



Salmonella Mississippi: An unusual cause of renal abscess in an immunocompetent patient

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ARTICLE INFO

Keywords:

Salmonella

Abscess

Renal

Urinary tract infection

ABSTRACT

Renal abscess is a rare manifestation of *Salmonella* infection. This usually occurs in the presence of risk factors that include immunosuppression, renal stones and urinary structural abnormality. We describe a 19-year-old male with no risk factors who developed a left renal abscess and gram-negative sepsis caused by *Salmonella Mississippi*. This was managed successfully with percutaneous drainage of the abscess and a prolonged course of antibiotics. To our knowledge, this is the first reported case of *Salmonella Mississippi* as a cause for renal abscess in an individual with no identifiable risk factors.

1. Introduction

Salmonella species are waterborne and foodborne pathogens that infect the gastrointestinal tract and do not typically involve the urinary tract. *Salmonella* infection as a cause for renal abscesses is rare.¹ Risk factors include urinary tract structural abnormality, renal stones, and immunocompromised state.^{2,3} Symptoms can include fever, dysuria, urinary frequency and costovertebral angle tenderness.¹

We describe a patient that developed a left renal abscess and gram-negative sepsis caused by *Salmonella Mississippi* species with no identifiable risk factors. The patient was managed successfully with ultrasound guided percutaneous drainage of the abscess and a prolonged course of antibiotics.

2. Case presentation

A 19-year-old male presents to our hospital emergency department (ED) with a 1-week history of intermittent fevers, lethargy, rigors, urinary frequency, malodorous urine, nausea and vomiting. In the preceding three months he was intermittently swimming in a nearby dam. He had a background of eczema for which he was on Dupilumab. There was no history of immunosuppression, urinary tract abnormality, urinary calculi, recent overseas travel, diabetes mellitus, sick contacts or HIV infection.

The patient was in septic shock on arrival in the ED. He was hypotensive (blood pressure 80/60 mmHg), in sinus tachycardia (125 beats/min), febrile (38.1 °C) and tachypnoeic (respiratory rate 24 breaths/min). On examination he had mild left flank tenderness on palpation with no other findings. Bedside urinalysis showed small blood but was negative for leucocytes and nitrites. This was sent off for formal culture which subsequently demonstrated no growth.

Laboratory analysis showed leucocytosis of $12.7 \times 10^9/L$ associated with neutrophilia of $11.8 \times 10^9/L$. C-reactive protein was elevated at 153 mg/L while renal function tests revealed urea of 8.4 mmol/L, creatinine of 207 $\mu\text{mol/L}$ and eGFR 39 ml/min/1.73m².

A contrast enhanced computed tomography (CT) abdomen pelvis demonstrated a 43 mm × 38 mm × 24 mm complex cystic focus in the left interpolar kidney with septations as shown in Fig. 1. There was no evidence of stones or any urinary tract structural abnormality. The patient was given a renally adjusted dose of IV Augmentin 1.2g 8-hourly for sepsis with a suspected urinary source. He was initially resuscitated with 3 L of 0.9% normal saline and required 3 mg in total of metaraminol boluses. He was subsequently transferred to ICU for vasopressor support and had required noradrenaline (7 mcg/min) and metaraminol (10 mg/hr) infusions. His antibiotics were subsequently escalated to IV Piperacillin/Tazobactam 4.5 g 8-hourly.

On day 2 of admission, an ultrasound guided percutaneous drainage of the abscess was performed under local anaesthetic. Brown purulent

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<https://doi.org/10.1016/j.eucr.2022.102197>

Received 16 July 2022; Received in revised form 6 August 2022; Accepted 20 August 2022

Available online 24 August 2022

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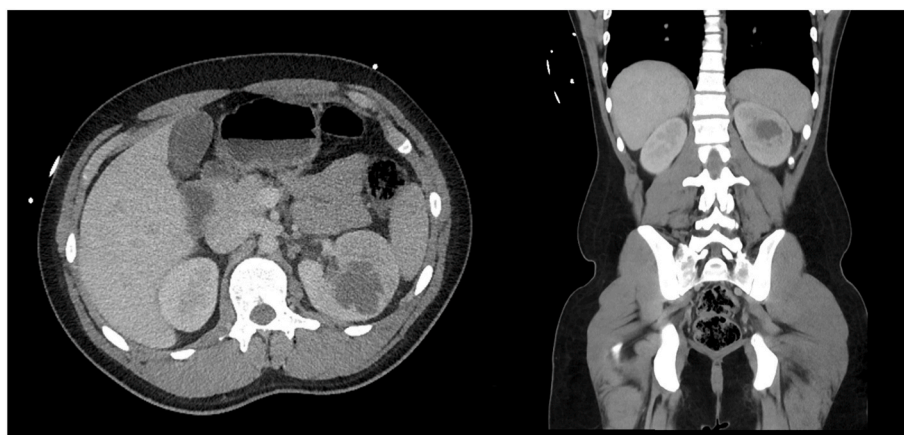


Fig. 1. Contrast enhanced CT abdomen and pelvis demonstrating the *Salmonella Mississippi* left renal abscess (43 mm × 38 mm × 24 mm). Left (Axial). Right (Coronal).



Fig. 2. Contrast enhanced CT abdomen and pelvis showing position of drain tube and reduction in size of abscess to a diameter of 8 mm. Left (Axial). Right (Coronal).

fluid was aspirated and sent for culture. An 8.5 French Dawson-Mueller drain was inserted into the abscess cavity. The patient made a good clinical recovery and was transferred to the ward on day 4. The fluid aspirate grew *Salmonella* species. Subsequent serotyping identified this to be *Salmonella Mississippi* species. This pathogen was also present on serial blood cultures and on stool culture. Antibiotics were changed to IV Ceftriaxone 1g 12-hourly as the *Salmonella Mississippi* isolate was sensitive to this antibiotic.

We performed a repeat CT urogram on Day 7 which demonstrated reduction in the size of the abscess to 8 mm in diameter as shown in Fig. 2. The drain was then removed.

The patient was de-escalated to oral amoxicillin 1g 8-hourly and discharged on day 10 to complete a further 14 days of treatment.

Renal ultrasound performed at 2 months showed complete resolution of the abscess. The patient was seen in clinic at this time. He was clinically well and did not have any residual symptoms.

3. Discussion

Salmonella infection as a cause for renal abscess is rare. Renal abscesses are typically caused by pathogens such as *Escherichia coli*, *Klebsiella*, *Proteus* and *Staphylococci*.⁴ In the literature there have been only a few cases of *Salmonella* species as a cause for renal abscess.^{1–4}

However, ours is the first to describe the serotype *Salmonella Mississippi*. *Salmonella Mississippi* is a serotype of *Salmonella* that is rare throughout most parts of the world. Approximately 80% of all *Salmonella Mississippi* cases in Australia are found in Tasmania. This serotype is

predominantly found isolated in its native wildlife and in untreated drinking water.⁵ Given our patient's history of swimming in a nearby local dam, it is possible that this dam contained *Salmonella Mississippi* and may have been the source of our patient's infection.

Renal abscesses can arise from ascending urinary tract infections or through haematogenous spread.¹ Since *Salmonella Mississippi* was isolated in our patient's stool, blood and aspirate cultures, we hypothesise that there was likely an initial infection of the gastrointestinal tract with subsequent haematogenous spread to the kidneys.

Risk factors for *Salmonella* renal infection includes urinary tract structural abnormality, renal stones and immunocompromised state,² for which our patient had none.

The management of *Salmonella* renal abscesses in the literature have been similar. Initial administration of broad-spectrum antibiotics such as cephalosporins are recommended, especially in the paediatric population.³ Prolonged course of antibiotics is advised with a duration of 3–6 weeks.² Like our case, *Salmonella* renal abscesses have been managed with radiological percutaneous drainage in addition to antibiotics either with ultrasound or CT.^{1,3,4} Similarly to us, serial imaging to confirm interval resolution of renal abscess have also been performed.¹

Consent

Patient consent was obtained in writing.

Funding sources

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Abbreviations

None.

Author contributions

William Chui: Writing - original draft. Writing - review & editing.

Henry Pan: Writing – review & Editing.

Pravin Viswambaram: Writing - review & editing.

Jennifer O'Hern: Writing - review & editing.

Philip Tan: Writing - review & editing.

Victor Ilie: Supervision.

Declaration of competing interest

None.

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