



CASE REPORT

Neonatal Meningitis due to *Listeria monocytogenes*: A Case Report From Central India

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Abstract

Listeria monocytogenes is an opportunistic psychotropic pathogen though rarely reported in India but associated globally with serious infections like meningitis, meningoencephalitis, brain abscess, endocarditis etc. Neonatal infections caused by *L.monocytogenes* are under reported in Indian subcontinent due to lack of pathognomic features and low index of clinical suspicion. *L.monocytogenes* is a rare pathogen affecting the immunocompromised adults and immunocompetent infants progressing to meningitis after the intake of contaminated food or water especially in low-socioeconomic strata. We reported a rare case of 6 days old neonate with Late onset fulminant meningitis attributed to *L. monocytogenes*, at a tertiary care teaching hospital of Datia (Northern Madhya Pradesh).

Key Words

Listeria monocytogenes; Neonatal Meningitis; CNS (Central Nervous system); CSF (Cerebrospinal fluid).

Introduction

Listeria monocytogenes is a gram positive, intracellular, non-sporulating, non-encapsulated, motile, facultative anaerobic opportunistic pathogen. This environmental psychotropic pathogen is associated with a wide range of infections like meningitis, meningoencephalitis, disseminated abscess, brain abscess, spine abscess, septicaemia, endocarditis, granuloma, premature births, amnionitis, abortions and stillbirth. Focal infections include corneal ulcer, necrotizing ulcer, cataract extraction, bacterial keratitis, suppurative arthritis, osteomyelitis, cholecystitis, liver abscess, peritonitis, pneumonia and pleuritis. Target population mainly includes immunocompromised people, pregnant women, infants, neonates, elderly, organ transplant cases, cancer patients

and those in close contact with animals. Neonatal infections caused by *L. monocytogenes* are under reported in Indian subcontinent due to lack of pathognomic features and low index of clinical suspicion.¹¹⁻²¹

Listeriosis is a rare invasive disease with high mortality with global incidence ranging between 0.1 and 11.3/1,000,000 population.¹³¹

This pathogen primarily invades the brain stem accompanied by complications such as acute hydrocephalus. The clinical symptoms are similar to other cases of bacterial meningoencephalitis like fever, headache, vomiting, and altered sensorium. A wide range of domestic and wild animals are potential zoonotic reservoirs for Listeriosis. Sepsis and meningitis are

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common manifestations of invasive listeriosis. This bacterium is 10 times more capable than other neuroinvasive pathogens like *Streptococcus pneumoniae* at invading the CNS. In neonates it causes late onset meningitis. Awareness of this pathogen is therefore crucial, to enable adequate treatment to be started promptly for a better outcome.^[4]

We report a rare case of 6 days old neonate with Late onset fulminant meningitis attributed to *L. monocytogenes*, at a tertiary care teaching hospital of Datia, (Northern Madhya Pradesh).

Case Report

A 2.8 Kg full term 6-PND (post natal days) female baby delivered by emergency LSCS presented in Pediatric OPD with complaints of Respiratory distress, seizures and no feeding with history of no spontaneous crying after delivery and was immediately admitted in Special New borne care unit. The condition initially improved after CPAP support but later deteriorated and shifted to mechanical ventilation. There was no history of antenatal steroids, drug abuse, gestational Diabetes mellitus, leaking PV in mother. The mother gave a history of fever in third trimester and a mild episode of diarrhoea for which the treatment was sought. There was no history of apnea, grunting, jaundice, antenatal fetal distress. Meconium stained amniotic fluid noted on delivery. No family history of congenital malformations/anomalies.

Patient was on Amikacin, Cefotaxime and antiepileptic drugs. Seizures continued despite treatment with antiepileptics like Phenobarbitone, Phenytoin, Sodium valproate. Lumbar puncture was done and CSF sent to Microbiology laboratory for culture/sensitivity, Biochemistry Lab. for biochemical analysis and Pathology for differential cell counts.

On general examination, the child was found to present with high grade fever, poor feeding, a vacant stare, irritable and a pulse rate of 134/minute. APGAR score at the

time of admission was 3-4. The central nervous system examination showed neck rigidity, Brudzinski sign elicited, hypertonia, exaggerated deep tendon reflexes without clonus and tonic posturing with seizures.

Patient presented with frank per-rectal bleeding and was transfused with 1 unit of Fresh frozen plasma (FFP).

Laboratory investigations showed normal Renal Function tests, Normal Serum electrolytes, High CRP levels (124.6 mg/L by latex based agglutination), Complete blood count showed a high total white blood cell count of 24,300 cells/ μ L and Platelet count was low (52000/ μ L). The platelet indices as a markers of platelet activation were altered significantly.

CSF analysis revealed pleocytosis with neutrophilic predominance. Biochemical analysis of CSF showed a low glucose concentration of 58 mg/dl and a moderately elevated protein concentration of 65 mg/dl. The blood glucose level was 98mg/dl.

The gram staining of the CSF showed plenty of polymorphonuclear leucocytes, and few gram-positive bacilli (diphtheroid-like) were visualized. Wet mount of CSF on microscopy showed bacilli exhibiting the tumbling motility.

The CSF was inoculated on 5% sheep blood agar, chocolate agar and MacConkey agar. The blood agar showed large colonies with narrow zone of β hemolysis (Fig. 1).

Gram stained culture smear revealed Gram positive bacilli on microscopy (Fig. 2)

Motility test by Hanging drop preparation revealed characteristic tumbling motility at 25°C but rendered non-motile at 37°C.

Further Biochemical tests were done with the following findings:

Positive catalase test, Negative oxidase test, a positive Methyl Red test, Negative on Mannitol Salt agar (MSA), Positive bile esculin hydrolysis, Yellow slant & butt on

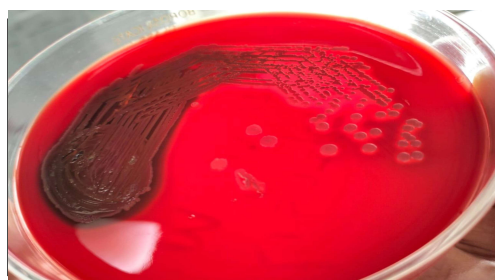


Fig.1: Beta-Hemolytic Colonies of *Listeria monocytogenes* with narrow zone of hemolysis

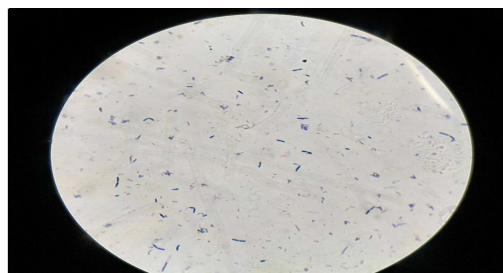


Fig.2 : Gram positive coccobacilli seen in Direct smear of CSF

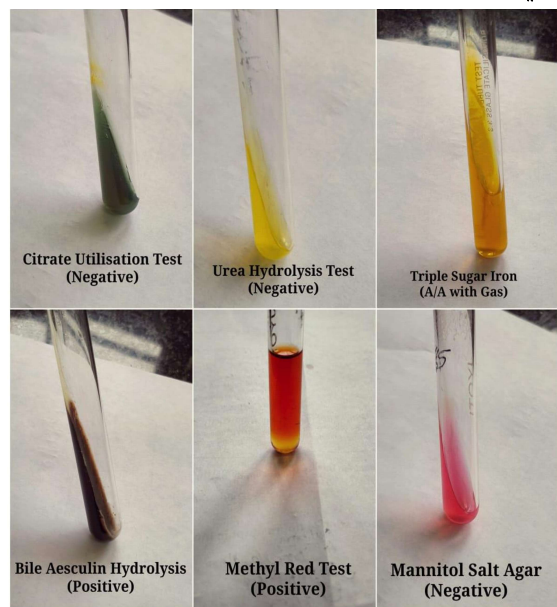


Fig. 3: Biochemical tests for *Listeria monocytogenes*

TSI agar slant indicating fermentation of Dextrose, Lactose and Sucrose (Fig. 3).

Standard biochemical tests showed the organism to be *L.monocytogenes*. Antimicrobial Susceptibility testing was done using Kirby Bauer disk diffusion method and interpreted as per CLSI 2024 guidelines. The organism was found to be susceptible to Ampicillin, Amoxycillin clavulanate, Gentamicin, Cotrimoxazole, Doxycycline, Tetracycline, Imipenem and Tigecycline but was resistant to third generation cephalosporins.

On admission to NICU, the patient was started on Cefotaxime, and later on Piperacillin tazobactam but did not show any clinical improvement. Following the isolation of *L. monocytogenes*, the patient was started on intravenous Ampicillin at 200mg/kg/day and Gentamicin at 2.5 mg/kg/dose, every six hours.

Discussion

L. monocytogenes can infect a wide range of hosts, especially immunocompromised patients. The mode of transmission is mainly through ingestion of contaminated food and water. The symptoms of infection ranges from abdominal discomfort, and diarrhoea to fulminant meningitis, UTI and occult bacteremia. One of the most prevalent group are the pregnant females, in whom this bacterium can get transmitted to the fetus through transplacental transmission leading to intrauterine infection and spontaneous abortion. It is considered a pathogen of concern as it rapidly progresses to meningitis in neonates and life threatening in absence of prompt diagnosis and

timely treatment.^[5]

Neonatal meningitis is the most severe form of the disease which includes posturing, seizures and bulging fontanelle which can indicate a CNS infection.^[6,7] The in-vitro antibiotic susceptibility profile of the organism as per the CLSI 2024 guidelines indicated that the highest susceptibility was shown for penicillin, ampicillin and cotrimoxazole, but other literatures suggest susceptibility towards more antibiotics as well like aminoglycosides, erythromycin, tigecycline and carbapenems. However the organism is known to exhibit intrinsic resistance towards 3rd generation Cephalosporins.^[8]

Conclusion

Timely and definitive diagnosis of the pathogen and its differentiation from common laboratory contaminants like *Bacillus* spp., Diphtheroids, and common pathogens like *Escherichia coli*, *S. pneumoniae*, *S. agalactiae* etc., plays a key role in the formulation of the antimicrobial therapy which can drastically affect the patient outcome.

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