

Salmonella Sepsis in a Preterm Neonate- A Case Report

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ABSTRACT

Sepsis in neonates may rarely be caused by *Salmonella typhi*, clinical features of which may remain undifferentiated from other causes of sepsis. The mode of transmission can be vertical or horizontal. The present case report describes a 30-day-old female baby, born at 28 weeks of gestation, who presented with features suggestive of sepsis, and there was a growth of *Salmonella typhi* in the blood culture. The neonate showed evident clinical improvements after 48 hours of antibiotics. The neonate was discharged after three weeks without any immediate adverse effect. The case emphasises the consideration of salmonella sepsis and the possible source of infection in neonates.

Keywords: Blood culture, Blood stream infection, Neonatal sepsis, Salmonellosis, *Salmonella typhi*

CASE REPORT

A 30-day-old female neonate was admitted to the Neonatal Intensive Care Unit (NICU) with breathing difficulty, decreased activity and poor feeding for the preceding two days. The baby was born to a 28 years old primigravida mother, after seven years of marriage and with the treatment of infertility. She was delivered by lower segment caesarean section for sudden labour pains and assessed to have a gestational age of 28 weeks with a birth weight of 990 grams. The neonate cried immediately after birth but as she developed distress was admitted to NICU. She had received surfactant and was ventilated for five days and was finally discharged after 20 days in stable condition. She was given mixed feeding of her mother's milk and formula at home.

On admission to NICU, the baby appeared dull, activities were decreased. Temperature, heart rate, capillary refill time, blood pressure and respiratory rate were normal while SpO₂ was 86% on room air and needed blow-by oxygen to maintain saturation of more than 90%. She weighed 1200 grams at the time of admission. A provisional diagnosis of late-onset neonatal sepsis was made. The neonate was started on intravenous fluids and antibiotics ampicillin and gentamycin. An investigative assessment of the baby is shown in [Table/Fig-1].

Blood investigation	Results
Total leucocyte count	12700/ μ L
Absolute neutrophil count	4600/ μ L (moderate neutropaenia)
Platelet count	63000/ μ L (thrombocytopenia)
Immature neutrophil/ Total neutrophil (I/T)	<1
C-Reactive Protein (CRP)	6.13 mg/L
Haemoglobin	8.3 g/dL
Cerebrospinal fluid (CSF)	CSF sugar 81 mg/dL against blood sugar of 98 mg/dL
Cerebrospinal fluid protein	279 mg/dL
Cell count	25 cells/ μ L (40% polymorphs, 60% lymphocytes)

[Table/Fig-1]: Investigation details.

Packed red blood cells (10 mL/kg) were transfused on the second day of admission. On the third day of admission, the baby showed improved activity, oxygen requirement decreased and oxygen was weaned. Orogastric feeding was started on day 3 of admission and amount gradually increased, the neonate was on full feeds on day 10

of admission. The blood culture showed growth of *Salmonella typhi* which was sensitive to ampicillin, trimethoprim/sulfamethoxazole, ceftriaxone, cefixime, chloramphenicol, and azithromycin. Antibiotics were changed to cefotaxime 150 mg/kg/day, considering the CSF report. Cerebrospinal Fluid (CSF) culture showed no growth.

The neonate showed consistent clinical improvement and was discharged after three weeks of antibiotics in a stable condition. Weight at the time of discharge was 1255 grams and the neurosonogram was reported to be normal. The baby was further followed-up in the Outpatient Department (OPD) after one week and was gaining weight adequately approximately 20 gm/kg/day, with no neurological deficit. The neonate was lost to follow-up after the first visit.

The mother was evaluated as a potential source of infection with blood culture, widal test, stool, and urine cultures but her tests were normal with no evidence of typhoid fever. Also, there was no history of fever in any of the family members in the preceding two weeks. Contaminated water and improper preparation of the formula feeds were so suspected to be the cause of salmonella infection. There was no cross infection in the NICU post admission of the neonate. Family members were advised for the typhoid vaccine at the time of discharge.

DISCUSSION

Enteric fever is a febrile illness caused by infection of *Salmonella enterica* serotype Typhi or serotype paratyphi A, B, or C through food or water contaminated with human faeces. A large proportion of the global burden is concentrated in South Asia with a high incidence in India. A recent study estimated the national incidence of typhoid fever to be 360 cases per 100,000 persons per year, with substantial heterogeneity among the country [1]. It has been seen that the incidence of culture-confirmed typhoid is more in young children [2].

Salmonella typhi infection may be benign and self-limited but in a small number of cases result in bacteraemia and invasive infection. Invasive infection occurs because of distorted immunity of the local enteric system and is usually seen in extremes of ages and depressed immune systems. This form is more common in infants less than two years of age and more so in neonates [3,4].

Sepsis caused by *Salmonella typhi* in neonates although rare but is a life-threatening illness. The trend of culture positive typhoid fever shows that the incidence of culture positive typhoid fever is decreasing. Literature on this subject is being increasingly reported from endemic areas as evident from multiple reports in recent times

[5,6]. Because of the lack of specific clinical features as seen in adults and paediatric populations, salmonella sepsis remains an underdiagnosed condition in neonates. *Salmonella typhi* infection in the paediatric population has been studied in detail by the majority of literature but data on infants is rare and presentation in the neonatal population is still rarer [7]. Clinicians have reported very few cases in this population as the clinical feature remain indistinguishable from other causes of sepsis [8,9]. The rarity of salmonella sepsis in the newborn can be explained by the fact that neonates are usually not exposed to food items that may be contaminated with *Salmonella typhi*. The clinical pictures found in adults and older children are not seen in neonates because of the limited cytokine release from the macrophages in Peyer's patches. The classical "rose spots" are usually not seen in neonates [8].

In a case reported by Juyal D et al., the neonate presented with fever, respiratory distress, and refusal to feed [10]. While Sharma D et al., reported a neonate who presented with decreased activity and refusal to feed [11]. Kankanarachchi I et al., reported a case of salmonella sepsis, who presented at age 38 of life with fever and convulsion [12]. The index case showed respiratory distress, decreased activity, and refusal of feeds. These constellation of symptoms are common presenting features of late-onset neonatal sepsis and one should consider salmonella as one of the potential causes in endemic regions.

The route of infection may be vertical from the mother or horizontal from a carrier or environment [13]. From an infected mother salmonella can be transmitted via placenta or from the secretions of the birth canal [14]. Though breast milk is usually protective it has also been reported to be a source of salmonella infection. Cooke FJ et al., has listed cases of isolation of salmonella in breast milk possibly by contamination by dirty hands. Contaminated milk from an asymptomatic mother may also be a possible cause [15].

In the case reported by Juyal D et al., there was a history of feeding the baby 'mishri' water at home. The index neonate was bottle fed [10]. Most of the time the source identification remains elusive as documented in several reports. There should be a search for a source of infection that can be aided by sending blood, urine, and stool culture of the mother. The urine, blood, and stool culture of the mother did not show growth of salmonella. In the present case, the exact source of infection could not be ascertained, but possibly it came from the use of water in the preparation of formula feeds.

Diagnosis of salmonella sepsis usually is made on basis of blood culture growth. Most of the case reports mention the confirmation of diagnosis on the basis of the growth of salmonella in blood culture [10-12]. This neonate also had a growth of *Salmonella typhi* in blood culture.

The management includes supportive care mainly, prevention of hypothermia, fluids, maintaining electrolytes in the normal range, blood transfusion for anaemia, and management of shock with inotropes. Definitive treatment includes broad-spectrum antibiotics,

usually third-generation cephalosporins. Most of the reports mention that once a sensitive antibiotic is started or substituted there is marked clinical improvement [10-12,16]. Survival is seen even in the tiniest of neonates as described by Lim CT and Lim JW [17]. This neonate also started improving consistently as sensitive antibiotics were started with a good outcome till discharge.

CONCLUSION(S)

Salmonella typhi sepsis in neonates remains a very rare cause of sepsis neonatorum and most of the time clinical features remain indistinguishable from sepsis due to other causes and the presentation may be varied in each neonate. The growth of *Salmonella typhi* in blood culture confirms the diagnosis. *Salmonella typhi* as a cause of neonatal sepsis should be considered in areas, where *Salmonella typhi* infection is common in the paediatric and adult population.

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