

Legionnaire's Disease Presenting with Severe Rhabdomyolysis and Acute Kidney Injury

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Learning Objectives

- 1) Describe the clinical presentation and causes of Rhabdomyolysis
- 2) Describe the clinical treatment of Acute Kidney Injury caused by Rhabdomyolysis
- 3) Discuss epidemiology of Legionella infection

Case Presentation

A 49 y/o woman with a history of asthma, diabetes, GERD, hypertension, presented to the Emergency Room with 7-10 days of **cough** and **shortness of breath** followed by severe asymmetric **muscle pain and weakness in her right upper extremity and bilateral legs**. This worsened until she was unable to walk up the stairs in her home. She also noted **dark urine** with **dysuria**. This occurred a week following heavy rainfall in the Mid-Atlantic region.

Physical Exam: VS: T 37.5, P 89, RR 18, 107/67, PO2 94%
Normal exam with the following exceptions:

- Gen: Distressed breathing, wearing 3L nasal cannula
- MSK: Calf pain to deep palpation over thigh and calf bodies bilaterally, and right triceps
- GU: CVA tenderness on L side

Labs: CK: **423920 U/L**, Ca (corrected): 7.8, P: 5.3 mg/dL, **CRP: >270 mg/L**, **ESR: 67 mm/hr**, TSH: 1.2, Utox: neg, UA: **>182 WBC**:, RBC: 78, Nitrite: neg, Leuk Est: Large, BCx: neg, upper resp PCR: neg, Flu A+B Ag: neg, HIV, HCV, HBV: neg, WBC: 5.3 E3/mcL Hgb: 10.8 G/dL PLT: 83 E3/mcL

Imaging: RUQ US: Unremarkable
CXR, shown below

128	93	67	105
4.4	19	8.5	

2.6	5.5
0.5	0
1443	397
64	



Figure 1. A: AP chest radiograph showing a R lower lobe hazy opacity B: Lateral view

Hospital Course:

- The patient was initially treated with normal saline 250cc/hr with 1.5 amps of bicarbonate added, and she was started on levofloxacin for pneumonia
- One day after admission **urine legionella antigen was positive** (see Fig. 1 and Table 1)
- The patient's urine culture also grew pan sensitive *E. coli*, no changes to her antibiotics were made
- Trended daily:
 - Cr (mg/dL) peaked at a 2 days after presentation to **10.0** (baseline 0.8) →9.7→8.9→8.1→7.1→6.2
 - CK (U/L) trended down steadily from **423920**→323417→140947→66367→35754→19926
- Ca, K, and P and volume status remained within safe levels, monitored daily
- As the patient's renal function improved her metabolic acidosis, uremia, and ↑AST/ALT normalized
- By hospital day #3 the patient began having symptomatic relief of her pain but muscles remained tender, however she was able to walk unassisted
- Hospital day #5 patient was switched from IV to PO fluids and her Cr and CK continued to follow their trends, she was then discharged 24hrs later

Date (Feb '18)	Temp (F)	Precipitation (in)	Event(s)
7	38	0.49	Rain
8	32	0	
9	37	0	
10	45	1.06	Fog, Rain
11	57	1.05	Fog, Rain, T-Storm
12	51	0.09	Rain
13	38	Trace	Rain
14	44	0.03	Rain
15	61	0.01	
16	54	0.05	Rain
17	39	0.42	Rain, Snow

Table 1: Rainfall reported in Washington, DC ~5 days before the patient's symptoms began in February, 2018. Increased rainfall is linked to higher incidence of legionella pneumonia (2) (Data from wunderground.com)

Treatment and Outcome:

- The patient was treated with aggressive hydration, and levofloxacin for 5 days to cover her legionella pneumonia and *E. coli* UTI then was switched to 9 days of azithromycin and discharged home with improving CK and renal function, but lingering muscle soreness

Discussion

- *Legionella* species is a recognized but rare cause of rhabdomyolysis. Legionella species live in water, and exposure to inoculated water systems leads to transmission of the disease, and commonly causes pneumonia in infected individuals²
- Rhabdomyolysis (typically CK >5000 U/L) is caused by massive muscle necrosis manifesting with the **triad of limb weakness, muscle pain, and "tea" colored urine**¹
- Causes¹ commonly include **infection** (Strep, HIV, Hep, Flu, CMV, EBV, HSV), hyperthermia, endocrinopathies (DKA, hyperosmolar, hypothyroid), overuse (seizure, exercise), **trauma** (immobility, crush), ischemia, medication (statins), EtOH (abuse/withdrawal), cocaine/heroin abuse, genetic
- A common complication of rhabdomyolysis is acute kidney injury due to myoglobin obstruction of renal tubules and direct glomerular cytotoxicity. Treatment includes **aggressive hydration** (10L fluid over 1st 24 hours), **alkalinizing urine**, close monitoring for ↓Ca, ↑K, ↑P and expected decrease in CK by ~40-50% daily, consider antioxidants (e.g. vitamin C), may require hemodialysis¹

- Our case highlights the value of including a broad infectious work up when investigating the cause of rhabdomyolysis, as early diagnosis and initiation of treatment can prevent life threatening complications

References

- 1) Bosch, et al. Rhabdomyolysis and acute kidney injury. N Engl J Med. 2009 Jul 2;361(1):62-72.
- 2) Hicks, et al. Increased rainfall is associated with increased risk for legionellosis. *Epidemiology and Infection*. 2007;135(5):811-817.