



INVASIVE NON TYPHOIDAL SALMONELLOSIS (iNTS) IN AN IMMUNOCOMPETENT ADOLESCENT – A CASE REPORT

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ABSTRACT

Invasive Non-typhoidal Salmonellosis (iNTS) is increasingly recognized as an emerging cause of blood stream infections in developing countries. With its diverse clinical presentations and alarming case fatality rate (20%: ranging from 3% to 50%), iNTS necessitates timely diagnosis and intervention. We report a case of invasive non-typhoidal salmonella (iNTS) infection in a 19-year-old girl who was managed appropriately based on a timely diagnosis. Detailed investigations did not reveal any other predisposing factors or evidence of an underlying immunodeficiency. Follow-up showed complete resolution of symptoms with no long-term sequelae. Invasive non-typhoidal salmonellosis was reported previously in patients suffering from chronic illnesses and immunosuppressed conditions. But, the incidence of iNTS is increasingly reported in immunocompetent hosts from developing countries. The proper diagnosis and timely treatment is essential and understanding of the pathogenesis between these correlations will assist in the development of preventive strategies for this illness.

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INTRODUCTION

Invasive non-typhoidal Salmonellosis (iNTS) is increasingly recognized as an emerging cause of blood stream infections in developing countries. Malnourished children and immunosuppressed individuals show an increased risk for this disease.(1) With its diverse clinical presentations and alarming case fatality rate (20%: ranging from 3% to 50%), iNTS necessitates timely diagnosis and intervention.(1) The correlation between prevalence of iNTS and malaria has been found to be significant and various pathogenetic mechanisms are being proposed in recent studies from malaria endemic regions. The invasive non-typhoidal Salmonellosis in a healthy individual has been rarely reported from our country especially from the North-Eastern region. Here we report a case of invasive non typhoidal Salmonella (iNTS) infection in an otherwise healthy adolescent girl.

Case Presentation

A 19-year old girl was admitted to our hospital with complaints of abdomen pain, vomiting, fever and rigors along with burning micturition for 2 days. She had a history of loose stools (3 episodes) before the onset of these symptoms. Clinical and sonological examination revealed splenomegaly.

Provisionally she was suspected to be suffering from enteric fever / urinary tract infection. A blood sample was drawn for routine examination, culture sensitivity, serology and liver function tests after admission. A mid-stream clean catch urine sample was taken for microscopy and culture sensitivity. Urine microscopy showed no abnormalities and urine culture was sterile.

Liver function tests were normal. The total leucocyte count was 6200 cells/mm³. The differential count showed 72% neutrophils, 22% lymphocytes, 5% monocytes and 1% eosinophils. Her hemoglobin level was low (8.7gm/dl) and peripheral blood smear examination revealed dimorphic anaemia. The peripheral blood smear did not reveal any malarial parasitic forms. The serological test for enteric fever (WIDAL test) and rapid test for Malaria (PARACHEK) were negative.

Blood culture yielded non-lactose fermenting colonies on MacConkey agar within 24 hr. They were Gram negative bacilli and based on biochemical tests (Table 1) the isolate was presumptively identified as *Salmonella* spp. Based on the agglutination (O – 1,9 and 12) and biochemical tests, most probable serotype is *Salmonella* Enteritidis. The antimicrobial sensitivity testing was done on Mueller-Hinton agar using the

Kirby-Bauer disk diffusion method against the following antimicrobial agents: ampicillin, ciprofloxacin, nalidixic acid, cotrimoxazole, chloramphenicol and ceftriaxone.

Table 1 Biochemical properties of the isolate.

Biochemical test	Result
Indole production	-
Citrate utilization	+
Triple Sugar Iron (TSI) test*	K/A with H ₂ S
Urease production	-
Sugar fermentation [#]	
Glucose	AG
Lactose	-
Sucrose	-
Mannitol	A
Arabinose	-
Lysine decarboxylase	+
Ornithine decarboxylase	+
Arginine dihydrolase	-
Hugh Leifson's OF test [§]	F
Motility	
Catalase	+
Oxidase	-
Nitrate reduction	+
Methy red test	+
Voges-Proskauer test	-
O-nitrophenylgalactoside (ONPG test)	-

*K/A – Alkaline slant and acidic butt

[#]AG – Acid production with gas; A – Acid production

[§]F – Fermentative pattern

The results were interpreted according to Clinical and Laboratory Standards Institute guidelines (CLSI 2015). (2) The isolate was sensitive to cephalosporins and fluoroquinolones tested.

Other investigations did not reveal any other predisposing factors or evidence of an underlying immunodeficiency.

She was started on empirical treatment with intravenous ceftriaxone in view of enteric fever / UTI after collection of samples during admission. The same was continued after the culture and sensitivity report. The patient showed good clinical response and recovered without complications. She was discharged after one week and repeat blood culture taken after treatment was sterile.

DISCUSSION

The *Salmonella* spp. are associated with two main types of clinical illness in humans, namely enteric fever and non-typhoidal salmonellosis.(3) Non-typhoidal Salmonellae are ubiquitous gram negative bacteria that produce a more localized response including self-limited form of gastroenteritis as they are believed to lack the human specific virulence factors.(4) Non-typhoidal *Salmonella* (NTS) disease is a major cause of diarrhoeal illness worldwide and causes around 93 million enteric infections and 155,000 deaths worldwide.(1) A very few proportion of non typhoidal salmonella disease manifests as invasive disease. However, invasive NTS infections (iNTS) are associated with significant morbidity and mortality. A systematic review of iNTS infections revealed that though invasive NTS forms only a small proportion (3.6%) of total NTS infections, owing to its high case fatality rate the number of deaths are greater than four times than that of the enteric infections.(1) A large number of iNTS cases has been reported from sub-Saharan Africa where it is associated with HIV, malnutrition and malaria.(5) The incidence of iNTS infections in Asia appears to be escalating as the proportion of immunosuppressed patients is increasing either due to primary illness or due to

modern treatment modalities.(6) However, the iNTS among immunocompetent individuals is very rare. Most of the time the disease presents mimicking enteric fever, malaria, etc.

At present, diagnosis of invasive non-typhoidal *Salmonella* infections largely depends upon culture based methods. Considering its ability to cause serious complications in a short period of time, we are in need of methods which should give rapid results. Few serological tests based on ELISA showed sensitivities in the range of 70-95% and specificity ~90%. (7) A major challenge in the development of serologic tests for iNTS is the huge diversity of non-typhoidal serovars globally, which necessitates empirical as well as locally targeted selection of antigens to achieve adequate sensitivity. Additionally, it will be difficult for serologic diagnostics using current technologies to distinguish between the two syndromes NTS can cause: self-limiting gastroenteritis and invasive systemic infection. (8)

The multidrug resistant *Salmonella* spp. are being increasingly reported which complicates the management of invasive disease. (9,10) There is an alarming rise in the proportion of strains which are resistant to extended spectrum cephalosporins, fluoroquinolones, macrolides and aminoglycosides, which are being used widely for empirical treatment of these infections.(11)With the increase in multidrug resistant strains, timely testing and reporting of antimicrobial susceptibility is important in these situations.

CONCLUSION

Invasive non-typhoidal salmonellosis was reported previously in patients suffering from chronic illnesses and immunosuppressed conditions. But, the incidence of iNTS is increasingly reported in immunocompetent hosts from developing countries and the high prevalence of malaria in these regions provide an ecological niche for it. The proper diagnosis and timely treatment is essential and understanding of the pathogenesis between these correlations will assist in the development of preventive strategies for this illness.

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