

Purulent Bacterial Meningitis at Birth

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ABSTRACT

Meningitis is an acute inflammation of the protective membranes covering the brain and spinal cord, which are known as the meninges. This infection may be caused by *Streptococcus pneumoniae* bacteria. In this study, we presented the case of a female newborn with meningitis secondary to *Streptococcus pneumoniae*. Her birth weight and height were normal. After 24 hours of birth, the neonate was diagnosed with tachypnea, without presenting any signs of fever or respiratory distress. The newborn was referred to Sheikh Children's Hospital, where chest X-ray showed clear lungs with no evidence of abnormality. Furthermore, the cardiothoracic ratio was normal. A complete blood count demonstrated white blood cell (WBC) count of 5400/uL. In Blood/Culture (B/C) test, *Streptococcus pneumoniae* was reported, and the results of the cerebrospinal fluid (CSF) analysis confirmed this result. Following 14 days of receiving antibiotic therapy, the results of CSF analysis were within the normal range. Her visual and hearing examinations were normal, and demonstrated improved situation. The infant was discharged with exclusive breastfeeding.

Keywords: Bacterial meningitis, Newborn, intensive care unit

Introduction

The infection caused by *Streptococcus pneumoniae* bacteria (pneumococcus) is a pneumococcal disease. These bacteria may bring about numerous types of disorders including pneumonia, meningitis, as well as ear, sinus and blood stream infections. Meningitis is an acute inflammation of the protective membranes covering the brain and spinal cord, collectively known as the meninges (1).

Streptococcus pneumoniae is the most common causative agent of childhood meningitis. However, it is a rare pathogen in neonates (2). Meningitis' signs usually manifest quickly and may include fever, changes in mental status, poor feeding or irritability in children, nausea and vomiting (3). Pneumococcal meningitis is a major cause of fever in children. In this study, we presented the case of neonatal meningitis attributed to *Streptococcus pneumoniae* in the neonatal intensive care unit (NICU) of Sheikh Hospital, Mashhad, Iran.

Case presentation

A preterm female neonate, with birth weight, height and head circumference of 3600 g, 51 cm and 36 cm, respectively, was born in a hospital through normal spontaneous vaginal vertex delivery. Her Apgar scores were normal. She did

Table 1. Laboratory tests and results on admission

not have history of premature rupture of membrane (PROM) or other diseases in the first 24 hours after delivery. Breastfeeding was underway without facing any problems. The neonate was discharged from the hospital within 24 hours of birth.

After 24 hours, the neonate was taken to Sheikh Children's Hospital with tachypnea and without any other signs such as fever or respiratory distress. She was transferred to the NICU due to her critical condition. Chest X-ray exhibited clear lungs with no evidence of abnormality; furthermore, cardiothoracic ratio was normal.

The neonate received antibiotic therapy, including ampicillin and gentamicin. Complete blood count demonstrated white blood cell (WBC) count of 5400/uL, with 29% lymphocytes and 71% bands. Electrolyte count, as well as arterial blood gas (ABG) and liver and kidney function tests showed normal study (Table 1). An infectious disease specialist was consulted, and the antibiotic regimen was changed to meropenem and vancomycin.

After 48 hours, the blood culture test showed *Streptococcus pneumoniae*, and the results of the cerebrospinal fluid (CSF) culture confirmed

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|---|-------------------------------------|
| White blood cells (WBC) count (cells/ μ l) | 5400 |
| Lymphocytes% | 29 |
| Neutrophil% | 71 |
| Arterial blood gas | |
| pH | 7.14 |
| PCO ₂ (mmHg) | 28 |
| HCO ₃ (mmol/l) | 9.6 |
| BE | -18 |
| LP | |
| Glucose (mg/dl) | 21 |
| Protein (mg/dl) | 130 |
| WBC | 8100 |
| Neutrophil% | 98 |
| Lymphocytes% | 2 |
| Cerebrospinal fluid/Culture | (<i>Streptococcus pneumoniae</i>) |
| Biochemical analysis | |
| Blood sugar (mg/ dl) | 76 |
| Serum glutamic-pyruvic transaminase (mg/dl) | 48 |
| Serum glutamic oxaloacetic transaminase (mg/dl) | 96 |
| Alkaline phosphatase | 687 |
| Total protein | 5.3 |
| (Creatinine)mg/dL | 0.9 |
| BUN (mg/dl) | 36 |
| Electrolytes | |
| Ca (mg/dl) | 8.8 |
| Na (mEa/l) | 146 |
| K (mEa/l) | 4.2 |
| other | |
| Ammoniac | 115 |

its existence. CSF analysis showed 130 mg/dl protein, 21 mg/dl glucose and WBCs with 98% and 2% polymorphonuclear cells and lymphocytes, respectively. The other results of the CSF tests are presented in Table 1.

Following 14 days of receiving antibiotic therapy, the infant's CSF results were within the normal range, and her visual and hearing examinations were normal. Her situation was improved, and she was discharged from the hospital with full-term breastfeeding. After one month of follow-up, she had normal developmental milestones, 900 g weight gain and was not readmitted to the hospital.

Discussion

This report is a rare presentation of bacterial

meningitis at birth time. Rossi determined that the primary cause of meningitis in a less-than-three-month infant was *streptococcus pneumonia* (4). Accordingly, in a study by Baş, *Streptococcus pneumoniae* was the leading causative agent in the newborns with community-acquired meningitis. It is also suggested that low socioeconomic status and overpopulated living conditions may have a role in both incidence and prognosis of neonatal meningitis. Patients with low socioeconomic background were mostly from crowded families. Prevention interventions such as training families for hygienic care and minimizing infants' contact with other people to reduce the risk for streptococcus infections in the first three months of life, would have a significant impact on diminishing the number of meningitis cases (5).

Balliu Badia et al. reported two cases of neonatal early-onset sepsis, one of whom was diagnosed with meningitis. Positive culture for pneumoniae was obtained from both newborns and their mothers. They were full-term and had normal birth weight and height. The significant clinical findings were fever and respiratory distress. Leucopenia was found in both cases and in one case the chest radiography was abnormal. Both neonates had an uneventful recovery after initiating antibiotic therapy and no long-term sequellae were detected (6). Also, Baş et al. reported eight cases of pneumococcal meningitis in NICUs, between January 1999 and December 2008. Irritability, poor sucking and fever were the principal findings in their initial physical examinations (5).

Streptococcus pneumoniae may reach the fetus or newborn via the transplacental route due to maternal bacteremia, or through ascending infection from the maternal genital tract or by passing through a colonized birth canal (7). In some rare cases, neonatal sepsis with this organism was caused by vaginal transmission and endometritis (8,9). Unfortunately, maternal vaginal swabs could not be performed in these cases.

Bacterial meningitis is a medical emergency, in which early diagnosis and treatment is imperative to lower the rate of long-term complications and mortalities. Lumbar puncture is used to confirm diagnosis in patients presenting with clinically suspected meningitis. If imaging is to be performed before lumbar puncture, empiric therapy should be initiated first, as a delay in treatment can result in poor outcomes. The choice of initial antimicrobial therapy is based on the most common bacteria causing the disease

considering the patients' age, clinical setting and patterns of antimicrobial susceptibility (10).

Conclusion

In a nutshell, meningitis should be suspected in neonates if any unexplainable change (even if only asymptomatic respiratory distress) in their clinical status is observed. Although pneumococcal meningitis is an unusual incidence in neonates, immunization against pneumococcal diseases can have beneficial effects on prevention of pneumococcal meningitis and other related diseases in the developing countries.

Acknowledgment

The authors greatly appreciated cooperation of Mrs Nooshin Abdollahpour.

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