Early-Onset Listeriosis in Prematurity: A Case Report

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Listeria monocytogenes has been known for several decades, but its infection of newborn infants has been rarely reported in Taiwan. We here report a case of a premature newborn with a gestational age of 31 3/7 weeks and a birth body weight of 1,070 gm, who was found to have early-onset Listeria sepsis, pneumonia and suspected meningitis. Unexpected meconium stained amniotic fluid was found at birth. After treatment with ampicillin and gentamicin, her condition improved gradually. She was discharged on the 59th day with a body weight of 2,712 gm, and complete eradication of the Listeria infection. (Clinical Neonatology 1998;5(1): 32-34)

Key words: Listeria monocytogenes, Early-onset sepsis, Pneumonia, Prematurity

Listeria monocytogenes was first described by Murray et al in 1926 [1]. It is a short, motile, gram-positive bacillus, which can cause infection in humans, especially in immunocompromised individuals, in the elderly, during pregnancy, and in the neonatal period. When infection occurs in pregnancy, it can cause premature delivery, stillbirth or abortion. When infection occurs in newborn infants, it can present as early- or late-onset sepsis, pneumonia, and meningitis, similar to infection by group B streptococci. Hypothermia, poor feeding and lethargy will be found in these infected newborn infants [2]. In America and Europe, this bacteria is not uncommonly reported. In Taiwan, this is a rare infection. Here we report a case of prematurity involving early-onset Listeria infection.

Case Report

This female premature newborn, with a gestational age of 31 3/7 weeks and a birth body weight of 1,070 gm, was vaginally delivered, and meconium stained amniotic fluid was noted. There was a delay of initial crying and the Apgar score was 5/6 at 1 and 5 minutes. The newborn was then sent to the intensive care unit under the impression of prematurity with respiratory distress syndrome, perinatal asphyxia and suspected sepsis. The mother’s history obtained from a local obstetric clinic showed premature rupture of membranes for 2 days and leukocytosis (WBC >30,000/cu mm). No culture of vaginal discharge was done after delivery. Initially, ampicillin (100 mg/kg/day) and gentamicin (5 mg/kg/day) were prescribed for prophylaxis of neonatal sepsis.

Beginning on the day of birth, yellowish discharge from the newborn’s nose and the endotracheal tube was observed. Her initial hematology studies showed a white blood cell (WBC) count 26,400/cumm (neutrophils: 55%, lymphocytes: 45%), hemoglobin (Hgb) level of 12.5 gm/dl, hematocrit level of 36.9%, and platelet count of 240 000/cu mm. Chest X-ray showed grade II/IV respiratory distress syndrome. The endotracheal tube was removed on the 3rd day without difficulty, and continuous positive airway pressure via the nasal route was subsequently given.

Unfortunately, frequent apnea and bradycardia were noted on the 4th day and sepsis was highly suspected. Cerebral spinal fluid (CSF) from a spinal puncture showed a WBC count of 2,170/cu mm (neutrophils: 90%, lymphocytes: 3%, monocytes: 5%, metamyelocytes: 2%), red blood cell (RBC) count of 110,000/cu mm, protein level of 25 mg/dl, glucose level of 9 mg/dl (simultaneous blood glucose level: 75 mg/dl) and no bacteria growth when cultured. On the same day, the hematology study showed a WBC count of 39,410/cumm (neutrophils: 55%, lymphocytes 17%, bands 9%, monocytes 8%, metamyelocytes 6%, myelocytes 2%, atypical lymphocytes 3%), RBC count of 3,360,000/cu mm, Hgb level of 11.9 gm/dl, hematocrit level of 36.4%, and platelet count of 236,000/cu mm. The C-reactive protein level

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was 0.26 mg/dl.

No bacteria was found on the Gram stain of the yellowish discharge from respiratory tract, and its culture did not grow any bacteria. A chest X-ray on the 5th day disclosed a diffuse infiltrate over the lung fields bilaterally, especially the right upper and right middle lobes. The Gram stain from the blood culture showed gram-negative bacilli on the 2nd day. On the 3rd day, the Gram stain revealed what appeared to be gram-positive cocci in chains. Finally, the organism was verified to be *Listeria monocytogenes* on the 5th day. Therefore, the dose of ampicillin was increased to 200 mg/kg/day. Two other lumbar punctures were performed. One done on the 11th day showed a protein level of 4,500 mg/dl and glucose level of 95 mg/dl; the other puncture performed on the 17th days showed a protein level 1,926 mg/dl and glucose level of 82 mg/dl. Cultures of CSF grew no bacteria. No white cell count was done due to the small amount of CSF available. The leukocytosis in peripheral blood and the yellowish discharge, which persisted for more than 10 days, improved gradually after antibiotic treatment for 18 days. Throughout the whole course, no fever or rash was noted. Finally, the infant was discharged on the 59th day uneventfully with a body weight of 2,712 gm.

**Discussion**

The *Listeria* species can be found in our environment, e.g. in soil, water, various animals, and contaminated foods. Foodborne listeriosis has been well-documented [3]. *Listeria* infection is commonly classified into four clinical groups: (1) listeriosis during pregnancy, (2) listeriosis in the newborn infant, (3) central nervous system, and (4) other: septicemia with pharyngitis and mononucleosis, oculoglandular, or cervicoglandular [4].

When infection with *Listeria* occurs during pregnancy, the patient may have an asymptomatic carrier state, the duration of which is unknown. Moreover, infection of the fetus might not occur during or after the carrier state [4].

The pathogenesis of perinatal *Listeria* infection is not very clear, but maternal listeriosis can be transmitted to the fetus by an ascending or transplacental route [4]. Since the mother in our case had a history of premature rupture of membranes for 2 days and leukocytosis >30,000 /cu mm, infection was highly suspected. Examination of the placenta has been proposed as being useful in the diagnosis of prenatal listeriosis [5], and the presence of macroabscesses in the placenta is the most characteristic finding. The placental weight in our case was 350 gm, which was within the normal range, and no abscess was found by the obstetrician.

In neonatal infection, listeriosis may be manifested either as early- or as late-onset sepsis, similar to group B streptococcal infection. Early-onset infection can be acquired by transplacental infection or aspiration from the birth canal during delivery, but the timing of late-onset transmission is not clear. Late-onset infection can happen between the 2nd and 5th weeks of life, and more commonly involves the central nervous system [2]. Serotypes Ia, Ib, and IVb are the predominant infecting serotypes in all cases of human listeriosis. The distribution of these serotypes is significantly different between the early- or late-onset patients. In addition, the birth body weight of an early-onset infected neonate is usually less than that of the neonate with late-onset infection [6]. When neonatal listeriosis exists, isolation of the newborn’s secretions and excretions is necessary, because there may be nosocomial cross-infection in nurseries [7]. Common use of a rectal thermometer among neonates has been considered to be one mode of transmission [8]. Certainly handwashing is an important method to prevent spreading the disease.

In the past, reports of *Listeria* infection occurring in Taiwan were scarce, even among immunocompromised adults [9,10]. Only one case of a premature neonate with a gestational age of 28 weeks and a birth body eight of 1,180 gm was reported [10]. The rare prevalence here may be due to our food habits differing from those of other countries. Contaminated milk products, meat, ready-to-eat foods [11], and raw vegetable products have been considered to be major sources of infection [12]. Also, incorrect judgement of culture results due to the coccobacilli shape and changeable gram-positive stain may contribute to the low prevalence rate in Taiwan. In addition, this organism frequently is thought to be a contaminant because of its similarity to diphtheroids. Therefore, the laboratory should be informed when this infection is suspected [2].

Meconium staining in amniotic fluid of premature newborns, especially those of less than 32 weeks’ gestation, has been documented in reports of *Listeria* infection [4]. It is very important to keep this in mind. Early detection by gram stains and cultures of blood, urine, or any secretion is necessary to prevent deterioration. In our case, meningitis was suspected due to low glucose level (9 mg) and leukocytosis in CSF of the first lumbar puncture. Chest X-ray showed diffuse parenchymal infiltrates on the 5th day, which suggested the presence of aspiration pneumonitis [2].

Leukocytosis with predominant polymorphonuclear cells in peripheral blood was also seen in our case. Throughout the whole course, the monocytes increased, and the numbers were between 5 and 13% of the total number of white cells. *L. monocytogenes* had been well
documented as being to manufacture a monocytosis-producing agent [4], which could shorten the generation time of monocyte precursors in vivo [13].

Ampicillin, penicillin G, and trimethoprim-sulfamethoxazole are currently the accepted antibiotics for treating listeriosis. Erythromycin and tetracycline are alternative agents, but cephalosporins, quinolones, and oxacillin have little effect [14-16]. Aminoglycosides have been recognized as being able to provide synergistic effects in treatment [17-19]. This synergism may be especially helpful in improving outcomes for neonates and premature infants with Listeria infection.

Reference