

Use of Steroids in Severe Salmonellae Infection in a 10 Months Old Girl: Case Report

Al Shabibi Buthina¹, Al Hashmi Samiya², Al Hashami Hilal^{3,*}

¹Pediatrics Intern, Royal Hospital, Muscat, Oman

²Pediatrician, Royal Hospital, Muscat, Oman

³Pediatrics Infectious Diseases consultant, Royal Hospital, Muscat, Oman

*Corresponding author: hashamihs@gmail.com

Received October 23, 2018; Revised November 28, 2018; Accepted December 09, 2018

Abstract *Salmonellae* is one of determine infectious cause of acute gastroenteritis among children all over the world. It causes acute and self-limited gastroenteritis which can be complicated by Severe infection with central nervous system (CNS) involvement that can carry high risk of morbidity and mortality. Here, we report a case of *Salmonella species* acute gastroenteritis followed by severe sepsis with neurological manifestations in a child who is known case of Autosomal Recessive polycystic kidney with liver fibrosis. The infection was successfully treated with intravenous antibiotic along with short course of steroids. The child has complete recovery without any sequelae. In conclusion, this report demonstrates that use of steroid in severe *salmonella* infection with CNS involvement can improve the outcome.

Keywords: *Salmonellae species, sepsis, steroids*

Cite This Article: Al Shabibi Buthina, Al Hashmi Samiya, and Al Hashami Hilal, "Use of Steroids in Severe Salmonellae Infection in a 10 Months Old Girl: Case Report." *American Journal of Medical Case Reports*, vol. 6, no. 11 (2018): 222-223. doi: 10.12691/ajmcr-6-11-1.

1. Introduction

Non-typhoid *Salmonellosis species* are subgroup of *salmonella enterica*. They are gram negative rod-shaped bacillus. The route of transmission is fecal-oral route by a direct person to person contact or ingestion of contaminated water and food. In contrast to *typhoidal salmonella* the route of transmission of the disease can occur through direct contact with an infected animal as well. The most common clinical manifestation of the disease is acute gastroenteritis. It is the second common cause of diarrhea after campylobacter. Furthermore, it can present with bacteremia and focal infection such as meningitis and osteomyelitis. [1]

Salmonella are more sensitive to the acidity of the stomach than *shigella*. Therefore, it is more common in individuals with hypochlorhydria. Organisms that successfully escape the acidity of stomach pass through the small bowel to the distal ileum and colon. It enters the apical membrane of gut epithelial cell through the bacterial mediated endocytosis process. The bacterial containing vesicles at last shed off its content into the lamina propria through the basal membrane. Gastroenteritis is caused by the inflammatory process and influx of neutrophils into the intestinal lumen. [2]

The chemicals released into the blood stream to fight the infection in one hand may cause a life threatening sepsis reaction in the other had. Non-typhoid salmonella is known to cause sepsis in immunocompromised patient,

specially to HIV patient. They are often severely ill and presenting with high grade fever and chills. Surprisingly diarrhea may be absent. Furthermore, they are more vulnerable to septic shock. [3]

2. Case Presentation

A 10 months old Omani girl known case of Autosomal Recessive polycystic kidney with liver fibrosis. She is on regular follow up with pediatric nephrology service. She presented to emergency department with impression of impending septic shock that was preceded by fever and diarrhea. Her symptoms started 4 days before presentation with watery loose motion 4-6 time daily mixed with mucus, multiple episodes of vomiting, poor oral intake, runny nose, cough and fever. She had history of recent travel to India. Parents did seek medical advice and took the child to private hospital where she was investigated and diagnosed with acute gastroenteritis and received intravenous fluid then discharged home. Two days later, her conditions deteriorated, and she became drowsy, with high grade fever.

In the Emergency room she was febrile 39.3c, tachypneic 46 breath\minute, tachycardic 150 beat\minute, hypotensive 113\62 dehydrated with sever metabolic acidosis her PH was 7.20. She had wheezy chest, distended abdomen, hepatomegaly and palpable kidneys. She received 3 boluses of normal saline and then kept on maintenance intravenous fluid (IVF). She continued to have ongoing loss and showed worsening metabolic acidosis.

She was admitted to pediatric intensive unit (PICU) and kept on ventilator support and required inotropic support. For the sepsis management; she was started on intravenous ceftriaxone and metronidazole.

Her investigations showed as follow: complete blood count: Hb:10.8, WBC:10.2, C-reactive protein: 261, renal function test showed: Na 130mmol/L, K= 3.4mmol/L CO₂=11mmol/L, urea= 13.6 mmol/L and creatinine 64 umol/L

Blood culture showed gram negative bacilli which was then identified later as salmonella species. It was sensitive to Ampicillin, ciprofloxacin, ceftriaxone and (trimethoprim+sulfame). Chest X-ray was normal.

After 3 days of admission in the PICU; she continued to spike high grade fever with further raised CRP (364). Antibiotic regimen was upgraded to intravenous meropenem and vancomycin as she was hemodynamically unstable.

With the new presentation of lethargy, altered conscious level and bradycardia; new impression of salmonella sepsis with meningoencephalitis was made. Immediate non-contrast CT scan was done to rule out ICP or brain edema and it was normal. In addition to the intravenous antibiotics; she was started on high doses of dexamethasone of 8 mg (1mg/kg) for three days duration. Furthermore, Echocardiography was done relieved normal cardiac structure with mild depressed myocardial function secondary to sepsis. Lumbar puncture was done, and cerebrospinal fluid (CSF) analysis was unremarkable including cytology, biochemistry (glucose 6.7mmol/L, protein 0.28g/L), microbiology (no bacterial growth) and CSF viral panel PCR was negative for the following viruses (Adenovirus, HSV 1 and 2, Parvovirus, enterovirus, paraechovirus, human herpes virus, varicella, CMV and EBV).

With the negative CSF results, normal CT brain, sensitivity report of the blood culture; her antibiotics downgraded to ceftriaxone alone.

During her admission period she developed thrombus of the right iliac and femoral vein which was treated by clexan and low molecular weight heparin (LMWH). Chest radiograph showed evidence of right upper lung collapse and bronchopneumonia kept in high flow nasal cannula and chest physiotherapy.

After 8 days of admission in PICU she was shifted to the high dependency unit. She continued to improve clinically and shifted after 2 days into general bed for the continuation of ceftriaxone for 14 days from the last negative culture. On discharge, she was afebrile, asymptomatic with normal neurological examinations.

3. Discussion and Literature Review

Salmonella infection known to cause severe infection. Use of steroid as adjunctive therapy has been described in the literature for severe salmonella infection with shock state and neurological manifestations such as altered mental state [4]. Two studies looked into the effect of steroid use in both mortality and morbidity of *Salmonella* infection.

On 1981 a randomized, placebo controlled, and double-blind study was conducted in infectious diseases hospital in Jakarta to determine the role of dexamethasone in reducing the mortality rate in severe typhoid disease. Severe cases were identified by the presence of fever and shock or abnormal alertness and with the presence of *S.typhi* or *S.paratyphi*

in culture of blood, marrow or aspirate. A total of 38 cases were randomly grouped into 20 cases treated by chloramphenicol and dexamethasone (group A) and 18 cases on chloramphenicol and placebo (group B). Two of the twenty cases in group A died while ten of eighteen in group B died. The 10 percent case fatality in the dexamethasone-chloramphenicol group was significantly lower than the 55.6 percent case fatality rate in chloramphenicol group. Furthermore, survivors of either group had similar clinical course in terms of return of alertness, total day of hospitalization and showed no difference in regard of complications. Moreover, none of the survivors developed intestinal perforation. In another retrospective analysis study conducted in Dhaka, Bangladesh (2006-2007) to determine the role of IV dexamethasone as an adjunct to the antimicrobial therapy in the management of enteric fever and encephalopathy. Clinical diagnosis was based on the isolation of *S.typhi* and *S.paratyphi* from blood, fecal cultures and or positive widal test and using the Glasgow coma scale. 23 cases were identified with three mortalities. None of the fatalities received Dexamethasone while all the 20 survivor cases were managed by antimicrobial drug and adjunct dexamethasone. The recommended dose of dexamethasone as per the studies is a high dose of 3mg/kg as an initial dose followed by daily doses of 1mg/kg QID for eight doses [4,5].

4. Conclusion

We have reported a case of *Salmonella species* acute gastroenteritis followed by severe sepsis with neurological manifestations in a child who is known case of Autosomal Recessive polycystic kidney with liver fibrosis. The infection was successfully treated with intravenous antibiotic along with short course of steroids.

This case highlights the potential role of steroids in the treatment of complicated *Salmonella* infections with shock state and neurological manifestations.

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