Case Report

Neonatal Meningitis due to *Listeria Monocytogenes*: A Case Report from Southern India

Microbiology Section

SADIA KHAN, S. SUJATHA, B.N. HARISH, IRA PRAHARAJ, S.C. PARIJA

ABSTRACT

Introduction: *Listeria monocytogenes* is an uncommon cause of bacterial meningitis in neonates. Infections due to this organism in neonates can be categorized as an early onset or a late onset disease. While the early onset neonatal listeriosis is due to an in utero infection, the late onset form primarily occurs due to exposure to the organism during vaginal delivery.

Case Presentation: Here, we report a 2 week old female child who presented with late onset meningitis due to *Listeria monocytogenes* and responded adequately to appropriate antimicrobial therapy.

Conclusion: Physicians should always consider *Listeria* as a possible aetiological agent of meningitis in paediatric patients, regardless of their age or immunological status in a developing country. *Cephalosporins* which are the most commonly used antimicrobials in bacterial meningitis,are unlikely to elicit a favourable response in such cases.

Key Words: *Listeria*, Neonatal meningitis

KEY MESSAGE

- It is important to differentiate meningitis due to *Listeria monocytogenes* from other causes as cephalosporins, the most commonly used antibiotics in bacterial meningitis are unlikely to elicit a favourable response in such cases.

INTRODUCTION

Listeria monocytogenes is a gram positive intracellular pathogen which is associated with a number of clinical entities like septicaemia, abortions, stillbirth, meningitis and meningoencephalitis. The infections by this psychrotrophic organism are commonly seen in pregnant women, newborns, the elderly, in immunocompromised people and in individuals who are in frequent contact with animals [1]. Neonatal infections which are caused by *Listeria* spp in Asia are quite under reported [2]. A low index of clinical suspicion and the absence of pathognomic clinical features often contribute to this. We illustrate through a case report of late neonatal sepsis, the importance of the identification of *Listeria monocytogenes* from CSF and blood and its theraupetic implications.

CASE REPORT

A 2.74 kg, full term, female baby was delivered by an emergency lower segment caesarean section (LSCS) at our hospital. The Apgar scores were 8 at 1 minute and 9 at 5 minutes. The infant progressed fairly until 14 days, after which she developed fever, showed a poor feeding pattern and presented with abnormal movements. On general examination, the patient showed high grade fever, poor feeding with the regurgitation of milk, a vacant stare and a pulse rate of 140/minute. The central nervous system examination showed hypertonia, exaggerated deep tendon reflexes without clonus and tonic posturing with seizures. The patient showed respiratory distress and so, was immediately admitted to the Neonatal Intensive Care Unit (NICU). The patient's mother was a 22-year-old primi gravida who had presented at 39 weeks of gestation with non progression of labour, as a result of which she was taken up for an emergency caesarean section. The mother did not give any history of fever or any history which was suggestive of any focus of infection. The baby was breast fed till the 14th day of life, when she presented to the paediatric emergency. Laboratory investigations of the infant on admission showed a white blood cell count of 1.2 x 10^9/l units. The haemoglobin levels and the platelet counts were within normal limits. The cerebrospinal fluid (CSF) showed a glucose concentration of 0.74g/l and a protein concentration of 0.68g/l. The blood glucose level was 0.98g/dl. The gram staining of the CSF showed plenty of polymorphonuclear leucocytes, but no bacteria were visualized. The CSF was inoculated on 5% sheep blood agar, chocolate agar and MaConkey agar. The blood agar was incubated in a CO_2 incubator, while the other media were incubated for 24 hours in ambient air at 37°C. The blood agar showed large colonies with a Narrow zone of β (beta) hemolysis, which was more evident when the colonies were removed. Corresponding growth was seen in chocolate agar, while there was no growth in MaConkey agar. Further tests showed the isolate to be a catalase positive, oxidase negative, gram positive rod, with a tumbling motility at 25°C and non motile at 37°C. Based on the above findings, the organism was presumptively identified as *Listeria* spp and it was subcultured on Polymyxin Acriflavine Lithium Chloride Ceftazidime Esculin Mannitol Agar (PALCAM) agar, which is a selective medium for *Listeria* spp. The next day, black colonies which were characteristic of the *Listeria* spp were seen. Standard biochemical tests showed the organism to be *Listeria monocytogenes*. Antimicrobial Susceptibility tests which

were done by using the disc diffusion test demonstrated that the organism was susceptible to ampicillin, vancomycin, gentamicin and tetracycline and that it was resistant to *cephalosporins*. *Listeria monocytogenes* was isolated from the blood culture of the patient after 5 days of incubation.

On admission to NICU, the patient was started on Ceftriaxone, but did not show any clinical improvement. Following the isolation of *Listeria monocytogenes*, the patient was started on intravenous ampicillin at 200mg/kg/day and gentamicin at 2.5mg/kg/dose, every six hours. Within 48 hours, her clinical condition improved dramatically and the patient was afebrile. Repeat blood and CSF cultures after 48 hours of treatment were negative. Overall, gentamicin was given for seven days and ampicillin was continued for a total of two weeks. The patient showed remarkable improvement and was discharged after 7 days in good condition. The maternal high vaginal swabs were negative for *Listeria* spp. No history of potential sources of listeriosis like the intake of unpasteurized milk or partially cooked meat by the mother were elicited.

DISCUSSION

Listeriosis is an uncommon disease in immunocompetent individuals. However, cases in immunocompetent individuals with serious sequelae like unilateral abducens paralysis and inappropriate anti diuretic hormone secretion, have been described [3]. Though it is a rare affliction, listeriosis in immunocompetent infants may also be preceded by gastroenteritis due to the same causative organism [4]. Pregnant women are prone to this infection as the placenta provides the causative organism a protective niche for its growth [5]. This is evident from the fact that while the incidence of listeriosis in the general population is 0.7 per 100000, it is 17 times higher in pregnant women (12 per 100000) [6]. Neonatal listeriosis can occur by transplacental infection or by an infected birth canal. It occurs in two clinical forms, early onset and late onset. The early onset disease presents within the first 5 days of delivery, especially in the preterm infants of symptomatic mothers. The late onset disease presents during the 1st to 4th weeks of life, usually as a purulent meningitis [7]. The mother generally remains asymptomatic. Listeriosis during pregnancy may cause severe complications in the neonate. This makes listeriosis a diagnostic concern in febrile pregnant women at any stage of pregnancy. The first-line treatment is based on high-dose amoxicillin, to be used for at least 3 weeks for the treatment of listeriosis during pregnancy. If the foetus survives, a longer therapy until delivery should be given [8].

In this case, the patient showed the features of a late onset disease, with meningitis and septicaemia. Purulent meningitis is a frequent presentation of the late onset disease, although it is also seen in 24% of the early onset disease cases. Misidentification of the *Listeria* spp from CSF has often been reported. Moreover, cases of neonatal listeriosis in India are usually under reported. In a prospective study which was done in 1981, the prevalence of listeriosis was found to be 0.2% among the total number of births and 2.2% among the meconium stained babies [9]. Recent reports from the sub Himalayan belt and other other areas of India indicate that the disease which is caused by *Listeria* spp might be more prevalent in the country than was previously thought [10;11].

Cephalosporins which are the most commonly used antimicrobials/ antibiotics in bacterial meningitis, is unlikely to elicit a favourable response in such cases. Secondly, due to its morphological similarities to diphtheroids and streptococci, misidentification of the *Listeria* spp is possible [12]. Therefore, the isolation of gram positive rods from CSF should alert the microbiologist to a possibility of *Listeria* infections.

ABBREVIATIONS

PALCAM: Polymyxin Acriflavine Lithium Chloride Ceftazidime Esculin Mannitol Agar; CSF: Cerebrospinal fluid; LSCS Lower Segment Caesarean section; NICU: Neonatal Intensive Care Unit.

CONSENT

A written informed consent was obtained from the patient's mother for the publication of this case report. A copy of the written consent is available for review with the Editor-in-Chief of this journal.

REFERENCE

[1] Low JC, Donachie W. A review of *Listeria monocytogenes* and listeriosis. *Vet J* 1997 Jan;153(1):9-29.
[2] Gupta V, Gautam V, Mehta N, Kumari I, Joshi RM. Listeriosis in second trimester of pregnancy: case report from India. *Jpn J Infect Dis* 2003 Apr;56(2):60-1.
[3] Dilber E, Aksoy A, Cakir M, Bahat E, Kamasak T, Dilber B. *Listeria monocytogenes* meningitis in two immunocompetent children. *Ann Trop Paediatr* 2009 Sep;29(3):225-9.
[4] Pattarino G, Arrigoni S, Grazioli R, De PA, di NB. A case of *Listeria monocytogenes* meningitis in an immunocompetent infant. *Minerva Pediatr* 2006 Aug;58(4):391-4.
[5] Bakardjiev AI, Stacy BA, Portnoy DA. Growth of *Listeria monocytogenes* in the guinea pig placenta and role of cell-to-cell spread in fetal infection. *J Infect Dis* 2005 Jun 1;191(11):1889-97.
[6] Southwick FS, Purich DL. Intracellular pathogenesis of listeriosis. *N Engl J Med* 1996 Mar 21;334(12):770-6.
[7] Riedo FX, Pinner RW, Tosca ML, Cartter ML, Graves LM, Reeves MW, et al. A point-source foodborne listeriosis outbreak: documented incubation period and possible mild illness. *J Infect Dis* 1994 Sep;170(3):693-6.
[8] Fayol L, Beizig S, Le MA, Lacroze V, Simeoni U. Neonatal meningitis due to *Listeria monocytogenes* after 3 weeks of maternal treatment during pregnancy. *Arch Pediatr* 2009 Apr;16(4):353-6.
[9] Thomas S, Verma IC, Singh M, Bhujwala RA. Study of neonatal listeriosis in north India. *Indian J Med Res* 1981 Jan;73:28-32.
[10] Mokta KK, Kanga AK, Kaushal RK. Neonatal listeriosis: a case report from sub-Himalayas. *Indian J Med Microbiol* 2010 Oct;28(4):385-7.
[11] Srivastava S, Sen MR, Kumar A, Anupurba S. Neonatal listeriosis. *Indian J Pediatr* 2005 Dec;72(12):1059-60.
[12] Gellin BG, Broome CV. Listeriosis. *JAMA* 1989 Mar 3;261(9):1313-20.

AUTHOR(S):
1. Dr. Sadia Khan
2. Dr. S. Sujatha
3. Dr. B.N. Harish
4. Dr. Ira Praharaj
5. Dr. S.C. Parija

PARTICULARS OF CONTRIBUTORS:
Department of Microbiology, JIPMER, Dhanavantri Nagar, Puducherry-605006, India.

NAME, ADDRESS, TELEPHONE, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Sadia Khan, Department of Microbiology
Amrita Institute of Medical Sciences, Kochi-682041
E-mail:drsadiakhan83@gmail.com, Tel: 08943258743

DECLARATION ON COMPETING INTERESTS:
No competing Interests.

Date of Submission: **Jan 25, 2011**
Date of Peer Review: **Mar 05, 2011**
Date of Acceptance: **Mar 08, 2011**
Date of Publication: **Jun 13, 2011**