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**Case Report**

# *Salmonella typhimurium* sepsis in a neonate: a rare and challenging case

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## ABSTRACT

Neonatal sepsis attributed to Salmonella infection is a relatively rare phenomenon. It can have varied presentation encompassing mild, subclinical presentations to severe life-threatening complications and death. Prompt administration of appropriate antibiotics forms cornerstone of treatment. Authors present a case of 25-day-old neonate, who presented with fever, lethargy, respiratory distress, and signs of dehydration. Upon evaluation, the neonate was diagnosed with sepsis caused by *Salmonella enterica serovar typhimurium*. Prompt medical management was initiated, and the neonate responded well to treatment. The patient made a full recovery without any residual comorbidities or complications.

**Keywords:** Neonatal sepsis, *Salmonella typhimurium*, Rare infection, Blood culture, Antibiotics

## INTRODUCTION

Neonatal sepsis remains one of the leading causes of neonatal morbidity and mortality in India with Gram-negative bacteria being the predominant causative agents, with *Klebsiella pneumoniae* reported as the most common pathogen.[1] While Salmonella species are well-known for causing a broad spectrum of diseases including gastroenterocolitis, sepsis, and meningitis their role in neonatal sepsis is relatively rare. In a large-scale study analyzing 840 culture-positive cases of neonatal sepsis, no Salmonella spp. was isolated, underscoring the uncommon nature of this pathogen in neonates.[1]

Both typhoidal and non-typhoidal Salmonella (NTS) infections have been documented in the neonatal population, though infrequently and when they do occur, they may lead to severe clinical outcomes in neonates, even in cases involving strains considered to be of low virulence.[2] A neonate can experience severe morbidity from infection with an avirulent strain of Salmonella spp.[3] Here, we report a rare case of neonatal sepsis caused by *Salmonella typhimurium*, highlighting the need to consider this uncommon but serious pathogen in neonatal infections.

## CASE REPORT

25-day old male neonate was brought to us with complaints of watery, greenish, foul smelling not blood-stained motions for 7 days, moderate grade fever since 7 days and non-bilious vomiting since 3 days. Baby was born to 28 years old primigravida mother at 36 weeks of gestation. Baby was born via normal vaginal delivery, had cried immediately after birth and was discharged from hospital on DOL-3. On enquiry mother gave history of formula feeding by bottle with improper dilution. Patient presented with fever, lethargy, respiratory distress, dehydration (cumulative weight loss of 10% on DOL 25). Patient was started on B-CPAP, IVF, INJ Cefotaxim, Inj Amikacin and symptomatic treatment. ABG done was s/o metabolic acidosis. After starting treatment, patient improved hemodynamically but patient continued to have fever spikes. Repeat investigations done were s/o deterioration on day of admission 3 (Table 1, Figure 1-3).

**Table 1: Trend of investigations.**

| DATE | 17/6 | 19/6 | 20/6 | 21/6 | 24/6 | 25/6 | 28/6 |
|---|---|---|---|---|---|---|---|
| **HB** | 12.1 | 9.4 | 10 | 10 | 9.1 | 8.9 | 8.9 |
| **TLC** | 14,060 | 21,440 | 23,310 | 27,770 | 16,290 | 19,660 | 24,730 |
| **N/L** | 37/48 | 28/68 | 45/45 | 51/40 | 63/35 | 50/41 | 39/59 |
| **PLT** | 657 | 423 | 291 | 563 | 469 | 543 | 851 |
| **CRP** | 19.1 | 5.1 | 67 | 74.6 | 88 | 98 | 56.5 |
| **SGOT** | 47 | 69 | | | 39 | | |
| **SGPT** | 44.6 | 78 | | | 30 | | |

As patient continued to have fever spikes; CSF analysis, USG abdomen, USG skull, 2decho and skeletal survey was done which were negative. Blood culture report was s/o salmonella species. Blood culture was sent for salmonella serovar typing to National Research Institute, which confirmed *Salmonella typhimurium*, sensitive to B-Lactams (but resistant to Cephems), Carbapenems and and **F**louroquiolones. Antibiotics were changed to Inj Imipenem due to its 100% sensitivity to salmonella species based on review of literature. Gradually patient improved.

Total 14 days of antibiotics were completed and patient discharged in 3 weeks, in stable condition. Meanwhile, both mother and father were evaluated as a potential source of infection with Widal test, blood, urine and stool cultures but all tests were normal with no evidence of typhoid fever.

Hence contaminated water and improper preparation of formula feeds were suspected to be the prime cause of salmonella infection in our neonate. Patient was further followed up in OPD and found to have good weight gain with no neurological deficit. Family was counselled in detail regarding typhoid vaccination.

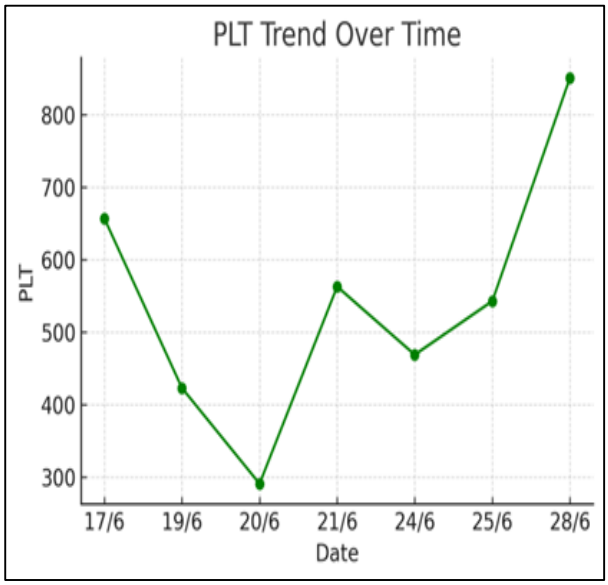


**Figure 1: Platelet trend over period of admission.**

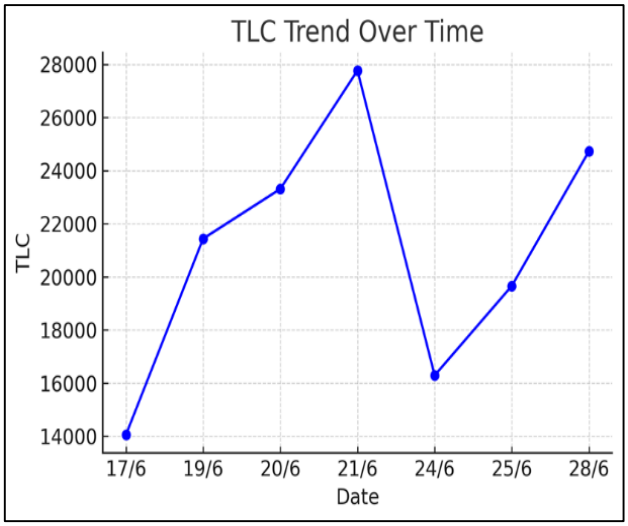


**Figure 2: TLC trend over period of admission.**

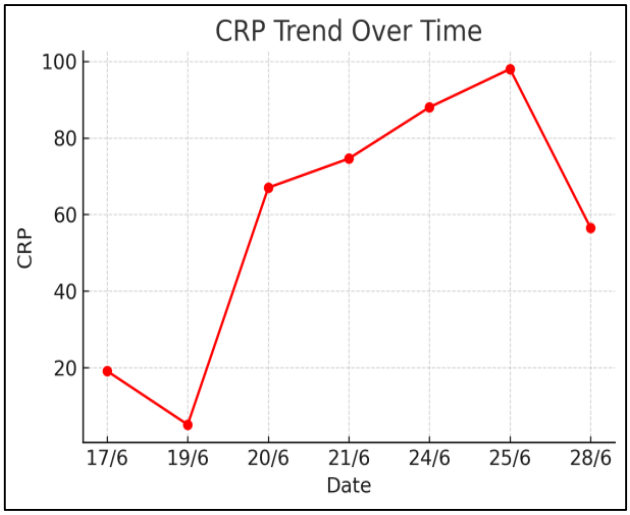


**Figure 3: CRP trend over period of admission.**

## DISCUSSION

Reports of Salmonella infection in neonates are exceedingly uncommon compared with its well-recognized burden in the broader pediatric population.[4] The rarity of these cases can be explained by the limited exposure of newborns to contaminated food and water,

which are the usual vehicles for transmission in older children.[5] When neonatal infections do occur, they are generally acquired either through vertical transmission-via the placenta or during passage through an infected birth canal-or through horizontal transmission from exogenous sources such as contaminated formula, water, or caregivers who are carriers.[6,7] Reed et al categorized neonatal typhoid into two clinical entities: a septicemic form, resembling early-onset sepsis, and an asymptomatic fecal carriage state.[4]

Classical features of typhoid fever, including leucopenia, splenomegaly, rose spots, and bronchopneumonia, are often absent in neonates.[8] This atypical presentation is thought to reflect the immaturity of the neonatal immune system, particularly reduced cytokine release from Peyer's patch macrophages.[5] As a result, neonatal Salmonella infection usually manifests with nonspecific symptoms such as poor feeding, irritability, jaundice, dehydration, hypothermia, respiratory distress, diarrhoea, or abdominal distension.[4,5]

Although uncommon, severe complications including meningitis, brain abscess, and cholecystitis have been described in case reports.[9-11] Mohanty et al documented a series of five neonates with Salmonella infection, where three presented with sepsis and two were asymptomatic carriers, underscoring the wide spectrum of clinical outcomes.[12] Raveendran et al also reported a case of vertical transmission of Salmonella Paratyphi A, reaffirming maternal–fetal spread as a plausible route of infection. Vertical transmission was first described historically by Wing and Treppoli in 1930, who reported neonatal *S. typhi* following maternal infection during pregnancy.[6,13]

The management of neonatal Salmonella infection involves a combination of supportive measures-such as maintaining normothermia, ensuring adequate hydration, and administering inotropes when necessary-and targeted antibiotic therapy.[14] Third-generation Cephalosporins like Cefotaxime and Ceftriaxone remain widely used empirically; however, global trends indicate increasing antimicrobial resistance.[15,16] In circumstances where cephalosporins and fluoroquinolones prove ineffective, escalation to Carbapenems has been shown to be effective and potentially lifesaving.[17,18]

In summary, although neonatal *Salmonella typhimurium* sepsis is rare, it poses substantial diagnostic and therapeutic challenges. Early suspicion, confirmation with blood cultures, and rapid initiation of appropriate antimicrobial therapy are critical to optimizing outcomes.

## CONCLUSION

Though *Salmonella typhimurium* or Salmonella species is a rare occurrence in neonates, it shouldn't be overlooked in endemic areas, especially in patients with history of bottle feeding or unhygienic practises. Blood culture remains the gold standard for diagnosing Salmonella species, emphasizing its importance in guiding timely and effective treatment. Circumventing antibiotic policy is sometimes as crucial as serovar identification and their reporting. It is equally important to perform root cause analysis to identify the origin of infection and implement targeted preventive measures. Also, the nurturing power of breast milk remains an unwavering, natural source of protection and comfort.

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