonatal meningitis by *Parechovirus* has been under reported as it is an uncommon causative organism. *Parechovirus* belongs to the *Enterovirus* groups. This case illustrates the most common features of an HPeV infection in this period of life, in particular the presentation as a sepsis-like syndrome with high fever and irritability without localization of symptoms [1,2]. In the United Kingdom, the combined incidence of EV and HPeV meningitis in neonates is 0.79/1,000 live births and 0.04/1000 live births respectively, as recently estimated in an elegant study by Kadambari et al., this is twice more common than bacterial meningitis.

The epidemiological context of this case is consistent with current evidence demonstrating that the HPeV infections are more frequent between September and January. Also, the familial contact with a flu like symptoms further supports the etiology as HPeV responsible for non-severe respiratory and gastrointestinal infections in about 60% to 70% of cases in infants below 3 years of age [3].

The most common presenting feature of HPeV infection is fever, irritability, poor feeding, tachycardia, rash. In the current literature most cases have been reported in older children quite unlike our case [3,4]. Most striking presenting feature in this age group is sepsis like syndrome with high fever, irritability, poor feeding without a localized focus of infection [2,5]. According to a recent publication, this clinical presentation may be more common than earlier thought, with HPeV being one of the major causes of neonatal sepsis and meningitis [6]. Our case did not show major CNS involvement, although irritability and high pitch cry were noted. Maculopapular rashes are very common feature during or after the illness but was not noted in our case [7].

While most neonatal infections are acquired during birth, *Parechovirus* can also be transmitted postnatally through respiratory

secretions or fecal-oral routes. Diagnosing *Parechovirus* neonatal meningitis can be challenging due to its rarity and overlapping clinical features with bacterial meningitis. Laboratory results of HPeV infections, compared with enterovirus infection, usually display lower leucocyte counts together with a silent CSF cytochemical exam, often with no pleocytosis [4]. CSF analysis typically reveals absence of pleocytosis normal protein levels and normal glucose level [1]. However, these findings are nonspecific and can be seen in other viral and bacterial infections. Sharp et al. have reported that CSF pleocytosis was less common in HPeV infections (2%) than enterovirus infections (41%) and mean CSF white cells counts and protein levels were also significantly lower in HPeV infections [8]. In our case CSF glucose was low, protein normal and no cells were identified. PCR-based molecular techniques are crucial for identifying the specific viral etiology, as demonstrated in this case.

The management of *Parechovirus* neonatal meningitis primarily involves supportive care, including hydration, fever control, and close monitoring of complications. Specific antiviral therapy for *Parechovirus* is not available, highlighting the need for symptomatic treatment and vigilant monitoring of the clinical status of baby. In this case infant received supportive care and clinical course gradually improved with no long-term sequela.

Many publications recently reported HPeV in younger age group causing meningitis and sepsis like illness [6]. The prognosis is generally good, and mortality and morbidity are less than 1% although several studies have also reported significant neurological sequelae in infant with HPeV3 infections. Neonates with *Parechovirus* meningitis have not been reported frequently but the potential of HPeV to lead to permanent neurological deficits is known. This explains why some authors suggest conducting full psychomotor surveillance during follow up of affected cases [4].

By reporting this case we aim to highlight the importance of viral causes of neonatal meningitis, specially HPeV-3. When approaching neonates with sepsis like illness considering viral etiologies is worthwhile is important in preventing unnecessary and prolong antibiotics treatment. We believe, real time Reverse Transcriptase -Polymerase Chain Reaction (RT -PCR) of CSF for viruses is an important laboratory test.

Conclusion

Parechovirus may presents with severe CNS manifestation and other significant clinical illness, in spite of normal inflammatory markers. Molecular diagnostic methods are essential for early diagnosis and should be implemented in the standard work-up for suspected sepsis and meningitis in neonates and young infants. Proper diagnosis and management will eliminate unnecessary treatment. The possibility of HPeV infection in the neonatal age group should be considered as differential diagnosis.

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