

A case of *Salmonella typhi* neonatal meningitis

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Sri Lanka Journal of Child Health, 2019; 48(4): 350-352

DOI: <http://dx.doi.org/10.4038/sljch.v48i4.8833>

(Key words: *Salmonella*, meningitis, neonates, chloramphenicol, Sri Lanka)

Introduction

Neonatal meningitis due to *salmonella typhi* is a relatively rare entity¹. However, several cases had been reported in developing countries². Here we present a case of neonatal meningitis due to *salmonella typhi* infection.

Case report

A 14 day-old baby boy presented to a district general hospital with fever and poor feeding of 4 days duration. In addition to fever, he did not have any other symptoms. He was the 3rd baby born to non-consanguineous healthy parents. He was born at term gestation with a birth weight of 3.5kg. There were no risk factors for sepsis in his antenatal or perinatal periods. Following admission, he developed a convulsion which lasted for 2 minutes. Examination revealed a bulging non-pulsatile anterior fontanelle and the head circumference (OFC) was 38 cm. Rest of his neurological

examination showed preserved primitive reflexes with no focal neurological signs.

Based on the clinical presentation, he was commenced on intravenous (IV) cefotaxime and ampicillin and lumbar puncture (LP) was performed later. His full blood count (FBC) was normal and the C-reactive protein (CRP) was 95mg/dl. LP on the 3rd day of admission revealed 260 neutrophils, 215 lymphocytes and 145mg/dl of proteins with a significant sugar difference (Table 1).

His blood, urine and cerebrospinal fluid (CSF) cultures were sterile. Due to poor clinical response, antibiotics were changed to IV meropenem for which he responded. IV antibiotics were given for a total of 21 days and the baby was discharged on day 35.

Table 1: Summary of investigations

Investigation	Day 14	Day 17	Day 38	Day 66
White blood cell count (per cu mm)	8,500		2,200	7,800
Haemoglobin level (g/dl)	12.5		11.8	8.9
Platelet count (per cu mm)	34,900		285,000	64,500
C-reactive protein (mg/dl)	95		221	<5
Cerebrospinal fluid (CSF) protein		145	139	95
CSF sugar: blood sugar (mg/dl)		14: 77	15: 52	34: 75
CSF neutrophils		260	60	03
CSF lymphocytes		215	140	18
CSF red blood cells		01	400	1300

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(Received on 06 February 2018: Accepted after revision on 16 March 2018)

The authors declare that there are no conflicts of interest

Personal funding was used for the project.

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Three days following discharge (38th day of life), he presented again with fever and a convulsion to Teaching Hospital Karapitiya. On admission, he was ill, less active and had a bulging anterior fontanelle. He was started on IV meropenem and repeat LP was done on the following day which was in favour of meningitis (Table 1). During the second admission his CRP was 229mg/dl and the FBC revealed isolated neutropenia. The baby continued to have fever despite being on IV antibiotics. Contrast enhanced computed tomography (CECT) of the brain showed widespread hypodensities in bilateral white matter suggestive of diffuse cerebritis. (Figure 1).

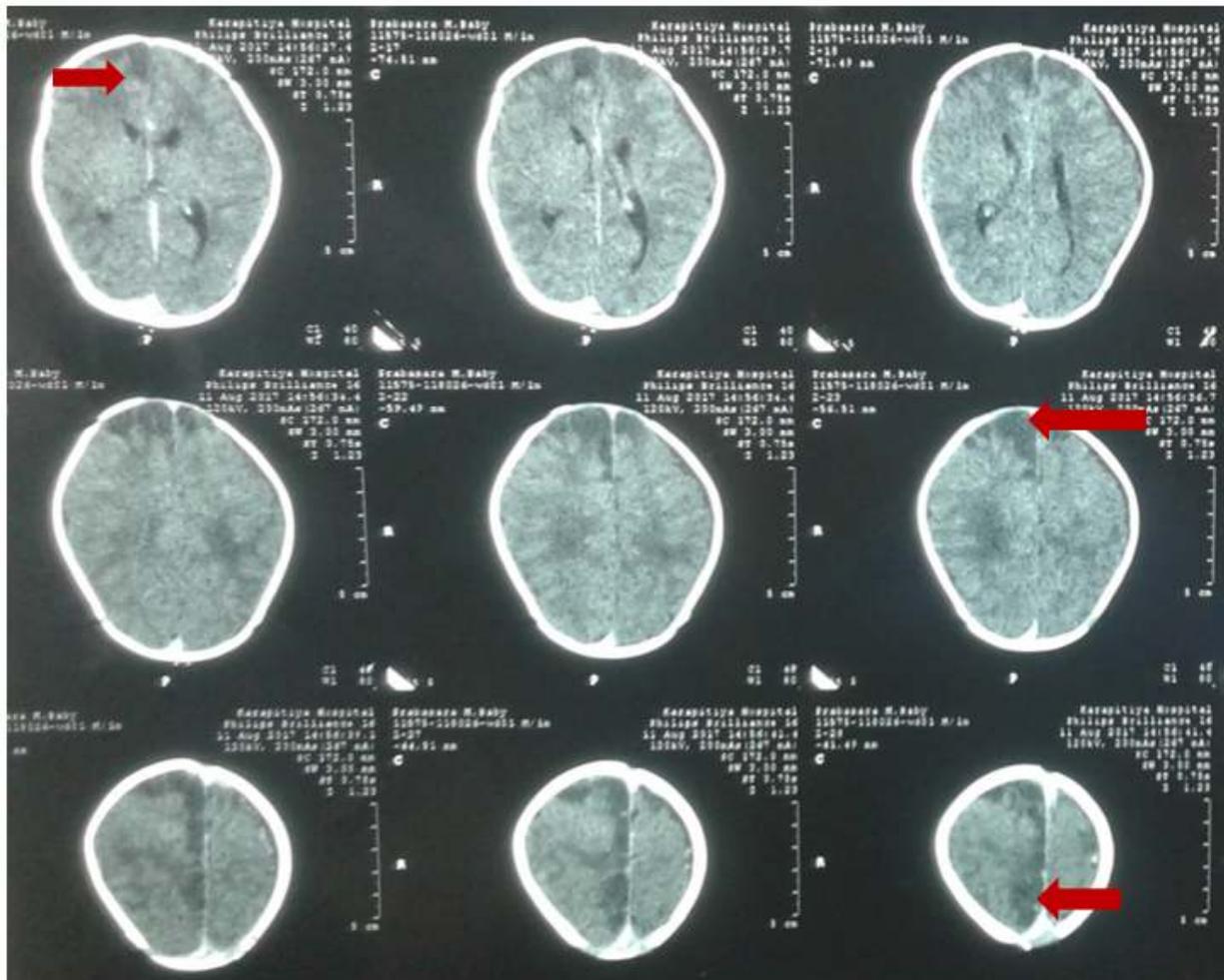


Figure 1: Contrast enhanced computed tomography of brain suggestive of diffuse cerebritis

His blood culture, which was done on day 38, became positive for *salmonella typhi* and it was sensitive to meropenem and chloramphenicol. However, CSF culture and stool culture did not show any bacterial growth. Since there was no clinical improvement with IV meropenem, IV chloramphenicol was added and continued for 14 days for which he made a remarkable improvement. His standard agglutination test (SAT) was negative on two occasions and his subsequent basic hematological parameters and CSF findings became normal (Table 1). Maternal stools culture became negative for salmonella and no other family member was found to have salmonella carrier stage. Screening for salmonella infection was done among household contacts and was negative. He made an uneventful recovery. Follow up assessment at the age of four months revealed no developmental concerns or features of hydrocephalus. His hearing and visual assessments were normal.

Discussion

Typhoid fever is caused by faeco-oral transmission of *salmonella typhi* or *salmonella paratyphi*

bacteria³. The incidence of central nervous system (CNS) infections due to *salmonella typhi* varies between 3-35%³. Meningitis secondary to salmonella is more common in the paediatric age group especially under 2 years of age¹. Though salmonella meningitis is rare in neonates, it results in both short term as well as long term neurological sequelae such as seizures, subdural empyema, cerebritis, ventriculitis and hydrocephalus⁴. In this patient, though neonatal seizures and radiological findings of diffuse cerebritis were evident, there were no long term adverse neurological complications.

The diagnosis of salmonella infection requires confirmation of the organism in blood, stool and urine. However, there are reported cases of salmonella meningitis where the organism had not been isolated in CSF but it was detected in blood⁵. In this baby, though CSF culture was negative, there were CSF changes suggestive of bacterial meningitis and blood culture became positive for *salmonella typhi*. In this case, the diagnosis was delayed due to negative blood culture during the first

admission. However, repeat CSF examination would have revealed an ongoing infection, since 22% of neonatal meningitis cases had positive CSF even after completion of 21 days of antibiotics irrespective of the aetiology⁶. Therefore, in such a circumstance the neonate should be reinvestigated and treated with a prolonged course of antibiotics.

Since salmonella is an intracellular organism, drug resistance is common among salmonella species which would aggravate the spreading of the organism. The recommended therapy for salmonella infection is IV third generation cephalosporins such as ceftriaxone for 4 weeks⁶. However, in this case, the organism was resistant to cephalosporins and responded only to IV chloramphenicol. Despite being on antibiotics, relapses are common in neonates with salmonella meningitis⁴. However, this baby made an uneventful long term recovery.

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