

An Unusual Case of Extensively Drug-Resistant (XDR) Salmonella Typhi Meningitis in 7 Month Old

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ABSTRACT

Meningitis is unusual complication of salmonella typhi, having a high mortality rate and neurological issues, making early identification & treatment absolutely essential. Its prevalence is 6 % with unfortunate deteriorating neurological sequence. Patients of bacterial meningitis mostly presented with headache, fever, ALOC & neck rigidity. CSF culture is used to make absolute diagnosis. In this case report, a case of 7 month old male baby is presented who had XDR-Salmonella typhi meningitis, an uncommon incident of salmonella meningitis manifested with enteric fever that was unresponsive to early antibiotic therapy. It was then treated with imipenem and azithromycin as the typhi strain was sensitive to these drugs as per culture report.

Keywords: *Salmonella typhi* , meningitis, extensively drug resistant

INTRODUCTION

Typhoid is caused by Salmonella typhi. It is gram negative bacilli. South Asian nations as a whole have a high prevalence of this bacteria, but Pakistan seems to possess the greatest percentage. Risk of salmonella is due to use of contaminated water and food. Meningitis is unusual Complication of salmonella typhi. Common agents of meningitis in infants are E.coli, Influenza, and streptococcus agalactiae.¹ Below is a defined case of infantile meningitis caused by salmonella typhi reported in paediatric unit.

CASE PRESENTATION:

This case explained a 7month old male, came with symptoms of fever, cough for last 5 days & shortness of breath for 3 days. He has no other pre-existing symptom. The patient is currently residing in Hyderabad. He is vaccinated upto date. Mile stone have been achieved upto Age. Patient admitted to PAEDS-3 through CLF As a case of pneumonia due to severe respiratory distress shifted to paediatric ICU.

On examination patient looks healthy, well-nourished and irritable. He was tachypnic, tachycardic , along with a high grade fever and maintaining Spo2 on O2 at 3liters . Physical examination was remarkable for bilateral ronchi in chest, hepatomegaly in abdomen and on Neurological examination bulged fontanelle, Neck stiffness and a positive kerning sign. Tone was increased in all limbs, power was 3/5 along with exaggerated reflexes. Laboratory investigations were significant for:

CBC showed Hb 8.2gm/dl , MCV 68.6FL , MDI 18.9 , Serum calcium 8.7mg/dl sodium 130mEq/L , potassium 5.6 mEq/L, chloride 91mEq/L, C-Reactive protein 5.529mg/dl. Pre-lumbar puncture random blood sugar 105mg/dl, CSF detail report showed yellow turbid, GLUCOSE 5mg/dl, protein 613 mg/dl, WBC PLENTY, Polymorph 85%, lymphocytes 15% CSF CULTURE shows Salmonella typhi. Which is resistant to Ampicillin, ceftriaxone, cefixime but sensitive to Azithromycin and Imipenem. Initially, He was kept NPO with Oxygen inhalation via nasal prongs, head was elevated up to 45 degrees. He was treated with ceftriaxone in septic dose, nebs with ipratropium, provas, and IV fluids. Fits observed during hospital stay so Meningitic protocol has been started Ceftriaxone was switched into meningitic dose. Phenytoin was added along with dexamethasone for 48 hours. Fits didn't control the patient's condition didn't improve phenytoin maximized along with vancomycin in meningitic dose. But fits didn't improve, levetiracetam was added with a loading dose and then continued in maintenance dose but fits weren't controlled as we had maximized it then mida infusion started after that we chased a CSF culture that showed salmonella typhi and it was sensitive to meropenem, and azithromycin we have started meropenem in meningitic dose upto 21-day. Brain imaging done that was normal. Patient got improved and well discharged home on multivitamins and levetiracetam drops with no evidence of a neurological deficit. Brain imaging done that showed normal.

DISCUSSION:

Meningitis is extremely unusual complication of salmonella typhi. Such Infection occur due to use of contaminated water and food, very few cases of meningitis caused by salmonella reported. Its prevalence in Pakistan 1452 cases of typhoid were identified on culture, among which 505 (34%) were non-XDR cases & 947 (66%) were XDR cases. 360 (38%) individuals suffering from XDR typhus vs 89 (18%) individuals with non-XDR typhoid both reported about 21 concerns ($P = .001$). Both group of Individuals (XDR typhoid ($n=210$, 23%) and non-XDR typhoid ($n=71$, 14%)) experienced ileal perforations as among its most frequent complications ($P.001$). Overall, mortality was documented in 17 (1.8%) patients with XDR Typhi infections and 3 (0.6%) patients with non-XDR Typhi infections ($p<0.061$)². *Salmonella* affects infants more than adults and it accounts for 0.8-6% of all cases of BM.³ Drug resistant typhoid fever is becoming a serious issue in South Asia, especially in Karachi Pakistan. The mechanism of AMR occurs via the plasmids in *S. typhi* H58 haplotype that carry resistant genes including trimethoprim-sulfamethoxazole resistance (*dfrA7*, *sul1*, *sul2*), ampicillin resistance (*blaTEM-1*), chloramphenicol resistance (*catA1*), fluoroquinolone resistance (*qnr*, *oqxAB*, or *aac(6')*Ib-cr), and ceftriaxone resistance (ESBL). Due to these genes, XDR typhoid is now a great burden (about 72% more burdensome) than sensitive typhoid in Pakistan, specifically in terms of cost related to diagnosis and nursing care.¹ We must have to think Typhoid Fever as a differential in foreigners returning travelers and should manage appropriately, although it's rare but should not be missed.⁴ In countries like Pakistan, *Salmonella* Typhi is a leading cause of pediatric septicemia.^{5,6} In the past 30 years, invasive *Salmonella* Typhimurium ST313, linked to the African AIDS epidemic, has emerged.⁷ *Salmonella* meningitis has high morbidity and mortality, with up to 40% fatality rates in children, regardless of serotype. Meningitis-causing bacteria invade by interacting with host cells. They use virulence factors and immune response inhibitors to help with invasion, survival, and spreading.⁸ *Salmonella* meningitis accounts for 0.8 to 6% of bacterial meningitis cases, mostly affecting children under five, especially neonates (16%) and infants (6%).⁹ The brain is protected by barriers like the blood-brain barrier (BBB) and cells in the CNS, which produce immune responses. Meningitis-causing bacteria penetrate these barriers using virulence factors and immune inhibitors to invade and survive.¹⁰ This co-infection may be more common than expected but is often missed due to similar clinical features. In dual infections, strains may share or differ in susceptibility. In reported cases, the strains had identical antibiotic sensitivities. Our ongoing cohort suggests co-

infections are more severe, with longer illness (14–17 days vs. 9 days for single infections) and higher fevers (102–104°F), requiring extended care.¹¹ Understanding the shedding patterns of *S. Typhi*, especially in children—who bear the highest disease burden in low- and middle-income settings—is crucial for shaping strategies to reduce transmission and overall impact.¹² Abdominal symptoms like diarrhea, nausea, vomiting, and pain are common in enteric fever. The pain is usually diffuse but can be intense in the right iliac fossa, mimicking appendicitis. Other symptoms include headache, cough, and malaise. In children under five, fever may be the only symptom, making diagnosis challenging unless complications arise.¹³

CONCLUSION:

Infant meningitis caused by *Salmonella* typhi is terrible condition that often results in brain impairment and more fatalities. There remains a significant need for additional expert guidance and larger-scale studies to establish standardized recommendations for the treatment of *Salmonella* meningitis, as current therapeutic approaches are primarily based on isolated case reports and lack consensus on an optimal management strategy. Carbapenems may be considered a viable therapeutic option in cases of relapse or when there is inadequate clinical response to third-generation cephalosporins or ciprofloxacin.

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AR: Concept, design, interpretation and analysis of data and final revision of manuscript

CD: Did data collection and manuscript writing

MT: Final revision of manuscript.

AR: Did data collection and manuscript writing

LS: Did data collection and manuscript writing

AF: Manuscript writing

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