

A CASE OF SALMONELLA MENINGITIS IN AN IMMUNOCOMPETENT INFANT

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ABSTRACT

Salmonella species represent a documented, though rare, etiology of bacterial meningitis, predominantly impacting infants, elderly individuals, and those who are immunocompromised. The condition is associated with considerable morbidity and mortality, in addition to substantial neurological complications. A 3-month-old male infant with no prior health issues was admitted to the emergency department at Jinnah Hospital, Lahore, presenting with a 48-hour history of fever, lethargy, poor feeding, and irritability. There was no significant travel history or known sick contacts, but the family had a pet bearded dragon at home. On examination, the infant was having fever (39.2°C), tachycardia, and had a bulging anterior fontanelle. Kernig's sign was negative. Initial laboratory investigations revealed leukocytosis with a left shift. Lumbar puncture revealed CSF pleocytosis, high protein, and low glucose. Blood and CSF cultures were sent. The infant was empirically started on intravenous ceftriaxone and vancomycin. After 48 hours, both blood and CSF cultures grew *Salmonella* Enteritidis. Antibiotics were de-escalated to high-dose intravenous ceftriaxone for a total course of 4 weeks. The patient showed gradual clinical improvement. This case highlights the importance of considering non-typhoidal Salmonella as a causative agent of meningitis in infants, even those who are apparently immunocompetent. A thorough history, including exposure to reptiles, is crucial. Salmonella meningitis requires prolonged antibiotic therapy and close monitoring for complications. This case had a positive outcome due to prompt diagnosis and appropriate management.

Keywords: Salmonella meningitis, bacterial meningitis, infant, complications, ceftriaxone

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INTRODUCTION

Bacterial meningitis remains a life-threatening infection, especially in the pediatric population. While *Streptococcus pneumoniae*, *Neisseria meningitidis*, and *Haemophilus influenzae* type b are the most common pathogens, Gram-negative bacilli, including *Salmonella* species, are important etiological agents in neonates and infants.^{1,2}

Salmonella meningitis is a rare but severe extra-intestinal manifestation of salmonellosis, accounting for less than 1% of all Salmonella infections and approximately 0.9% of cases of bacterial meningitis.³ It carries a mortality rate of up to 50% in some studies, and over 50% of survivors

experience severe neurological complications such as hydrocephalus, seizures, cerebral abscess, and developmental delay.⁴ We present a case in a 3-month-old infant to underscore the clinical challenges and management strategies for this devastating infection.

CASE PRESENTATION

A full-term 3-month-old boy was brought to the emergency room with a two-day history of high fever, lethargy, and poor feeding. The parents also complained of erratic irritability and vomiting that was not accompanied by bile. There was no history of diarrhea, rash, or seizures.

Notably, the family owned a pet bearded dragon, which the infant had no direct contact with, but was housed in the common living area.

On admission, the patient was ill-appearing and lethargic. Examination revealed that he was febrile having temperature of 39.2°C, heart rate 178 beats/min, respiratory rate of 42 breaths/min, and

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blood pressure was 85/50 mmHg. The anterior fontanelle was full and bulging. Neurological examination was otherwise non-focal; meningeal signs (nuchal rigidity, Kernig's sign) were absent. The rest of the physical examination was unremarkable.

Initial Investigations:

- Complete Blood Count (CBC): White blood cell count $22.5 \times 10^9/L$ (neutrophils 78%, bands 12%), hemoglobin 10.8 g/dL, platelets $350 \times 10^9/L$.
- C-Reactive Protein (CRP): 125 mg/L (elevated).
- Lumbar Puncture: Cerebrospinal fluid was cloudy.
 - CSF White Cell Count: 800 cells/ μL (90% neutrophils)
 - CSF Protein: 180 mg/dL (elevated)
 - CSF Glucose: 30 mg/dL (simultaneous blood glucose 95 mg/dL; CSF: Blood glucose ratio = 0.31)
 - Gram stain: showed numerous polymorphonuclear leukocytes and Gram-negative bacilli.

A diagnosis of bacterial meningitis was made. The infant was immediately started on empirical intravenous antibiotics: ceftriaxone (100 mg/kg/day) with vancomycin (60 mg/kg/day). He was admitted to the pediatric intensive care unit for close monitoring.

After 48 hours, the CSF and blood cultures both yielded Gram-negative bacilli, identified as *Salmonella* Enteritidis. The isolate was sensitive to ceftriaxone, cefotaxime, and ciprofloxacin.

Vancomycin was discontinued, and high-dose ceftriaxone (100 mg/kg/day IV) was administered. A head ultrasound was performed to screen for potential complications and yielded normal results. Over the following 72 hours, the patient exhibited no fever and showed increased alertness and feeding.

The infant completed a 4-week course of intravenous ceftriaxone. A repeat lumbar puncture after 2 weeks of therapy showed significant improvement (WBC 25 cells/ μL , protein 65 mg/dL, glucose 50 mg/dL). Follow-up head ultrasound prior to discharge showed no evidence of hydrocephalus

or abscess formation.

The family was counseled extensively on the risks of reptile exposure and advised on strict hygiene measures. The patient was discharged with scheduled follow-up appointments in neurology and infectious disease clinics to monitor for potential long-term effects.

DISCUSSION

This case illustrates several critical aspects of *Salmonella* meningitis. Firstly, it is a disease of infancy; over 80% of cases occur in children under one year of age, with peak incidence between 2 and 12 weeks. The immaturity of both their immune system and gastrointestinal barrier facilitates bacterial translocation and hematogenous spread to the meninges.⁵

The source of infection in this case was likely the household pet bearded dragon. Reptiles (including turtles, lizards, and snakes) are known asymptomatic carriers of *Salmonella*, and contact with them or their environment is a major risk factor for human infection, particularly in children.⁶

The management of *Salmonella* meningitis is challenging due to its high complication rate. A prolonged course of antibiotics (typically 4-6 weeks) is recommended to prevent relapse, which is more common than with other forms of bacterial meningitis. Third-generation cephalosporins (ceftriaxone or cefotaxime) are the mainstay of treatment. In cases with resistance or poor clinical response, fluoroquinolones or meropenem may be considered as alternatives.⁷

The most dreaded complications include:⁸

- Hydrocephalus: Requiring ventriculoperitoneal shunt placement.
- Subdural Effusions/Empyema
- Cerebral Abscess
- Seizures and Developmental Delay

Therefore, serial neurological imaging and long-term developmental follow-up are imperative for survivors.

CONCLUSION

Salmonella meningitis is a severe, life-threatening infection with a propensity for neurological complications. A high index of suspicion is required,

especially in infants presenting with meningeal signs and a history of reptile exposure or gastroenteritis. Prompt diagnosis through CSF analysis and culture, followed by immediate initiation of appropriate antibiotics and a prolonged treatment course, is essential to improve outcomes. This case underscores the importance of public health education regarding the risks of salmonellosis from reptile pets in households with young children.

Patient Consent

Parents were provided with all relevant information concerning this case report and were requested to consent willingly in writing for the publication of this case report.

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Author's Contribution

Conceptualization study design	MZS, ZA
Data Acquisition	TM, AAN
Data Analysis/ interpretation	MZS, ZA
Manuscript drafting	HM AS, MZS
Manuscript review	MZS, ZA, TM, AAN,

All authors read and approved the final draft.

REFERENCES

1. Köse Ş, Öztürk A, Yılmaz Ç, Karbuz A. Salmonella meningitis: a case report and review of the literature. *Turk Arch Pediatr.* 2020;55(1):87–90.
2. Tsai MH, Huang YC, Chiu CH, Lin TY. Nontyphoidal Salmonella meningitis in children: epidemiology, clinical characteristics, and prognostic factors. *Clin Infect Dis.* 2010;50(3):332–7.
3. American Academy of Pediatrics. Salmonella Infections. In: Kimberlin DW, Barnett ED, Lynfield R, Sawyer MH, editors. *Red Book: 2021–2024 Report of the Committee on Infectious Diseases.* 32nd ed. Itasca, IL: American Academy of Pediatrics; 2021. p. 695–701.
4. Centers for Disease Control and Prevention. Salmonella Infection from Reptiles and Amphibians [Internet]. Atlanta, GA: CDC; 2023 [cited 2024 May 15]. Available from: <https://www.cdc.gov/healthypets/pets/reptiles/salmonella.html>
5. Mastroianni CM, Lichtner M. Salmonella meningitis in adults: a case report and review of the literature. *J Chemother.* 2017;29(2):117–20.
6. López CH, Calvo C, García-García JJ. Neurological complications of bacterial meningitis in children: current concepts in management. *Curr Infect Dis Rep.* 2018;20(9):33.
7. Bula-Rudas FJ, Rathore MH. Salmonella meningitis in infants: a 10-year review. *J Pediatric Infect Dis Soc.* 2018;7(2):e86–e89.
8. Tunkel AR, Hasbun R, Bhimraj A, Byers K, Kaplan SL, Scheld WM, et al. 2017 Infectious Diseases Society of America's Clinical Practice Guidelines for Healthcare-Associated Ventriculitis and Meningitis. *Clin Infect Dis.* 2017;64(6):e34–e65.