CASE REPORT

Legionnaires disease presenting as acute kidney injury in the absence of pneumonia

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SUMMARY

Legionnaires disease is a pneumonic illness with multisystem involvement. In 1987, Haines *et al* reported the only reported case of isolated renal disease of legionellosis without concurrent respiratory disease. A 62-year-old man presented with generalised weakness and malaise and watery diarrhoea, and was found to have acute kidney injury on admission. He was initially managed as acute gastroenteritis complicated with dehydration and acute kidney injury with intravenous hydration. Despite adequate hydration, his renal function was worsening day by day. Later in the course of his sickness he developed pneumonic illness and was diagnosed with Legionnaires disease after a positive urine antigen test. We are reporting the second case of Legionnaires disease presenting as an isolated acute kidney injury in the absence of respiratory symptoms on presentation.

BACKGROUND

Legionnaires disease is one of the clinical entities caused by *Legionella pneumophila* associated with pneumonia and extrapulmonary manifestation involving multiple systems. Acute kidney injury is an uncommon extrapulmonary manifestation of Legionnaires disease.¹ However, isolated acute kidney injury in the absence of concurrent pneumonia makes this case a diagnostic challenge, leading to delay in appropriate management. We are reporting this case to inform physicians of the possibility of Legionnaires disease presenting as an isolated acute kidney injury with no clinical or radiological evidence of pneumonia at presentation.

CASE PRESENTATION

A 62-year-old man presented with generalised weakness and malaise for 1 day. The patient had also had a few episodes of watery stools with no blood or mucus for the past 3 days. He denied any fever, chills, rigours, abdominal pain or vomiting. Review of other systems was unrevealing. His other medical problems were hypertension, HIV infection with last CD4 count of 369 cells/ μ L and undetectable viral load 1 year earlier, coronary artery disease, ischaemic stroke with no residual weakness and left nephrectomy for renal cancer. He smokes 20 cigarettes and drinks alcohol every day. His home medications were aspirin, atorvastatin, losartan, ritonavir, darunavir, raltegravir, emtricitabine and tenofovir. The patient denied contact with any sick person and also denied recent travel. On examination, his mucous membranes were dry. He was tachycardic with a pulse rate of 107 bpm. Blood pressure was 107/86 mm Hg with

orthostasis. Temperature was 97.6°F. All other system examinations were normal.

The initial laboratory reports revealed white cell count (WCC) of 6.6 K/ μ L, haemoglobin of 13.9 g/dL and platelet count of 356 000. The patient's electrolytes were within normal range, however, his blood urea nitrogen and creatinine were elevated to 21 and 1.8 mg/dL, respectively. Phosphorous was 3.8 mg/dL (normal range 2.4–4.7). Aspartate transaminase was mildly elevated to 47 with normal alanine transaminase, alkaline phosphatase and bilirubin. Creatine kinase was within normal range at 87 IU/L, excluding rhabdomyolysis as a cause of renal impairment. Urinalysis showed 2–5 red blood cells (RBC), 1–5 WCC and no active sediments. The patient's CD4 count during this admission was 366 cells/ μ L. Initial clinical impression was acute gastroenteritis with severe dehydration complicated with acute kidney injury. However, despite adequate hydration, creatinine increased to 2.6 mg/dL. Initial chest X-ray was performed on day 3 of admission after adequate hydration and was negative for infiltrates (figure 1). During hospital stay day 4, the patient became drowsy and developed acute respiratory distress after which he was intubated. Postintubation chest X-ray revealed left lower lobe infiltrate (figure 2); the patient was managed as possible aspiration pneumonia or healthcare-associated pneumonia with vancomycin, clindamycin and aztreonam as he was allergic to penicillin. Despite starting on antibiotics over the next 48 h he rapidly deteriorated into septic shock. He required three vasopressors to maintain the mean arterial blood pressure above 65 mm Hg. The treatment plan was re-evaluated due to lack of response to the current antibiotics and levofloxacin was added empirically to cover for atypical infection. He dramatically improved over the next 48 h, was tapered off vasopressors and became haemodynamically stable. He was on mechanical ventilatory support for a total of 9 days and was successfully extubated. Urine Legionella antigen was positive and Legionnaires disease was diagnosed as the cause of the clinical spectrum described. The patient completed treatment with levofloxacin and his renal function returned to normal. The source of infection was not identified and there were no further cases reported in our hospital during that period.

DIFFERENTIAL DIAGNOSIS

- ▶ Acute gastroenteritis complicated with dehydration and acute kidney injury
- ▶ Aspiration pneumonia

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Figure 1 Initial chest X-ray on day 3 of admission showing clear lung fields.

- Healthcare-associated pneumonia
- Legionnaires disease

TREATMENT

The patient's symptoms and signs improved dramatically after initiation of levofloxacin, which is the drug of choice.

OUTCOME AND FOLLOW-UP

The patient was discharged home after resolution of symptoms.

Figure 2 Chest X-ray on day 4 showing left lower lobe infiltrate.

DISCUSSION

Legionellosis is a collective term used to describe the two clinical entities Legionnaires disease and Pontiac fever caused by *L. pneumophila*. Legionnaires disease² is associated with pneumonia and multisystem involvement whereas Pontiac fever³ is a self-limiting flu-like illness with no associated pneumonia.

Legionnaires' disease was first described in 1976 after an outbreak among the delegates of the 58th Congress of the American Legion in Philadelphia,⁴ and the presumed source of infection was contaminated water in the hotel's air conditioning. It was later postulated that the pneumonia epidemics prior to 1976 in Philadelphia, Washington DC and Minnesota also could have been due to Legionnaires disease, when *L. pneumophila* was identified in a specimen from 1943.

In USA, hospitalisation due to legionellosis is estimated to be around 8000–18 000 cases annually. Incidence of legionellosis in the state of New York dramatically increased from 0.83 cases/100 000 population in 2002 to 2.74 cases/100 000 population in 2009, and continued to be elevated at 2.02 and 2.64 cases/100 000 population in 2010 and 2011, respectively.⁵

The commonly identified risk factors for legionnaires disease are smoking, chronic lung disease transplant recipients, glucocorticoid treatment and other immunosuppressive states. However, HIV infection does not increase the risk of legionella infection, but could be associated with severe disease.⁶

The legionellaceae family has multiple species of which *L. pneumophila* is the commonest causative agent accounting for 90% of legionellosis cases.⁷ Urine legionella antigen testing⁸ is a rapid test and is highly specific. Moreover, it can be used for days, even after antibiotic initiation, due the persistence of the antigen in urine. However, its limitation is that it only detects

L. pneumophila serogroup 1 and its sensitivity varies according to the severity of the disease.

Sputum cultures are very sensitive and specific and will detect all types of legionella, yet obtaining a sample might be cumbersome. Serological studies are highly specific but least sensitive and demonstrating rising antibody titres at 4–12 weeks will delay the diagnosis.⁹ Legionnaires disease is a pneumonic illness with systemic complications involving the pulmonary, renal, gastrointestinal tract and central nervous system. The possible pathogenesis for the systemic complications can be explained by circulating endotoxins causing microvascular vasoconstriction and end organ ischaemia.¹⁰

Acute kidney injury is a rare reported complication of Legionnaires disease, which can range from a mild transient renal impairment to severe anuric kidney injury necessitating haemodialysis. Renal biopsies of these patients revealed tubulointerstitial nephritis and/or acute tubular necrosis. Relman and McCluskey reported a case of acute tubulointerstitial nephritis associated with pulmonary Legionnaires disease in 1978,¹¹ and subsequently in 1981 Poulter *et al*¹² and Carlier *et al*¹³ reported cases of acute kidney injury with Legionnaires disease. In 1987, Haines *et al*¹ reported the first case of isolated renal involvement of legionellosis without concurrent respiratory involvement. The literature research did not show any other similarly reported cases.

We report the second case of legionellosis presenting as an isolated acute kidney injury with no concurrent pneumonia, leading to delay in diagnosis and institution of appropriate treatment. However, our patient eventually developed altered mental status and pneumonia and was later diagnosed to have legionella pneumonia. Acute kidney injury improved with treatment of Legionnaires disease with levofloxacin,¹⁴ and it did not improve with hydration alone. This case report will enlighten physicians

on the rare possibility of early acute kidney injury in the absence of pneumonia in Legionnaires disease and will facilitate early initiation of treatment and better outcomes, unlike in our patient, who went into septic shock due to delay in appropriate management. Physicians should consider the possibility of Legionnaires disease if a patient is disproportionately sick with a high degree of dehydration and acute kidney injury, especially with history of diarrhoea, even in the absence of pneumonia.

Contributors MY made substantial contributions to the conception, acquisition, analysis and interpretation of data for the work. She also contributed to drafting the manuscript, revising it critically for important intellectual content, final approval of the version to be published and agrees to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. BS made substantial contributions to the conception, acquisition, analysis and interpretation of data for the work. He also contributed to drafting the manuscript, revising it critically for important intellectual content, final approval of the version to be published and agrees to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Competing interests None.

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Learning points

- ▶ Although Legionnaires disease is a pneumonic illness with systemic manifestations, it can rarely present as isolated acute kidney injury with generalised malaise without pneumonia.
- ▶ Delay in diagnosis and appropriate treatment can increase the mortality.
- ▶ Empiric treatment for pneumonia should always include coverage for atypical organisms.
- ▶ The diagnosis and treatment plan should always be re-evaluated in a patient who is not improving with current management.

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