CASE REPORT

Salmonella-related urinary tract infection in an elderly patient

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SUMMARY

An elderly female patient with an uncomplicated urinary tract infection from *Salmonella newport* is presented. Radiological and laboratory studies were performed because of her systemic and exposure risk factors as well as prior urinary tract abnormalities. While this patient was successfully treated as an outpatient with oral antibiotics, complications and recurrence are common and deserve close follow-up with repeat urine cultures at a minimum. Further laboratory and radiological testing should be guided by patient gender, risk factors and recurrence.

BACKGROUND

Non-typhoidal *Salmonella* is a rare cause of urinary tract infections in children and adults.^{1–5} It is often not associated with enteritis symptoms or positive stool cultures and can be fraught with complications of recurrence even after multiple prolonged antibiotic treatment regimens.^{2 3 5–7} Owing to the importance of underlying structural genitourinary abnormalities, a radiological workup is often necessary, as well as a search for other risk factors associated with this disease entity.^{3 5–7}

CASE PRESENTATION

A 73-year-old Caucasian woman presented with 'another urine infection'. Two weeks earlier, she had been evaluated at our office for symptoms of dysuria and nocturia. At that time, a urinalysis with microscopy revealed moderate blood with positive leucocyte esterase on a midstream collection, however, a urine culture was not performed. She was treated empirically with a 7-day course of macrodantin, which she had finished, but her symptoms had not improved. Her genitourinary (GU) history was negative for gross haematuria or renal lithiasis but positive for dysuria, nocturia and stress incontinence. Her review of systems was negative for fever, nausea, abdominal pain, emesis or diarrhoea. The patient's medical history was significant for frequent urinary tract infections, renal insufficiency without hypertension, gastroesophageal reflux disease, significant osteoarthritis of her knees and hips and depression with insomnia. Prior pertinent surgeries included a cystocele and rectocele repair in the 1980s, which was complicated by left hydronephrosis and a non-functioning kidney. This led to a subsequent left nephrectomy in 2005, related to an infection in the left ureteral tract. She also had a prior cholecystectomy following an episode of gallstone pancreatitis. Her physical examination showed vitals of temperature 98.1° F,

blood pressure 160/84, 88 bpm, 16 breaths/min and weight of 281 with body mass index of 50. The rest of her physical examination was otherwise normal.

INVESTIGATIONS

Haematology and basic chemistry panels were normal apart from a baseline creatinine of 1.54. Urinalysis with microscopy was again positive for many WCC's and bacteria seen, but no casts or crystals. Her urine culture reported out 2 days later and grew >100 000 colony forming units/mL of a *Salmonella* species sensitive to ampicillin, ceftriaxone and trimethoprim/sulfamethoxazole. This was further typed as *Salmonella newport* by our state health department. A review of her prior UTIs, showed no history of *Salmonella* by urine culture but only isolated urinary infections of *Klebsiella pneumonia*, *Citrobacter freundii* and *Escherichia coli*, respectively, in the years since her nephrectomy.

Stool cultures were not ordered as she reported no gastrointestinal (GI) symptoms of diarrhoea or hematochezia and had already started the empiric treatment of trimethoprim/sulfamethoxazole at the time of the urinary culture result. Owing to her history of left nephrectomy, the patient underwent abdominal ultrasonography which showed a 1.2 cm hyperechoic region on the lower pole of the right kidney concerning for an angiomyolipoma and discreet small pancreatic pseudocysts. Further imaging with CT of the abdomen and pelvis showed a sub-centimeter renal cyst in the lower pole of the right kidney with overlying calcification of the renal fat, a pseudocyst of the pancreas with fatty infiltration and a mildly enlarged spleen. No hydronephrosis or renal or bladder stones were seen in either study.

TREATMENT

The patient was treated with trimethoprim/sulfamethoxazole twice daily for 14 days and referred to our local infectious disease consultant.

OUTCOME AND FOLLOW-UP

The patient did well following her single oral antibiotic regimen but required 14 days, compared to typical UTI regimens, appropriate to her *Salmonella* aetiology.^{2 6–9} Stool studies were not performed at the time of her infectious disease visit, 6 weeks later, as the patient had already completed her trimethoprim/sulfamethoxazole regimen prior to this appointment and was asymptomatic of both urinary and GI symptoms at that evaluation. She did report to the specialist, however, a weeklong period of diarrhoea 3–4 weeks prior to the UTI symptoms, but without

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fever, hematochezia or mucous in the stool. Her exposure risk factors included farm animals of goats and pigs on her property but she had no direct contact with them and no exotic pets. She recalled eating some questionable spoiled shrimp during that time frame but this did not concern her as it was self-limited, and she occasionally experienced similar episodes of loose stool since her cholecystectomy. After 14 days of trimethoprim/sulfamethoxazole follow-up urine cultures were negative for *Salmonella*. She has had several UTIs since then with different bacterial species identified by urine culture (*E. coli* and *K. pneumonia*) and was referred back to her urologist for further evaluation and consideration of antibiotic prophylaxis. Imaging with postvoid residual ultrasonography revealed 0 mL of urine remaining in the bladder. Treatment with daily prophylactic antibiotics was initiated by her urologist, and the patient has been asymptomatic since that time.

DISCUSSION

Non-typhoidal *Salmonella* (NTS) urinary tract infections were found to represent only 0.63% of all *Salmonella* infections in large retrospective reviews.^{1 2} The overall incidence of *Salmonella* positive urine cultures has been estimated to be between 0.015% and 0.118%.⁵ Human salmonellosis most commonly presents with acute gastroenteritis symptoms and only occasionally bacteraemia or focal infections. An asymptomatic carrier state of the urinary, biliary or intestinal tracts can potentially be present for months to years after the initial onset of acute disease symptoms.^{2 5 6 9}

The finding of a focal *Salmonella* UTI is not believed to merely be contamination of a urine sample from the stool of a patient with acute gastroenteritis or carrier state.^{2-5 8 10 11} Most recent case series report patients with only urinary tract symptoms and *Salmonella* isolated on urine culture but negative stool cultures for *Salmonella* species.^{2 3 5-7 11} The pathophysiology of *Salmonella* UTIs results from either haematogenous spread or direct ascending invasion of the GU tract.^{1 3 5-7 9-11} An ascending route of infection is favoured in this patient due to the mild diarrhoeal illness she reported prior to her presentation and her risk factors of recurrent urinary infections. Her exposure to farm animals and potentially contaminated food is also consistent with NTS infections, such as *S. newport*.

Risk factors for *Salmonella* UTI include exposure to exotic reptiles, recent *Salmonella* gastroenteritis and patients with chronic illnesses such as cardiopulmonary or liver disease, gastric resection, duodenal ulcers, sickle cell disease, diabetes mellitus and haemodialysis. As well, immunosuppression is a risk factor in patients with renal transplant, HIV/AIDS, rheumatological diseases such as systemic lupus erythematosus and haematological or solid tumour cancers.^{3-6 10} Urological predispositions such as prior surgery, renal allograft, neoplasm, duplicating collection system, indwelling catheter, enteric fistula, uncircumcised state and urinary stasis due to pregnancy, stones, stricture, cystocele, vesicoureteral reflux or an enlarged prostate are reported to be risk factors and must be considered in the work up of patients who are found to have *Salmonella* UTIs.^{3 5-7 9-12} Paterson *et al* suggests a urological work up in all male patients. They further contend that the isolated finding of NTS in the urine of women most commonly represents uncomplicated cystitis without the need for further investigation.¹² In this non-immunocompromised patient, the risk factors of recurrent UTIs and prior nephrectomy were believed to warrant an ultrasound to rule out another genitourinary anatomic risk factor or complication.

Complications of *Salmonella* UTIs include pyelonephritis, renal insufficiency, nephrotic syndrome, renal lithiasis, genitourinary abscesses, recurrence and chronic bacteriuria.^{1 3 6 7 11} As in all *Salmonella* infections, bacteraemia and death can occur, although the later appears to be rare in UTI-reported cases.^{1 3 5 6 10}

Finally, some case reviews of patients with *Salmonella* UTIs report the need for prolonged antibiotic therapy of 2 weeks or longer.^{3 5-7} This increased duration is due to potential bacteraemia during the course of the disease, the risk for recurrent or chronic asymptomatic bacteriuria as a *Salmonella* carrier with shorter treatment regimens, and concern for antibiotic resistance of carriers in spite of appropriate treatment from in vitro sensitivity data of isolated cultures.^{2 3 5-7 11}

Learning points

- ▶ *Salmonella* urinary tract infections (UTIs) are rare and generally symptomatic.
- ▶ *Salmonella* UTIs may complicate an enteric *Salmonella* infection.
- ▶ Prolonged antibiotic therapy (2 weeks or longer) and follow-up urinary cultures are necessary due to recurrence or chronic asymptomatic bacteriuria.
- ▶ *Salmonella* UTIs are frequently associated with chronic diseases, immunosuppression or structural abnormalities of the genitourinary tract. A focused history and relevant physical examination are always warranted.

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