

Salmonella Paratyphi and multiorgan dysfunction: A rare case report

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ABSTRACT

Salmonella typhi (*S. typhi*) and *Salmonella paratyphi* A (*S. paratyphi* A), together known as typhoidal *Salmonella*, are causal agents for an invasive, serious, and sometimes fatal disease of humans called typhoid fever or paratyphoid fever (also known as enteric fever). *S. Typhi*, the lineage causing typhoid fever, is the main group; whereas *S. Paratyphi* A, the lineage causing paratyphoid fever, belongs to the second group, which comprises a set of three paratyphoid types (the other two being *S. Paratyphi* C and d-tartrate-negative *S. Paratyphi* B). All these lineages are adapted to humans, with *S. Typhi* and *S. Paratyphi* A being strictly restricted to growth in humans, and *S. Paratyphi* C being able to establish infections in experimental animals quite easily (at moderate infection doses); the host-restriction status of d-tartrate-negative *S. Paratyphi* B is so far unclear. The potential source of infection is the use of sewage-contaminated water in plants and vegetable irrigation and clinical presentation is varied, mainly presenting with fever, malaise, abdominal discomfort, and nonspecific symptoms often confused with other causes of the febrile syndrome. *S. Paratyphi* is usually a mild form of disease without any complication, but we report a complicated case of *Paratyphi*, who presented with fever and gastrointestinal symptoms complicated by multiorgan dysfunction needing mechanical ventilatory support, multiple hemodialysis, and blood transfusion. Fortunately, he recovered from all the insults and was discharged home in stable condition on the 26th day of hospitalization.

Keywords: Bicytopenia, pancreatitis, Paratyphi, rhabdomyolysis, *Salmonella*

Introduction

In the past, *Salmonella enteric* serotype Paratyphi A was thought to cause a smaller portion of enteric fever (EF) cases as compared to *Salmonella enteric* serotype Typhi,^[1] but this is no longer the case. Several recent reports showed an increased incidence of *S. Paratyphi* A causing the EF syndrome and even clinical features are indistinguishable in paratyphoid and typhoid fever.^[2] This is especially true in developing countries that have a high disease burden (incidence >100/100,000 cases/year) such as South-Central Asia and Southeast Asia,^[3,4] whereas

globally it 26 million (typhoid) and 5 million (paratyphoid A) illnesses have been estimated, with 190,000 deaths in 2010.^[5]

The portal of entry for *Salmonella* infection is the mouth, usually through ingestion of fecally contaminated food or water and infection occurs in a susceptible human host. The incubation period shortens and the risk for infection and disease increases with the ingested dose.^[6]

The severity and onset of the EF mainly depend on the virulence of the organism, the infective dose, and the host immune response^[7] and it can range from an uncomplicated febrile illness to life-threatening sepsis with multiorgan involvement. We report a previously healthy boy with EF complicated by multiorgan dysfunction including encephalitis, hepatitis, pancreatitis, and rhabdomyolysis.

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Case Report

A young 17-year-old healthy boy presented to our hospital with a high-grade fever associated with fatigue and myalgia for 7 days. He also complained of diarrhea that was watery without any blood or mucus, occurring three to four times a day for the last 2 days before admission. There was no history of eating uncooked food and food prepared outside his home, or any contact with animals. No other family member or immediate contact developed similar symptoms.

On admission, he was conscious and oriented to person; however, confused about time and place. Body temperature was 100.4°F, blood pressure 100/70 mmHg, heart rate was 118 beats/min, respiratory rate was 20 breaths/min, and oxygen saturation of 96% on room air. Physical examination showed pallor, icterus, dry mucous membranes, mild muscle tenderness, hepatomegaly with mild tenderness, and guarding of the upper abdomen and tea-colored urine. Otherwise, he had no edema, lymphadenopathy, or skin rash.

Laboratory investigations:

Laboratory investigations confirmed the presence of multiorgan dysfunction in the form of bicytopenia, acute kidney injury, rhabdomyolysis, pancreatitis, and hepatic dysfunction.

He was human immunodeficiency virus-negative, and workup for other infectious etiologies was negative, including dengue IgM; chikungunya IgM, *Leptospira* serology, urine culture; hepatitis A, B, C, and E panel; and malaria rapid antigen and smear. Chest X-ray on admission was normal [Figure 1].

He was started empirically on intravenous ceftriaxone and metronidazole but deteriorated on the second day of admission and developed aspiration pneumonia [Figure 2] with respiratory distress. He was put on ventilatory support and the antibiotic escalated to intravenous (IV) meropenem along with metronidazole.

Two sets of blood cultures grew *S. Paratyphi*, susceptible to ampicillin, ceftriaxone, cefixime, meropenem, chloramphenicol, and trimethoprim-sulfamethoxazole, but resistant to ciprofloxacin.

During treatment, he underwent four sessions of hemodialysis and received four units of packed cells. He gradually improved, bicytopenia corrected, renal function, liver function, lipase, and Creatine phosphokinase (CPK) decreased within normal limits and he was discharged on the 26th day of hospitalization.

Discussion

Some known facts about EF caused by *S. Typhi* is that it can result in severe disease with a complication rate of about 10–15%, including gastrointestinal bleeding, intestinal perforation, hepatitis, pancreatitis, typhoid encephalopathy, hemolytic uremic syndrome, pneumonia, disseminated intravascular coagulation, endocarditis, reactive hemophagocytic lymphohistiocytosis, and rarely rhabdomyolysis.^[8,9]

However, the present case illustrates that although *S. Paratyphi* usually causes EF and gastrointestinal illness, it can occasionally

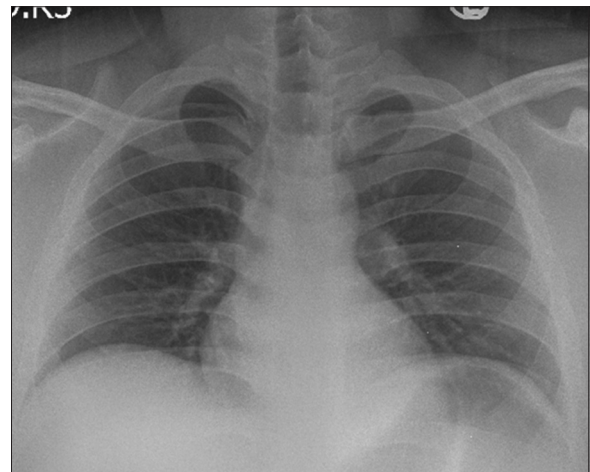


Figure 1: Normal chest X-ray on admission

Test	Day 1	Day 3	Day 25	Normal Value	Remarks
Hemoglobin	7.1 g/dL	6.0 g/dL	11.2 g/dL	13.2-16.6 g/dL	Bicytopenia
White cell count	1800/mm ³	2700/mm ³	7500/mm ³	4500-11000/mm ³	
Neutrophil count	74%	68%	74%	54-62%	
Serum creatinine	4.17 mg/dL	11.11 mg/dL	1.0 mg/dL	0.6-1.35 mg/dL	Acute kidney injury
Serum potassium	3.4 mmol/L	2.6 mmol/L	4.2 mmol/L	3.5-5.5 mmol/L	
Serum bicarbonate	13 mmol/L	18 mmol/L	25 mmol/L	23-30 mmol/L	
Creatine phosphokinase	34136.4 U/L	29348.7 U/L	174 U/L	21-232 U/L	Rhabdomyolysis
Urine blood	3+	3+	Negative	Negative	
Serum lipase	1405.7 U/L	688 U/L	38 U/L	10-150 U/L	Pancreatitis
Total bilirubin	3.73 mg/dL	3.28 mg/dL	1.0 mg/dL	<1.2 mg/dL	Hepatitis
Direct bilirubin	2.37 mg/dL	2.04 mg/dL	0.27 mg/dL	<0.3 mg/dL	
Aspartate transaminase (AST)	1023.2 U/L	1450.9 U/L	29 U/L	8-35 U/L	
Alanine transaminase (ALT)	353.8 U/L	365.8 U/L	28 U/L	4-36 U/L	
Serum albumin	2.79 mg/dL	2.70 mg/dL	3.5 mg/dL	3.4-5.4 mg/dL	
International normalized ratio (INR)	1.33	1.30	1.0	<1.2	

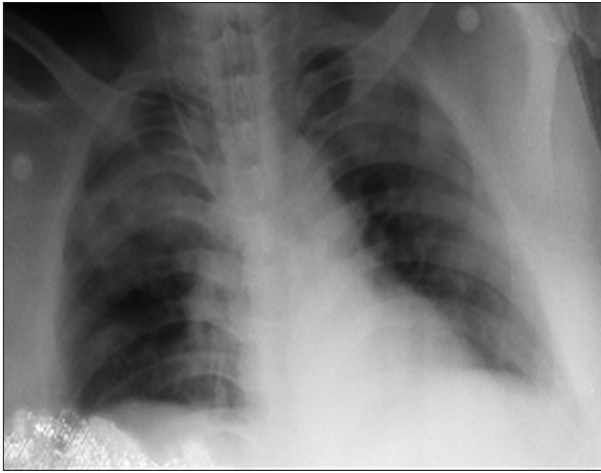


Figure 2: Opacity right mid zone on 2nd day

be responsible for severe and potentially fatal diseases. The unusual feature of this case is the degree of rhabdomyolysis.

Rhabdomyolysis has been reported in bacterial sepsis generally, however, in *Salmonella* infections, this is very rare and has only been reported with *S. Typhi* and *S. enteritidis*.^[10]

Myalgia, with or without myositis is observed in rickettsial fevers (scrub typhus), leptospirosis, dengue, HIV infection, Lyme disease, and infective endocarditis. In a retrospective study of 103 patients from India, 33% were noted to be patients with gram-negative sepsis. However, *S. Typhi*/Paratyphi was not isolated in their cohort, and the mean serum CPK of 7,114 IU/L was much lower than in our patient^[11] (34136.4 IU/L). Mechanisms of myositis/rhabdomyolysis include bacterial invasion of the muscle, sepsis-related tissue hypoxia, and altered metabolic capacity of the muscle.^[12]

Under-reporting of myositis probably occurs because CPK is not a routinely performed test in febrile patients unless weakness, calf pain, or cola-colored urine is present, or when leptospirosis is part of the differential diagnosis. Despite its rarity, EF should be included in the differential diagnosis of myositis or rhabdomyolysis and should be managed with the treatment of an appropriate antibiotic and adequate hydration to prevent complications.

Conclusion

The diagnosis, which strikes us with fever and severe myalgia in a tropical country such as India are leptospirosis, rickettsioses, dengue, chikungunya, and other viral fevers. EF is not usually considered in the differential diagnosis of myalgia with elevated creatinine phosphokinase. Although *Salmonella* infections have been described in the literature as a cause of focal myositis, our patient had diffuse myositis/rhabdomyolysis associated with acute kidney injury, pancreatitis, hepatitis, encephalitis, and bicytopenia. Very few cases of paratyphoid fever causing rhabdomyolysis have been reported. It is possible that myositis in

EF may have been unrecognized, and therefore, under-reported. EF should be suspected in endemic countries presenting with severe febrile illness complicated by bicytopenia/pancytopenia and myalgia.

Early diagnosis and treatment are very important to prevent dreaded complications and increased mortality of EF. Thus, physicians should remember that myalgia could be a harbinger of *S. Paratyphi* infection and myositis may be more frequently seen than not.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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