

Salmonella Sepsis and Urinary Tract Infection Complicating with Acute Kidney Injury in a HIV Positive Female Patient

GODFREY MUTASHAMBARA RWEGERERA¹, THATO TUMEDISO RAMOLEFHE²,
NGOY ALPHONSE NGOY³, MOLATEDI LESIAMANG⁴, YORDANKA PINA RIVERA⁵

ABSTRACT

Urinary Tract Infection (UTI) can rarely be caused by salmonella species. UTI salmonellosis may present as uncomplicated UTI, pyelonephritis or haemorrhagic cystitis. We present a case of a 44-year-old HIV positive female who presented with frank haematuria, fever, dysuria and confusion. These were preceded by non-bloody diarrhea that had resolved on presentation. Blood and urine culture grew salmonella species. The course of the patient was complicated by acute kidney injury that required haemodialysis. Patient improved on a two-week course of antibiotics with subsequent negative blood and urine cultures. We emphasise the importance of prevention on exposure of risk factors and close follow-up due to high risk of recurrence in special groups of patients.

Keywords: Antiretroviral therapy, Foodborne pathogens, Human Immunodeficiency virus, Urosepsis

CASE REPORT

A 44-year-old HIV-infected patient presented with two days history of fever with chills, dysuria, suprapubic pains and frank haematuria. Her condition had worsened on the day of admission whereby at this point she was confused. These presenting symptoms were preceded by one week history of non-bloody diarrhea; the diarrhea had stopped four days prior to presentation (this history was obtained around day five when patient had improved).

There was no history of colicky abdominal pain/ flank pains. There was no history of weight loss, bone pains, noted breast lump(s), joint swelling, night sweats, cough, and chest pain, shortness of breath or pharyngitis/tonsillitis. She had no history of genitourinary/gynaecologic/gastrointestinal surgery. She reared chickens at her home and admitted to handle them on daily basis. There was no recent history of consumption of uncooked meat (pork, beef, and chicken) or unpasteurised milk, cheese or raw eggs. She didn't report any contact with anyone who presented with similar symptoms. Patients' medical history was significant for being HIV-positive for over 13 years with history of multiple episodes of antiretroviral therapy defaulting.

Her CD4 and viral load at presentation were 354 cells/mm³ and 2355 copies/mL respectively. Patient was diagnosed to have HIV virological failure (viral load was 42153 copies/mL) three months earlier and was subsequently switched from Zidovudine/Lamivudine/Efavirenz to Tenofovir/emtricitabine/Dolutegravir. She had no history of underlying kidney disease, diabetes, malignancy, autoimmune diseases.

Physical examination on presentation revealed confusion, Kussmaul breathing, suprapubic and epigastric tenderness with the rest of systemic examination being unremarkable. Vital signs on admission were; blood pressure=132/91 mmHg; pulse rate=116 beats per minute; respiratory rate=24 breaths/minute, SpO₂=93% on room air and temperature=38.6°C. Her weight was 66.7 kg. Urine microscopy done at Accident and Emergency department revealed frank haematuria with red blood cells of >100/ HPF and white blood cells of full field/ HPF with protein 2+. There was no casts. Arterial Blood Gas (ABG) analysis was consistent with metabolic acidosis with pH of 7.205; hyperkalemia of 5.94 mmol/L and bicarbonate of 5.3 mmol/L. Urgent renal function tests revealed markedly elevated serum creatinine and urea of 1756 umol/L and 72.82 umol/L

respectively. Patient's haemogram revealed leukocytosis with White Blood Cell (WBC) of $17.93 \times 10^9/\text{L}$ (4-10); Neutrophilia of $14.6 \times 10^9/\text{L}$ (2-7); Lymphopenia of $0.8 \times 10^9/\text{L}$ (1-3); Haemoglobin of 10.5 g/dL (12-15); Platelet of $574 \times 10^9/\text{L}$ (150-400). Liver function tests/enzymes were within the normal range except for hypoalbuminemia of 28 μmol/L. Chest x-ray and electrocardiogram were unremarkable. Urine and blood for culture and sensitivity done on admission with results coming out on day five grew salmonella species. Salmonella infection growth in the urine was sensitive to cotrimoxazole and cefazolin whereas salmonella infection in the blood was sensitive to cefotaxime and chloramphenicol. Other antibiotics sensitivity/resistance patterns were not reported. Our laboratory had no facilities to serotype salmonella species at the time. Stool for culture and sensitivity was not performed as diarrhoea had stopped at the time of presentation.

Abdominal-pelvic ultrasound done on day seven of admission was unremarkable and it showed kidneys of normal size with a well-differentiated corticomedullary junction. The patient was diagnosed as having Acute Kidney Injury (AKI) as a complication of salmonella bacteraemia and UTI. AKI was complicated by metabolic acidosis, hyperkalaemia and uremic encephalopathy. Frank haematuria was adjudged to be secondary to haemorrhagic cystitis; the latter being a complication of salmonellosis UTI.

Patient was initiated on Intravenous ceftriaxone on the day of admission at the dosage of 1 gm once a day. The dosage of ceftriaxone was adjusted for renal functions [1]. On day five when we got culture results, we considered against increasing the dosage of ceftriaxone to cover for possible typhoid salmonella as we did not have serotype results; our decision was based on high likelihood of non-typhoid salmonella due to risk factor of rearing chicken and clinical resolution of symptoms. Ceftriaxone was administered for a prolonged period of 14 days in view of complicated infection in an immunosuppressed patient with atypical infection [2]. In the view of AKI; patient was also started on urgent haemodialysis, this was stopped on day seven when serum creatinine fell to 356 μmol/L and the patient was kept on maintenance intravenous normal saline. Antiretroviral therapy was switched to a renal friendly regimen of abacavir/lamivudine/dolutegravir with the view to consider patient's pre-admission regimen as renal function improves. Blood and urine culture repeated on day seven of admission were negative. Patient completed a two-week course of antibiotics. On day 14, her serum

creatinine and urea were 152 umol/L and 7.09 umol/L respectively. She was counseled on safe handling of chicken to avoid salmonella reinfection as this was the only identified possible source. Oral ciprofloxacin at a dosage of 500 mg twice a day for four weeks was prescribed as secondary prophylaxis.

She was referred to Infectious Disease Unit to have more sessions on adherence and consideration of antiretroviral therapy switch. She has been seen at the medical clinic after 4 and 12 weeks of discharge; she remains asymptomatic.

DISCUSSION

A previous study in Botswana done between February 2003 to July 2008 revealed that Salmonella and Shigella were the most common organisms isolated from stool specimens [3]. On the other hand; 65 (21.7%) out of 300 samples of raw meat sausages in Botswana comprised Salmonella isolates [4].

Urinary tract infection from Salmonella is rare [5,6] and usually associated with either genitourinary structural abnormalities or immunosuppressive and chronic conditions such as HIV positivity, diabetes mellitus, and rheumatologic diseases such as rheumatoid arthritis and systemic lupus erythematosus. Other chronic illnesses predisposing to Salmonella UTI include cardiopulmonary or liver disease, malignancies and chronic haemodialysis [7-9].

Salmonella UTI usually results either from direct urethral invasion or haematogenous spread from gastroenteritis [8]. Sepsis from salmonella infection is the leading cause of morbidity and mortality in HIV-positive patients in developing countries [10,11] with prevalence as high as 37% in a study done in Malawi among HIV-infected patients [10]. Mortality secondary to Salmonella sepsis among in patients is estimated to be as high as 77% [10].

We believe that the pathophysiology of salmonella UTI in our patient is haematogenous spread from the gastrointestinal tract; this is due to the fact that UTI was preceded by diarrhea episode [9,12] that had resolved on presentation. Our laboratory could not do serotyping to differentiate whether salmonella infection was typhoidal or non-typhoidal; however the fact that our patient reared chicken and was directly involved in the handling process, it makes non-typhoidal salmonella the most likely possibility [5,13].

Patients with HIV-infection are at high risk of salmonella recurrence [14]; with recurrence more likely to be due to recrudescence rather than re-infection [11]. A study by Gordon MA et al., in Malawi revealed a high recurrence rate of 43% [11]. Furthermore, recurrence has been shown to occur more in patients with detectable virological load [11]. The presented patient is a habitual defaulter of antiretroviral therapy with detectable viral load; hence at high risk of recurrence. It has been previously shown that good virological response reduce the chance of recurrence and ultimately the need for secondary prophylaxis [15]. We made extra efforts to emphasise importance of adherence as a means to reduce recurrence rate; close follow-up has been planned.

Treatment of salmonella bacteraemia and complicated UTI is prolonged compared to other typical organisms. In HIV-infected people, first episode should be treated with up to two weeks of intravenous antimicrobial therapy followed by four weeks of oral

quinolone [9,16]. Despite the fact that; we don't have guidelines for prophylaxis against non-typhoid salmonella; we considered that our patient had high likelihood of recurrence due her immunosuppression status with similar observation seen in sub-Saharan Africa [11]. Hence, we instituted secondary prophylaxis with quinolone with outcome of no recurrence after four weeks. In case of relapse, it is recommended to continue long-term suppressive therapy with quinolone or cotrimoxazole [9,17].

CONCLUSION

Salmonella infection is a rare cause of UTI in high risk individuals such as HIV positive. Thorough history taking is important to establish risk factors and initiate appropriate treatment. We emphasise the importance of prevention on exposure of risk factors and close follow-up due high risk of recurrence in special groups of patients.

REFERENCES

- [1] Ceftriaxone: Dose adjustment for renal impairment. <https://www.gloshospitals.nhs.uk/gps/antimicrobial-resources/a-z-bugs-and-drugs/ceftriaxone-dose-adjustment-renal-impairment/>. Last accessed on 10th December 2018
- [2] Sabih A, Leslie SW. Complicated Urinary Tract Infections. <https://www.ncbi.nlm.nih.gov/books/NBK436013/>. Last accessed on 10th December 2018
- [3] Rowe JS, Shah SS, Mothagodi S, Bafana M, Tawana E, Truong HT. An epidemiologic review of enteropathogens in Gaborone, Botswana: shifting patterns of resistance in an HIV endemic region. *PLoS ONE*. 2010;5(6):e10924.
- [4] Samaxa RG, Matsheka MI, Mpoloka SW, Gashe BA. Prevalence and antimicrobial susceptibility of salmonella isolated from a variety of raw meat sausages in Gaborone (Botswana) retail stores. *Journal of Food Protection*. 2012;75(4):637-42.
- [5] Fierer J, Swancutt M. Non-typhoid Salmonella. *Curr Clin Top Infect Dis*. 2000;20:134-57.
- [6] Van Beneden CA, Keene WE, Strang RA, Werker DH, King AS, Mahon B, et al. Multinational outbreak of *Salmonella enterica* serotype Newport infections due to contaminated alfalfa sprouts. *JAMA*. 1999;281:158-62.
- [7] Longo D, Fauci A, Kasper D, Hauser S. *Harrison's Principles of Internal Medicine*. 18th edition Columbus: McGraw-Hill; 2011; 1278-80.
- [8] Jehangir A, Poudel D, Fareedy SB, Salman A, Qureshi A, Jehangir Q, et al. Group D salmonella urinary tract infection in a immunocompetent male. *Case Rep Infect Dis*. 2015;2015:608632. doi: 10.1155/2015/608632
- [9] Tena D, Gonzalez-Praetorius A, Bisquert J. Urinary tract infection due to non-typhoidal Salmonella: report of 19 cases. *J Infect*. 2007;54:245-49.
- [10] Gordon MA, Walsh AL, Chaponda M, Soko D, Mbwiwiniji M, Molyneux ME, et al. Bacteraemia and mortality among adult medical admissions in Malawi predominance of non-typhi salmonellae and *Streptococcus pneumoniae*. *J Infect*. 2001;42:44-49.
- [11] Gordon MA, Banda HT, Gondwe M, Gordon SB, Boeree MJ, Walsh AJ, et al. Non-typhoidal salmonella bacteraemia among HIV-infected Malawian adults: high mortality and frequent recrudescence. *AIDS*. 2002;16:1633e41.
- [12] Tsai YC, Hou CL, Yao TC, Chen LC, Jaing TR, Huang JL. Risk factors and bacterial profiles of urinary tract infections in patients with systemic lupus erythematosus. *Asian Pac J Allergy Immunol*. 2007;25:155-61.
- [13] Salmonellosis in poultry. <https://www.viv.net/articles/blog/salmonellosis-in-poultry>. Last accessed on 10th December 2018.
- [14] Levine WC, Buehler JW, Bean NH, Tauxe RV. Epidemiology of non-typhoidal *Salmonella* bacteraemia during the human immunodeficiency virus epidemic. *J Infect Dis*. 1991;164:81-87. www.viv.net/articles/blog/salmonellosis-in-poultry
- [15] Chou YJ, Lin HW, Yang CJ, Chen MY, Sheng WH, Liu WC, et al. Risk of recurrent non-typhoid *Salmonella* bacteraemia in human immunodeficiency virus-infected patients with short-term secondary prophylaxis in the era of combination antiretroviral therapy. *J Microbiol Immunol Infect*. 2016;49(5):760-e67.
- [16] Arthur G, Nduba VN, Kariuki SM, Kimari J, Bhatt SM, Gilks CF. Trends in bloodstream infections among human immunodeficiency virus-infected adults admitted to a hospital in Nairobi, Kenya during the last decade. *Clin Infect Dis*. 2001;33:248-56.
- [17] Mourani C, Hagge G, Mallat SG, Chehab G, Sabbagh M. *Salmonella typhi* in a child with urinary tract infection and urolithiasis. *J Med Liban*. 2005;53:234-35.

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of Internal Medicine, University of Botswana and Princess Marina Hospital, Gaborone, Botswana.
2. Medical Officer, Department of Medicine, Princess Marina Hospital, Gaborone, Botswana.
3. Medical Officer, Department of Medicine, Princess Marina Hospital, Gaborone, Botswana.
4. Medical Officer, Department of Radiology, University of Botswana and Princess Marina Hospital, Gaborone, Botswana.
5. Lecturer, Department of Internal Medicine, University of Botswana and Princess Marina Hospital, Gaborone, Botswana.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Godfrey Mutashambara Rwegeera,
4775, Notwane Road, Private Bag-00713, Gaborone, Botswana.
E-mail: grwege@yahoo.com

FINANCIAL OR OTHER COMPETING INTERESTS:

None.

Date of Submission: Dec 06, 2018
Date of Peer Review: Jan 05, 2019
Date of Acceptance: Jan 21, 2019
Date of Publishing: Mar 01, 2019