Case Study

A Case of Measles in a 2-Month-Old Infant

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ABSTRACT

Background:
Measles is a common childhood infection; however, infection in infants younger than six months is rare because maternally derived antibodies are expected to provide protection.

Case presentation:
We report the case of a 2-month-old infant who presented with fever, cough, conjunctivitis, Koplik spots, and subsequently developed a maculopapular rash, predominantly involving the face and upper body. The infant developed post-measles pneumonia requiring hospitalization. There was a significant epidemiological link, as the mother had a recent measles infection. Measles IgM antibodies were markedly elevated. The infant recovered with supportive care, vitamin A supplementation, and antibiotic therapy. On follow-up, the patient is clinically well and gaining weight appropriately.

Keywords: Neonatal measles; measles epidemic; congenital measles; post-measles complications

Background

Measles, also known as rubeola, morbilli, or English measles, is a highly contagious viral illness with a basic reproductive number estimated between 12 and 18. Transmission occurs via respiratory droplets and aerosols released during coughing, sneezing, breathing, or speaking [1]. The disease can be effectively prevented by administration of two doses of measles-containing vaccine (MCV).

An infected individual is contagious from approximately six days before to four days after the onset of rash [2,3]. Although widespread vaccination has significantly reduced the global burden of measles, repeated outbreaks continue to occur in both low middle-income countries (LMICs) and high-income countries, with disproportionately higher mortality in LMICs [4]. Reducing measles-related mortality through vaccination has been a key component of efforts to decrease under-five mortality since the 1990s, including Millennium Development Goal 4 [5].

Measles has been a notifiable disease since 1975, and all suspected cases must be reported to health surveillance authorities within 24 hours, regardless of vaccination status [3]. Young age and malnutrition are important risk factors for measles-related mortality, with an estimated 4% of under-five deaths in India attributed to measles and its complications [6]. Approximately 30% of reported measles cases develop one or more complications [7].

Here, we report a case of measles complicated by pneumonia in a 2-month-old infant from Lahore, Pakistan, during a documented outbreak.

Case Presentation

A 2-month-old male infant presented with a three-day history of high-grade fever, cough, coryza, and respiratory distress. The caregivers also reported poor feeding, lethargy, and increasing work of breathing. There was a preceding history of fever associated with rash, watery eye discharge, and coryzal symptoms.

The infant was born at 38 weeks' gestation via normal vaginal delivery with a birth weight of 2.56 kg. The peripartum period was unremarkable. He was admitted to the nursery shortly after birth with a diagnosis of early onset sepsis.

At 40 days of life, the infant developed fever, cough, and respiratory distress, leading to hospital admission where he was treated as pneumonia. During this admissions, he received first-line antibiotics, later escalated to second-line therapy, and required supplemental oxygen. He was discharged once oxygen-independent. He was not investigated for immunodeficiency. Seven days later, he presented again with fever, and respiratory distress and was admitted to our hospital. On examination, the infant was febrile, lethargic, and tachypneic, with oxygen saturation of 85% on room air, improving to 96% with supplemental oxygen. Peripheral pulses were of good volume. There were signs of respiratory distress with decreased air entry and fine bilateral crackles. Mucopurulent conjunctivitis and post-inflammatory hyperpigmentation of the skin were noted. Intravenous access was obtained, and blood cultures were drawn.

Detailed contact tracing revealed that the mother had developed a febrile illness consistent with measles seven days prior to the infant's most recent presentation. Her illness resolved spontaneously within 5–6 days without medical intervention.

The grandmother reported that the mother, aged 32 years, had received a single dose of measles vaccine in childhood, consistent with the national immunization schedule at that time. The family resided in Lahore, a region experiencing a measles outbreak during the same period. The household belonged to a middle socioeconomic class, with adequate sanitation but household overcrowding.

Chest radiography demonstrated bilateral pulmonary consolidation (Figure 2). Laboratory investigations are summarized in Table 1. Given the clinical features, age, and strong epidemiological link, measles IgM antibodies were tested and found to be significantly elevated, confirming the diagnosis. Measles specific Ig G were significantly raised in the mother. Measles genotyping could not be performed due to financial constraints.

The infant was treated with age-appropriate vitamin A supplementation, intravenous ceftriaxone and azithromycin for five days, topical tobramycin for conjunctivitis, and supportive care. The patient showed clinical improvement and was discharged on day 10 of admission. On follow-up, he remains clinically stable and is gaining weight appropriately.

Figure 1: Measles Rash on face of child

Discussion

This case highlights measles infection occurring at an unusually young age, when maternally derived antibodies are generally expected to provide protection. The mother had received a single dose of measles vaccine at nine months of age, vaccine-induced immunity following early vaccination weans of quickly around 6 years of age. This may have resulted in insufficient transplacental antibody transfer and increased susceptibility in both mother and infant.

Neonatal measles may be acquired either postnatally or congenitally via vertical transmission. Due to successful vaccination programs, most available data on congenital measles date back several decades. Congenital measles has been associated with high mortality, particularly in preterm infants and those with neonatal pneumonia or perinatal infections [8].

Measles antibody titers in newborns closely correlate with maternal antibody levels, regardless of maternal age. Approximately 10% of infants are susceptible to measles at birth, and by three months of age, most infants lack protective antibody levels [13]. Studies have shown that only 30% and 15% of infants at two and four months of age, respectively, retain protective measles titers, with none protected by six months [14]. Risk factors for early infection include low birth weight, lack of breastfeeding, overcrowding, preterm birth, maternal susceptibility, and community outbreaks [8].

Early clinical manifestations of measles in young infants are often nonspecific, overlapping with other viral respiratory illnesses, which can delay diagnosis. The appearance of a characteristic morbilliform rash remains a critical diagnostic clue [1]. Complications arise from epithelial damage and virus-induced immunosuppression and include pneumonia, diarrhea, otitis media, blindness, and encephalitis [9–11]. Pneumonia and encephalitis are leading causes of measles-related mortality, with encephalitis being a major cause of long-term sequelae [12].

Table 1: **Laboratory investigations of the index case report Parameter (units) Observed value (Normal range)**

Hemoglobin (g/dl) (11.1–13.7)	11.3
Total leucocyte count (cells/mm3) (7.34–12.32)	5.8
Platelet count (lakhs/mm3) (184–430	208
CRP	12.96
Serum sodium (mmol/l) (132–140)	136
Serum potassium (mmol/l) (3.5–5.8)	4.7
Total protein/albumin (g/dl) (4.5–6/3.5–5)	4.2/2.1
AST/ALT (IU/L) (20–67/9–35)	50/31
ALP (IU/L) (104–455)	256
Serum calcium (mg/dl) Total (8.5–11) Ionic (3.7– 5.9)	Total 9.4 Ionic 4.81
Serum phosphate (mg/dl) (4.8–8.4)	5.9
Serum magnesium (mg/dl) (1.97–3.07)	2.8
measles antibodies IgM; > 25unit/ml suggestive of active infection). Maternal antibodies IgG ; >250 unit/ml suggestive of infection	446 unit/ml 592 unit/ml

Data on measles morbidity and mortality in infants younger than six months are limited. During the 2009 Cape Town outbreak, the median age of hospitalized children was 8.9 months, with a mortality rate of 3%, and 72% of deaths occurring in children younger than one year [13]. Similar findings were reported in a Philippine study (2016–2019), where mortality was 3.2%, with 41% of deaths occurring in children younger than nine months; no deaths were reported among previously vaccinated children [14].

The present case represents an epidemiologically linked measles infection, temporally and geographically associated with a confirmed outbreak. During outbreaks, suspected cases should undergo laboratory confirmation using serological assays or PCR when feasible [15]. In this case, diagnosis was established using measles IgM ELISA during the convalescent phase.

Outbreak control measures include interruption of transmission, early case identification, vitamin A administration, supportive care, and targeted immunization strategies such as outbreak response immunization (ORI). While WHO does not recommend routine prophylactic antibiotics, empiric therapy is appropriate when secondary bacterial infection is suspected [15]. Global strategies, including the WHO-UNICEF Global Immunization and Vision Strategy (GIVS) and Measles & Rubella Initiative, emphasize high MCV coverage with two doses, surveillance and effective case management. [16].

Lowering the age of first dose of measles vaccination has been proposed, however the vaccine effectiveness increases with age at administration—61% at 6–8 months, 84% at 9–11 months, and 93% at ≥12 months [16,17]. Also, there have been concerns about blunting of immunity to the second dose of vaccine if the first dose has been given at a younger age. Therefore, for infants younger than six months, early recognition, isolation, and supportive management remain essential18.

Figure 2: X-ray of child with Measles with evidence of pneumonia

Conclusion

Measles infection is uncommon in infants younger than six months due to passive maternal immunity. In this case, inadequate maternal antibody protection contributed to infection at a young age and subsequent complications. Awareness of such atypical presentations, particularly during outbreaks, is critical to ensure timely diagnosis and appropriate management, thereby reducing morbidity and mortality.

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