

A Rare Extended Multi Drug Resistance (XDR) *Salmonella typhi* Infection in Young Male Patient: A Case Report

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Abstract

Typhoid fever is not uncommon in developing countries or travellers returning from tropical destinations. Once patient is diagnosed with typhoid fever, the treatment should be prompt with effective and appropriate antibiotics regime; otherwise there is an increase risk of various complications. We report a case of a young patient diagnosed with typhoid fever and Multi Drug Resistance (XDR) *Salmonella typhi* infection.

Keywords *Salmonella*; Cephalosporins; Carbapenems

Introduction

Typhoid fever is a common and fatal bacterial infection caused by specific type of *Salmonella* species, *Salmonella enterica* that may causes mild to severe symptoms [1]. It has an incubation period of 6 to 30 days after exposure. Clinically it initially manifest with gradual onset of a high fever over several days [2,3], which is commonly accompanied by generalized weakness, abdominal discomfort or pain, constipation, headaches, nausea and vomiting [2] later in the disease process, some people may develop a skin rash called Rose spots (rose colored spots) [2].

If untreated and in severe infection, patient may experience acute confusion, intestinal hemorrhage and liver injury [4]. Without treatment rarely in some patients symptoms may last weeks or months [2,4] and those patients carry the bacterium without being affected and able to spread the disease to others by fecal-oral route [5]. The disease is mostly common in Indian subcontinent [6] and affected approximately 12.5 million cases worldwide in 2015.

Typhoid is treated with antibiotics, and there is drug resistance to chloramphenicol, Ampicillin, streptomycin and trimethoprim-sulfamethoxazole, known as multidrug-resistant typhoid [7]. We report a case of young patient presented with history of fever, vomiting and abdominal pain and was found to have extended multi drug resistant (XDR) *Salmonella typhi* infection, resistant to first line cephalosporins antibiotics and was sensitive to carbapenem only.

Case Presentation

Lab investigations

A 24 years-old man, previously healthy presented with history of fever for 1 week associated with recurrent vomiting and abdominal pain. He had loss of appetite and generalized body weakness. He had History of recently travel from Pakistan, 3 weeks prior to his presentation. His blood investigations are shown in Table 1.

Patient was hospitalized and was started on supported management and intra-venous (IV) ceftriaxone antibiotics. Blood cultures came back positive for gram negative bacilli which is shown to be *salmonella typhi* extended drug resistant organism (XDR) and sensitive to carbapenem only (Table 2).

Patient was started on meropenem 1gm q8hr under contact isolation. He continued to be febrile for initial 7 days and bacteremia persisted for 7 days despite the appropriate antibiotic (Meropenem). His repeated blood culture showed same sensitivity (Table 2). After 1 week of antibiotics patient started to be asymptomatic and fever improved. He received a total of 14 days of Intravenous Meropenem. He became asymptomatic was subsequently discharge.

Hemoglobin	13.0 g%
WBC	5.10
Platelets	210
Creatinine	78 umol/l
Sodium	137 mmol/l
Potassium	4.0 mmol/l
Alkaline Phosphatase	104.0 U/L
ALT	258 U/L
AST	349 U/L
Glucose	7.2 mmol/l

Table 1: Lab Investigation.

Drug	<i>Salmonella typhi</i> MIC Interp
Ampicillin	R
Cefepime	R

Ceftriaxone	R
Cefuroxime	R
Ciprofloxacin	R
Ertapenem	S
Levofloxacin	R
Meropenem	S
Trimethoprim/Sulfa	R

Table 2: Blood culture Report.

A repeat blood cultures after 7 days were negative for *Salmonella* organism

Discussion

Currently antibiotic resistance to typhoid fever is an emerging public health concern worldwide. The current literature shows that there is a steady growing resistance to *Salmonella* organisms which is mainly related to the inappropriate and excessive antibiotics abuse. This has led to continuing mutations in *Salmonella* species.

Studies by Dutta [8] and Frenck [9] has shown azithromycin is a better choice in treating resistant typhoid with both fluoroquinolone and ceftriaxone drugs. Similarly Azithromycin significantly reduces the relapse rates in comparison with ceftriaxone [10]. It has been reported that there a steady increase in Cephalosporin resistant in the Indian subcontinent [11].

The risk of ceftriaxone-resistant *S. typhi* infection is increased among children aged 15 years and younger, male, and those eating unhygienic food outside the house [12,13]. The most recent and largest outbreak of ceftriaxone-resistant *Salmonella enterica* serotype *typhi* described to date occurred in Pakistan. The outbreak was suspected to be attributed due to the contaminated drinking water, especially the mixing of sewage with drinking water [12,13].

A recent study done in Singapore suggests presence of *gyrA* and *parC* mutations in *Salmonella* isolated from retail fresh chicken meat. This showed most common resistances towards ampicillin, tetracycline chloramphenicol, sulfamethoxazole-trimethoprim and nalidixic acid. Mutations at two different sites of *gyrA* gene were found to have quinolone resistance genotype [14].

Ciprofloxacin resistance is an increasing clinical problem in South-east Asia and Indian-subcontinent, therefore ceftriaxone or cefotaxime is used as a first line therapy [7]. Cephalosporins are the drug of choice in treating invasive *Salmonella* infection especially in children's where use of fluoroquinolones are restricted and approved, but the growing resistance to ceftriaxone is public health concern [15].

In one of the study carried out in Taiwan, the Molecular analysis indicated that the majority of ceftriaxone resistance was due to the production of CMY-2 (64%) and CTX-M-3 (27%) β -lactamases. The only two SHV-type ESBLs were found in *S. enteritidis* isolates [16].

By the end of 2018, over 5000 cases of this extensively drug-resistant (XDR) *S. typhi* strain were reported, with imported cases in the United Kingdom and the United States. The strain remains susceptible to azithromycin and carbapenems, which are the main treatment options for this strain [17].

In our case the patient had recent travel to Indian sub-continent presented with fever, abdominal pain and vomiting, patient Blood cultures showed extended spectrum antibiotic resistance to ceftriaxone and sensitive to only carbapenem's.

The objective of reporting this case is to create awareness among all the health care associated personals about growing extended multi drug antibiotic resistance (XDR) *Salmonella* organism which is really an emerging grave public health concern.

Conclusion

Use of excessive antibiotics not only in humans but also in the live stocks is leading to dreadful fast-growing mutations in the *Salmonella* species and ultimately leading to extended multi drug resistant organisms (XDR). The proper use of antibiotics only if indicated, following appropriate blood culture and antibiotic stewardship in the hospitals and public health education Globally can minimize the fast growing extended multi drug resistant organism (XDR) *Salmonella* mutations.

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