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Pulmonary complications of congenital listeriosis in a preterm infant

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INTRODUCTION

Listeriosis is relatively rare and occurs primarily in newborn infants, elderly patients, and patients who are immunocompromised. Listeria monocytogenes is an intracellular, gram-positive bacillus which replicates at temperatures between 4-8°C. Infection occurs most of the time through contaminated food. The incubation period is variable, ranging from 1 day to 3 weeks. As in group B streptococcal infections, listeriosis can manifest in the neonate as early-onset disease with pneumonia, sepsis and/or meningitis (mortality rate of 20-30%, significantly higher in preterm infants) or late-onset disease manifesting primarily as meningitis. An erythematous rash with small, pale nodules characterized histologically by granulomas can occur in severe neonatal infection and has been termed „granulomatosis infantisepticum" (1). In immunocompetent patients listeriosis can present as a febrile gastroenteritis, cutaneous listeriosis (after direct skin exposure) or as focal infection most commonly involving the peritoneum, joints, endocardium or eyes. These presentations are self-limiting and are therefore probably vastly under diagnosed.

CASE REPORT

This male infant was delivered at 26 5/7 weeks of gestation by caesarean section following an otherwise unremarkable pregnancy. Caesarean section was performed due to a pathologic CTG and presumed chorioamnionitis with a maternal temperature of 38.2°C and a C-reactive protein of 157 mg/l. The maternal routine serologic examinations had been normal and a vaginal smear for GBS was negative. Apgar scores

Fig. 1

Babygram on DOL 1. Lung appearance was felt to be consistent with hyaline membrane disease.

Fig. 2

Maculopapular or granulomatous rash at birth.

were 6, 8, 8 at 1, 5 and 10 minutes, respectively. The amniotic fluid was putrid. Initial investigations showed a white blood cell count of 10.5 G/l with toxic signs, thrombocytopenia of 85 G/l, and a C-reactive protein of 71 mg/l. The patient required respiratory support with HFOV and iNO and circulatory support with inotropes and vasoactive agents. The first chest x-ray showed a picture compatible with hyaline membrane disease stage II (Fig. 1). There was an extensive maculopapular rash on the trunk (Fig. 2). Gram stain of a tracheal aspirate revealed gram positive rods, later identified as Listeria monocytogenes (Fig. 3) which also grew from blood cultures and both sides of the placenta. Amoxicillin and gentamycin was administered for three weeks. A lumbar puncture was not performed because of the patient's cardiorespiratory instability. In the following weeks, the hospital course was complicated by the development of pneumothoraces and extensive bilateral cystic lung changes (Fig. 4-7). Ultrasound examination of the brain showed bilateral grade III PIVH without parenchymal lesions. Mild to moderate posthemorrhagic hydrocephalus resolved spontaneously. Supplemental oxygen was required until a corrected age of 37 2/7 weeks. Despite persisting radiological abnormalities (Fig. 8), he was discharged off oxygen at 41 3/7 weeks. At the chronologic age of 6 months (corrected 3 months) there were subtle neurologic abnormalities (poor variability in movement patterns, discrete hypotonia of the upper extremities, slightly increased tonus of the lower extremities).

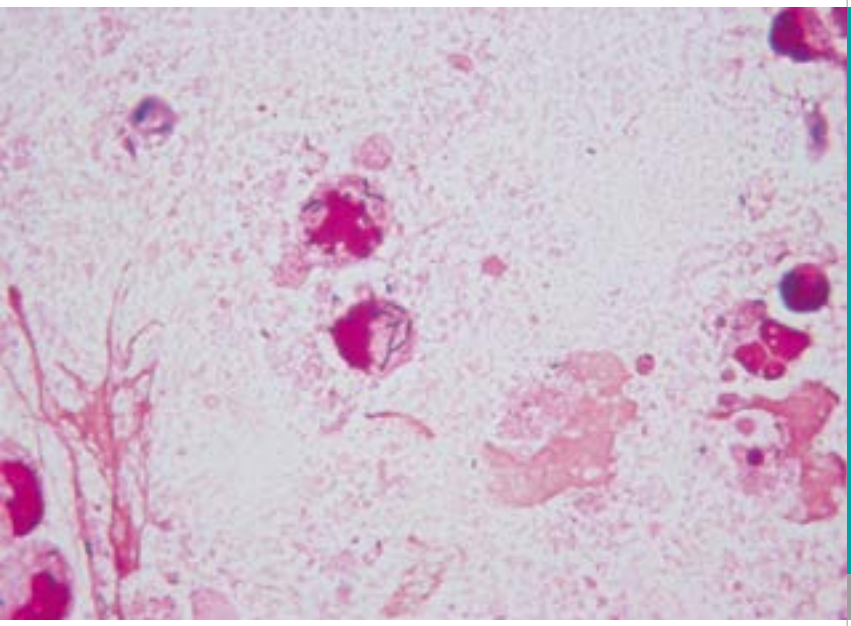

Fig. 3

Gram stain of tracheal aspirate with intracellular gram positive rods, later identified as Listeria monocytogenes.

Fig. 4

CXR on DOL 12. Bilateral cystic changes (left > right).

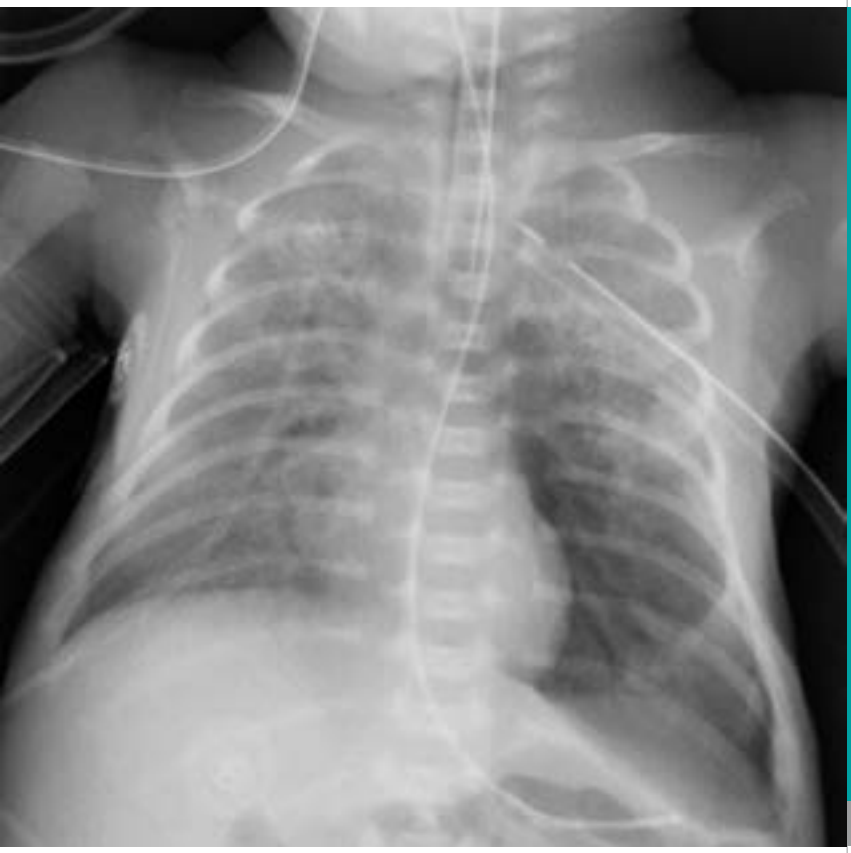

Fig. 5

CXR on DOL 14. Partially evacuated left-sided pneumothorax.

Fig. 6

CXR on DOL 36. Bilateral cystic lesions are still prominent.

Fig. 7

CXR at 2 months of age. Persistence of bilateral cystic lesions.

Fig. 8

CXR at 4 months of age. Persistence of bilateral cystic lesions.

At the chronologic age of 1 year (corrected 9 months) there was still a subtle discrepancy in the muscle tone between upper und lower extremities. Apart from that his development was age appropriate. During his first year of life the boy had several episodes of upper respiratory tract infections, but was never seriously ill, never hospitalised and never required specific respiratory therapy (i.e., inhalation therapy).

DISCUSSION

Neonatal listeriosis is still a non-negligible cause of infection in preterm and term newborns with an estimated incidence of 13 per 100'000 live births (i.e., about 10 cases per year in Switzerland). In fact, neonatal infection is the most common form of human listeriosis (2).

Numerous factors have been described to account for the increased susceptibility of newborn infants: delayed activation of macrophages, diminished interaction between macrophages and T-cells, diminished chemotaxis, impaired phagocytosis, decreased number of NK cells, diminished production of IL-12 (NK-cell activation, production of IFN-α, differentiation of T 1), and deficient opsonisation.

Most cases of early-onset listeriosis develop within the first two days of life, and there is often evidence of preceding maternal flu-like illness. These infants present with meconium-staining (even in VLBW infants),

respiratory distress, and apnea. Pneumonia is present in 50% of the cases (and, as demonstrated in our case, can lead to significant complications), meningitis in 25% and positive blood cultures 75%. In severe infections, a granulomatous rash may be present (Fig. 2) and should alert the physician to the possibility of neonatal listeriosis. In early-onset Listeriosis, mortality rates are as high as 20-30% and may even reach 65% in preterm infants.

In the late-onset form, infection occurs after seven days of life and manifests with a lower incidence of pneumonia (10%), but a much higher incidence of meningitis (95%). The mortality rate is around 15% and 20% in preterm infants (2). Positive blood cultures are found in 20% of cases.

A 14-day-course of ampicillin in combination with an aminoglycoside is recommended for the treatment of listeriosis. If clinical response is slow or meningitis is present, treatment for 21 days may be required.

REFERENCES

1. American Academy of Pediatrics, Committee on Infectious Diseases. Redbook, 27th Edition (2006): 426-428

2. Remington and Klein. Infectious Diseases of the Fetus and Newborn Infant, 5th Edition (2001), Chapter 27: 1157-1177