

The Many Faces of Salmonella: Atypical Extraintestinal Infections in a Tertiary Care Hospital in Pakistan

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Case Report

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Abstract

Purpose

To describe five unusual extraintestinal *Salmonella* infections at a tertiary care hospital in Pakistan.

Methods

This descriptive case series combined clinical histories, assessments, investigation and treatment records, and follow-up. Organism identification and antimicrobial susceptibility results were obtained from laboratory reports.

Results

Presentations included infant and neonatal meningitis, thyroid abscess, spondylodiscitis with a psoas abscess, and secondary infection of a hydatid cyst with pleural involvement. All five isolates were confirmed as *Salmonella* Typhi. The thyroid isolate was ceftriaxone-resistant and intermediate to ciprofloxacin and levofloxacin; the neonatal isolate was resistant to both fluoroquinolones. Tuberculosis was considered in the infant and spinal cases. All patients improved with antimicrobial treatment and source control where indicated. The infant developed neurological complications, and follow-up documentation was incomplete.

Conclusion

Salmonella should be considered in unusual focal infections in endemic settings. Culture from the affected site and susceptibility testing guide diagnosis and treatment; drainage or surgery may be necessary.

Introduction

Typhoid fever remains an important public health problem in Pakistan, where antimicrobial resistance complicates treatment. An analysis of five laboratory networks found that 57% of *Salmonella* Typhi isolates collected during 2017–2019 were extensively drug-resistant [1]. This background highlights the importance of identifying the organism and testing its antimicrobial susceptibility.

Although *Salmonella* usually causes enteric fever or gastroenteritis, it can also cause focal extraintestinal infections. Unusual presentations, including thyroid abscess and spondylodiscitis, may resemble other diseases and delay diagnosis [2, 3]. Culture of specimens from the affected site can establish the bacterial diagnosis and guide treatment.

We describe five patients with extraintestinal *Salmonella* infections, including meningitis in an infant and a neonate, a thyroid abscess, spondylodiscitis with a psoas abscess, and secondary infection of a hydatid cyst. The series highlights diagnostic challenges, microbiological findings, and the roles of susceptibility-guided treatment and source control.

Materials and Methods

This descriptive case series included five patients with culture-confirmed extraintestinal *Salmonella* infections at a tertiary care hospital in Pakistan between August 2025 and March 2026. Clinical details were collected through history-taking, review of investigation and treatment records, and follow-up. Cases were selected for unusual presentations, diagnostic challenges, or clinically important antimicrobial resistance.

Identification used API® 10 S and VITEK® 2 (bioMérieux, Marcy-l'Étoile, France), with Typhi confirmation by specific antisera agglutination. Disk diffusion followed CLSI M02, 14th edition [4]; zone diameters were interpreted using CLSI M100, 35th [5] or 36th edition [6], according to the edition used at testing.

For *S. Typhi*, multidrug resistance (MDR) was defined as resistance to ampicillin, chloramphenicol, and cotrimoxazole. Extensive drug resistance (XDR) additionally required resistance to fluoroquinolones and third-generation cephalosporins [7].

Case 1

Salmonella Typhi Meningitis

A 5-month-old boy presented with fever, poor feeding, and persistent seizures, requiring ventilation for five days. Cerebrospinal fluid (CSF) showed 6000 cells/μL (80% neutrophils), protein 2791 mg/L, and glucose 1.0 mmol/L. Culture yielded growth of ceftriaxone-susceptible *Salmonella* Typhi.

Inadequate response to ceftriaxone prompted meropenem; vancomycin and acyclovir were also given. By day 8, he was afebrile and seizure-free, but CSF abnormalities persisted. CT showed right frontotemporal and focal left frontal encephalomalacia, a right subdural hygroma (13 mm), and mild communicating hydrocephalus. Persistent abnormalities prompted GeneXpert MTB/RIF testing and empirical antituberculous treatment. Meropenem continued for 48 days and vancomycin for approximately 25 days. He remained stable and afebrile at follow-up, with persistent CSF abnormalities and neurological follow-up advised.

Case 2

Salmonella Typhi Thyroid Abscess

A 35-year-old woman presented with painful neck swelling, dysphagia, poor oral intake, and intermittent dyspnoea. Thyroid aspirate grew *Salmonella* Typhi: susceptible to meropenem and azithromycin;

intermediate to ciprofloxacin and levofloxacin; resistant to ampicillin, ceftriaxone, and cotrimoxazole. Chloramphenicol results were unavailable, preventing MDR/XDR classification.

Pressure symptoms and inadequate drainage required partial thyroidectomy. Histology showed infection without malignancy. Susceptibility-guided antibiotics produced improvement.

Case 3

Neonatal *Salmonella* Typhi Meningitis

A 15-day-old boy presented with fever, poor feeding, lethargy, and watery stools. CSF findings indicated bacterial meningitis. CSF collected on 28 March 2026 grew *Salmonella* Typhi, susceptible to ampicillin, cotrimoxazole, ceftriaxone, cefotaxime, and meropenem, but resistant to ciprofloxacin and levofloxacin. CSF herpes simplex virus types 1/2 PCR was negative.

Treatment included meropenem, vancomycin, initial acyclovir, ampicillin, cefotaxime, and levetiracetam. Cefotaxime was selected instead of ceftriaxone for neonatal safety [8]. Vancomycin and acyclovir were discontinued. He improved after approximately one month of treatment and remained well at follow-up.

Case 4

Salmonella Typhi Spondylodiscitis

A 22-year-old man from Sindh presented with fever, weight loss, night sweats, severe back pain, and difficulty walking. Ciprofloxacin provided temporary improvement. Livestock contact, maternal tuberculosis, and urinary incontinence were documented. C-reactive protein (CRP) was 99 mg/L and erythrocyte sedimentation rate 50 mm/h. *Brucella* serology was positive; assay details and titres were unavailable.

MRI showed L3–L4 spondylodiscitis with a left psoas abscess (4.0 × 3.1 × 5.6 cm), adjacent inflammation, and nerve-root involvement. Empirical antituberculous treatment was started. Following sampling and drainage, tissue culture grew *Salmonella* Typhi at 48 hours: susceptible to ampicillin, ceftriaxone, azithromycin, and meropenem; intermediate to cotrimoxazole and ciprofloxacin. Ziehl–Neelsen staining and GeneXpert MTB/RIF were negative. Biopsy showed acute and chronic inflammation without malignancy.

Following infectious diseases review, antituberculous treatment was stopped and ceftriaxone 2 g IV every 12 hours plus azithromycin 500 mg orally daily were started. The total antibiotic course lasted six weeks. Mycobacterial culture was negative, and improvement persisted at long-term follow-up.

Case 5

Hydatid Disease with *Salmonella* Typhi Infection

A 27-year-old woman presented with dyspnoea for one month and right upper-quadrant pain for two months. Right basal breath sounds were reduced, with percussion dullness. Leukocytes were $18.9 \times 10^9/\text{L}$ and CRP 198 mg/L. Imaging showed a loculated right pleural effusion with enhancing pleural thickening, right upper-lobe consolidation, and a right hepatic cyst containing air locules.

Pleural fluid contained *Echinococcus* hooklets, and cyst-wall culture grew *Salmonella* Typhi. Blood culture and *Echinococcus* serology were not performed. Thoracotomy, decortication, and cyst excision, followed by albendazole and meropenem, produced clinical improvement; CRP fell from 198 to 14 mg/L. Hepatic–thoracic anatomical continuity, drug doses, durations, and long-term outcomes remained undocumented.

Discussion

This series illustrates the diagnostic challenges of five extraintestinal *Salmonella* infections. Culture from the affected sites established the bacterial diagnosis and helped guide treatment. As selected clinical observations, these cases cannot establish disease frequency or compare treatment effectiveness.

Our infant's severe illness resembles a Pakistani report of *S. Typhi* meningitis requiring intensive care [9]. In a Taiwanese series of 24 neonates and infants, hydrocephalus and subdural collections occurred in 50% and 42%, respectively [10]. Similar complications developed in our infant despite clinical improvement. An inadequate response to ceftriaxone did not establish resistance, and persistent CSF abnormalities did not independently confirm tuberculosis. The neonate remained clinically well, but undocumented developmental and hearing assessments limit conclusions about long-term recovery.

Salmonella thyroid abscess is uncommon, with published cases managed using antibiotics and aspiration or surgical drainage [2]. Our patient required partial thyroidectomy because of pressure symptoms and inadequate drainage. This supports individualising source control rather than considering thyroidectomy routine treatment. Ceftriaxone resistance and intermediate fluoroquinolone susceptibility emphasised the importance of susceptibility-guided antibiotic selection.

Our spinal case resembles the tuberculosis-like presentation described in an Indian series of *S. Typhi* spondylodiscitis [3]. Tissue culture redirected treatment towards *Salmonella*, although negative Ziehl–Neelsen staining and GeneXpert results did not independently exclude tuberculosis. *Brucella* serology remained uncertain because assay details and titres were unavailable. Serological positivity may reflect infection, previous exposure, or cross-reactivity; it could not be confidently labelled false-positive in this patient [11].

S. Typhi infection of hydatid cysts has been reported in a Pakistani pulmonary case and an Indian hepatic case [12, 13]. Our patient had *Echinococcus* hooklets in pleural fluid and *S. Typhi* cultured from cyst-wall tissue. These findings support hydatid disease with secondary bacterial infection, but do not establish *Salmonella* empyema, a fistula, or the relationship between the hepatic lesion and thoracic disease.

Pakistan's burden of resistant typhoid provides relevant context but individual resistance categories require documented susceptibility results [1]. The infant's isolate was ceftriaxone-susceptible, the thyroid isolate was ceftriaxone-resistant, and the neonatal isolate was fluoroquinolone-resistant. No available profile established XDR. Treatment should therefore follow the individual isolate's susceptibility results and the patient's clinical course.

Conclusion

Consider *Salmonella* in unusual focal infections in endemic settings. Site-specific cultures and susceptibility testing guide treatment; drainage or surgery may be required.

Declarations

Ethics approval:

IERB exemption was granted on 9 October 2026 (FC-MIC-23-7/READ-IERB/26/4798).

Consent for publication:

Obtained from adult patients and parents of paediatric patients.

Competing interests:

None declared.

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Author Contribution

M.S. conceived the case series, coordinated data collection and follow-up, interpreted the clinical and microbiological findings, and drafted and revised the manuscript. F.Z. contributed to case documentation, interpretation of findings, and figure preparation. F.H. supervised the work and critically revised the manuscript. I.H. contributed to advanced isolate identification performed in his department, interpretation of the identification results, and manuscript review. M.H. contributed to data verification and manuscript review. T.S. contributed to infectious diseases assessment, treatment interpretation, and clinical review of the manuscript. Y.R. contributed to isolate collection, laboratory work, and manuscript review. A.A.K. contributed to interpretation of findings and manuscript review. All authors reviewed and approved the final manuscript and agree to be accountable for the work. W.A. contributed to isolate collection, laboratory work.

Data Availability

The clinical data supporting this case series are not publicly available because of patient confidentiality. Requests for access may be considered by the corresponding author, subject to institutional and ethical approval.

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