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Case Report

Internal Medicine Section

Paratyphi Pneumonia- Does What You Eat Matter?

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ABSTRACT

Most common signs and symptoms of typhoid are localised to gastrointestinal system. Less commonly, extraintestinal infectious complications occur with enteric fever. The present case report is about a 29-year-old female, without risk factors, who presented with fever, loose stools and cough of five days duration. The patient was diagnosed to have paratyphi A bacteraemia, with clinical and radiological features of pneumonia. Her sputum cultures were sterile, and hence paratyphi A pneumonia was diagnosed. She received 14 days of antimicrobial therapy and recovered. Vi-based monovalent vaccines do not offer protection against most paratyphoid fever, because only *Salmonella serovars Typhi*, and paratyphi C carry the Vi antigen. Further studies are needed on bivalent and polyvalent typhoid vaccines covering all serovars.

Keywords: Enteric fever, Extra intestinal, Vaccine, Vi antigen

CASE REPORT

A 29-year-old female homemaker, with no known co-morbidities, came with complaints of vomiting, low grade fever, loose stools for five days, and abdominal pain of four days duration. Stools were watery type, frequent and non blood tinged. She developed cough with expectoration two days after her presenting symptoms. She was hospitalised for 48 hours at another centre prior to arrival, and was managed conservatively with intravenous fluids. She mentioned consuming food from restaurant one week prior to this event. She had been vaccinated for Coronavirus Disease-2019 (COVID-19) and has tested twice negative for COVID-19, by means of Reverse Transcription-Polymerase Chain Reaction (RT-PCR).

On examination, the patient looked toxic with a pulse rate was 100/min, blood pressure was 120/90 mmHg, hypoxic with saturation of 93% in 8 litres of oxygen via face mask and with a respiratory rate of 28/min. Respiratory system revealed crepitations in right mammary and infra axillary area. She was conscious oriented with no focal neurological deficit.

Initial blood workup as depicted in [Table/Fig-1] showed neutrophil leucocytosis, normal platelets, normal amylase and lipase and mild transaminitis. Her urine routine did not show pyuria.

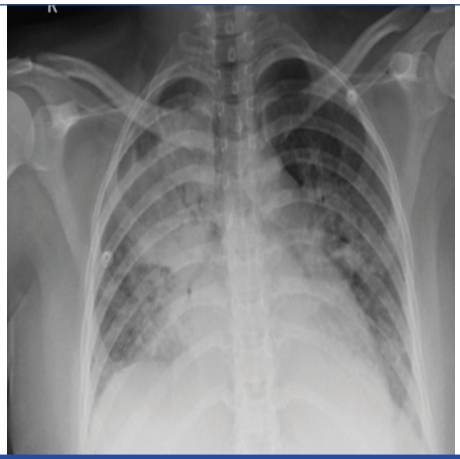
The chest radiographs, done at the other hospital, was normal, whereas subsequent chest radiograph, after 48 hours of hospital stay, showed dense consolidation of right upper and middle lobe [Table/Fig-2]. High Resolution Computed Tomography (HRCT) chest showed patchy air space opacities with ground glassing in bilateral lung fields, predominantly in the right middle and lower lobe and central distribution. Few subcentrimetric right paratracheal, precranial, subcarinal, prominent right supraclavicular lymph nodes [Table/Fig-3]. Multiplex viral PCR was negative. Radiographic diagnosis was community-acquired pneumonia.

Overall assessment, at this point, showed acute undifferentiated febrile illness involving gastrointestinal tract and respiratory system. Considering new consolidation, recent hospitalisation, suspecting nosocomial aetiology for deterioration, patient was started on carbapenem and teicoplanin covering gram positive organisms.

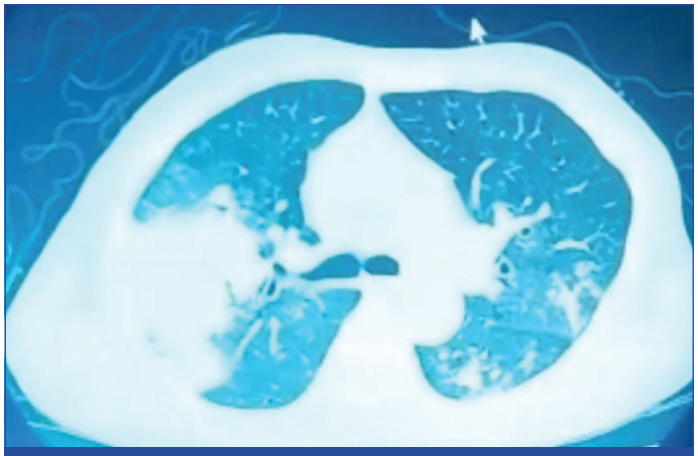
Considering prodrome of gastrointestinal symptoms, Computed Tomography (CT) whole abdomen was done. It showed hepatomegaly, mild diffuse fat infiltration in the pancreas, mild mural thickening involving ileocaecal junction and terminal ileum, multiple enlarged mesenteric lymph nodes and prominent retroperitoneal lymph nodes.

Investigation	Prior to admission	Recent report
Haemoglobin (g%)	11.5	10.7
Total count	10050 /mm^3	11070 /mm^3
Differential count		
Neutrophil	85%	64%
Lymphocytes	10%	24%
Monocytes	4%	11%
Eosinophils	1%	1%
Platelet count	4,00,000 /mm^3	2,00,000 /mm^3
Creatinine	0.8 mg/dL	0.6 mg/dL
Total bilirubin	0.8 mg/dL	0.6
Direct bilirubin	0.8 mg/dL	0.4
Indirect bilirubin	0.2 mg/dL	0.2
SGOT*	52 U/L	60 U/L
SGPT*	57 U/L	54 U/L
ALP*	126 U/L	116 U/L
GGT*	90 U/L	90 U/L
HbA1c*	5.6	5.5
Lipase	30 U/L	
Amylase	60 U/L	

[Table/Fig-1]: Laboratory findings.
*SGPT: Serum glutamic pyruvic transaminase; SGOT: Serum glutamic-oxaloacetic transaminase; ALP: Alkaline phosphatase; GGT: Gamma glutamyl transferase; Hba1c: Glycated haemoglobin

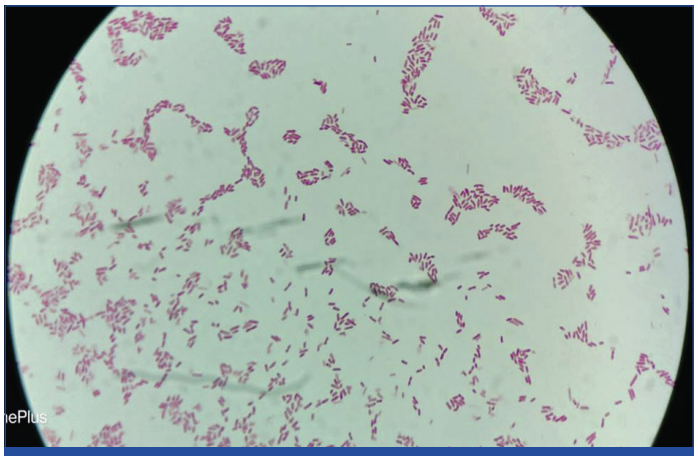


[Table/Fig-2]: Consolidation in right upper and middle lobe.



[Table/Fig-3]: High Resolution Computed Tomography (HRCT)-chest showing right middle and lower lobe opacity.

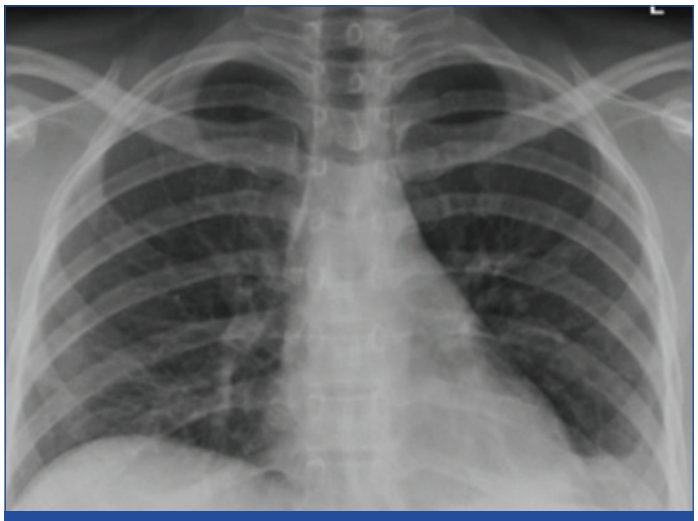
Aetiological differentials at this point were staphylococcal infection, enteric fever, aeromonas sepsis and nosocomial gram negative infections. Subsequently, she had gram negative bacteraemia [Table/Fig-4].



[Table/Fig-4]: High power oil immersion gram staining with crystal violet showing gram negative bacilli (100X).

Vitek ID detected *Salmonella paratyphi* A, and it was pansensitive. Diagnosis was *Salmonella paratyphi* A bacteraemia with probable pneumonia.

Antibiotics were de-escalated to ceftriaxone 2 gm once a day and azithromycin 1 gm once a day. The patient recovered after seven days of antimicrobials. Her chest radiograph as, done after seven days of hospitlisation, was normal [Table/Fig-5]. Sputum culture sent during admission was sterile. Her appetite and sense of wellbeing improved on discharge. Total duration of antimicrobial therapy was 14 days. Her follow-up was uneventful and she was advised typhoid vaccination.



[Table/Fig-5]: Resolved consolidations after 7 days of treatment.

DISCUSSION

Typhoid and paratyphoid (also known as enteric fevers) are infections acquired by the ingestion of food or water contaminated by Salmonella Typhi and Salmonella Paratyphi A,B,C. In endemic areas, important risk factors for disease include eating food prepared outside the home, drinking contaminated water, having close contact or relative with recent typhoid fever, poor housing with inadequate facilities for personal hygiene, and recent use of antimicrobial drugs [1].

Salmonella enteric serovar typhi, paratyphi A, paratyphi B, and paratyphi C may be referred to collectively as Typhoidal Salmonella, whereas, other serovars are grouped as Non Typhoidal Salmonella (NTS). Although Salmonella typhi predominates, lately paratyphi is emerging especially paratyphi A is increasing problem in Asia. The most common complications include cholecystitis, hepatitis, pneumonia, acute kidney injury, and myocarditis. Pneumonia may be due to secondary infection with other organisms such as *Streptococcus pneumonia* [2]. However, the index patient had pneumonia possibly due to *Salmonella paratyphi A*. Sputum analysis was sterile, bronchoscopy was not done as she recovered on directed therapy.

Burden of typhoid fever lays primarily in low income and middle income countries like Asia. Mogasale V et al., stated that the estimated number of typhoid fever cases in lower income and middle income countries in 2010, after adjusting for water-related risk, was 11.9 million cases with 1,29,000 deaths [3].

Definitive diagnosis of enteric fever requires the isolation of *S. Typhi* or *S. Paratyphi* from specimens of blood, bone marrow or another extraintestinal site. Lack of appropriate technology for Salmonella species serotyping in low-resource settings prevents discrimination between enteric fever caused by *S. Typhi* or *S. Paratyphi A* and infection with non typhoidal salmonellosis, therefore rates of true incidence of typhoid vs paratyphoid fever varies [4].

S.Paratyphi is the causal agent for a substantial proportion of enteric fever episodes that cannot be distinguished clinically from typhoid fever episodes in India and China [5].

Regarding extraintestinal complications of *Salmonella enterica* serotype typhi infection, the pulmonary complication secondary to enteric fever are pneumonia, empyema and bronchopleural fistula [6]. Chest radiograph abnormalities occur in 24% of patients with pulmonary findings such asbronchitis and pneumonia. However, S typhi is rarely found in the sputum. Duration of therapy was ceftriaxone and fluroquinolones in patients with pulmonary manifestations for 14-21 days [6]. The index patient had paratyphi A pneumonia and bacteraemia with sterile sputum cultures. She received 14 days therapy and there was clinical and radiological resolution.

Koul PA et al., observed bronchitis to be a dominant manifestation (77.6%), followed by bronchopneumonia, pleurisy, unilateral lobar pneumonia and pleural effusion. It is noteworthy to state that, the index patient had unilateral lobar pneumonia, an atypical amongst pulmonary manifestation of enteric fever [7].

There are not many cases reported on *S.paratyphi* pneumonia [5-7]. This case was reported to create awareness and anticipating it as a complication during clinical presentation. Treatment duration does not differ in paratyphi pneumonia bacteraemia.

According to Centers for Disease Control and Prevention (CDC), typhoid vaccines needs to be given atleast two weeks before travel to endemic countries [8]. Two types of second generation vaccines have been licensed for use: an oral live attenuated vaccine and an injectable subunit Vi-capsular polysaccharide vaccine. For the Vi capsular vaccines, as with other polysaccharide vaccine immunological limitations preclude their widespread use. The Vi vaccine-induced immune response is elicited by a T cell-independent

mechanism, to which children less than two years of age respond poorly. Further, there is no development of immunological memory [9].

However, Vi-based monovalent vaccines do not offer protection against most paratyphoid fever, because only Salmonella serovars, and Paratyphi C carry the Vi-antigen. Fluoroquinolones, amoxicillin or trimethoprim-sulfamethoxazole are the appropriate antimicrobials in uncomplicated drug susceptible cases [8]. Ceftriaxone, cefotaxime, oral cefixime and azithromycin for two weeks are optimal treatment in Multidrug Resistant (MDR) cases considering the intracellular nature of the microbe [10]. The index patient received antimicrobial therapy for two weeks.

CONCLUSION(S)

Pulmonary findings of paratyphi A are rare. It is suggested that pneumonia be recognised as a complication for adequate quality medical care. As paratyphi A is not covered by routine typhoid vaccine, further studies on bivalent and multivalent vaccines are required. Awareness about extraintestinal manifestations of paratyphi A is essential in tropical countries.

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