



## INTRODUCTION

### OREGON DRINKING WATER

- 16-23% of Oregon's citizens rely on well water as the primary source of drinking water
- Contamination of groundwater with nitrates, bacteria, viruses, fungi and parasites is a large problem
- Typically due to "agricultural fertilizers, animal feedlot operations, leaking septic systems, and aboveground application of wastewater"
- Leads to an array of complications- generally gastrointestinal illnesses



### LEPTOSPIROSIS

- Obligate aerobic spirochete
- Most widespread worldwide zoonotic infection
- Caused by pathogenic *Leptospira* species
- Typically found in tropical regions
- Manifestation: spectrum from subclinical infection to multiorgan infection [biphasic form (acute and immune)]
- Acute: septicemic and lasts one week
- Immune: antibody production + excretion of *Lepto*
- Portal of entry: Cuts in skin, contamination of water supplies (often urine of animals) and animal bites (rare)
- Pathology: Vasculitis, endothelial damage, and inflammatory infiltrates
- Diagnosis: Typically by serology for antibodies
- Treatment: Spectrum from symptomatic management to Doxycycline 100 mg twice a day for 7 days

### PATHOGENESIS OF LEPTOSPIROSIS

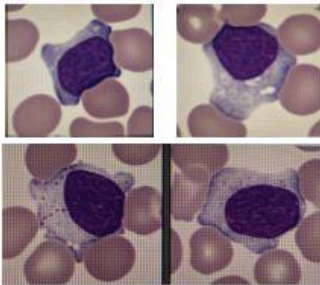
- Mechanisms of infection include: toxin production, attachment, immune mechanisms, and surface proteins
- Toxin production: elicits histopathologic effect with infiltration of macrophages and polymorphonuclear cells
- Attachment: To epithelial cells (renal particularly) and platelets (causes aggregation and thrombocytopenia)
- Immune mechanisms: complexes leading to inflammation in the central nervous system
- Surface proteins (LipL32) contribute to interstitial nephritis and renal damage

## CASE PRESENTATION

A 75-year-old male with past medical history significant for prostate cancer presented to the Emergency Department with one week of acute progressive weakness, leg and back pain, fatigue, diarrhea, dysuria, and confusion. On arrival, exam revealed no bruising, petechiae, or purpura and he was afebrile and normotensive. Initial labs were notable for a creatinine of 4.55, platelets of 14,000 and white blood count of 6.93 (trends listed below). A FENa was calculated to be 3%. Hemolysis labs (LDH, haptoglobin, fibrinogen, and D-dimer) were all within normal limits. A peripheral smear (shown below) did not show evidence of hemolysis but did show ballerina skirting. Immature platelet fraction was 1.3%. Labs and smear indicated underlying inflammatory process, intrarenal pathology, and inappropriate bone marrow response to decreased platelets. His kidney function improved with fluid resuscitation and platelets improved after one unit of platelet transfusion. *Leptospira* antibody test was sent and found to be positive. He was initiated on doxycycline and trended back to his baseline.

### NOTABLE LABS

- Creatinine (mg/dL) baseline 1.00 (4.55 → 3.97 → 3.11 → 2.54 → 2.15 → 1.69 → 1.41 → 0.91)
- Platelets (K/ cu mm) baseline 152 (14 → (platelet transfusion) 50 → 54 → 105 → 218 → 178 → 103)
- White Blood Cell Count (K/ cu mm) baseline 4.80 (5.00 → 4.37 → 5.61 → 9.60 → 5.28)
- Blood & Urine culture: no growth at 5 days
- Coombs direct: Negative
- Lactate Dehydrogenase (U/L): 209
- *Campylobacter*, *Salmonella*, *Shigella*, *Vibrio*, *Yersinia enterocolitica*, *E. coli shigatoxin 1 & 2*, *Norovirus*, and *Rotavirus*: Not detected
- Ova and Parasites: no parasites observed
- *Leptospira* Antibody: POSITIVE



Blood Smear: Reactive lymphocytes and "ballerina skirting". "scalloped margins and indentations by surrounding red blood cells" with no evidence of hemolysis

## CONCLUSIONS

### LEARNING OBJECTIVES

- The importance of a detailed history and broad differential to appropriately guide management (testing and treatment)
- Initial presentation may be nonspecific (fever, headache, chills, abdominal pain, rash, diarrhea, jaundice, chills)
- Time from exposure to symptoms is typically 2 days- 4 weeks
- Suspicion should be confirmed with either serological test
  - Either the Microscopic Agglutination Test to detect serovar-specific antibodies
  - Solid-phase assay for Immunoglobulin M antibodies)
- Treatment should include:
  - Antibiotic treatment should include doxycycline
  - Transfusion as needed
  - Supportive care

### IMPLICATIONS

- Be careful what you wish for, you may get *Leptospirosis* from that wishing well

## REFERENCES

- Daher, E. F., Silva, G. B., Silveira, C. O., Falcão, F. S., Alves, M. P., Mota, J. A., Libório, A. B. (2014). Factors associated with thrombocytopenia in severe leptospirosis (Weill's disease). *Clinics (Sao Paulo, Brazil)*, 69(2), 106-110. doi:10.6061/clinics/2014/02/06
- Hoppe, B. O., Harding, A. K., Staab, J., & Counter, M. (2011). Private well testing in Oregon from real estate transactions: an innovative approach toward a state-based surveillance system. *Public health reports (Washington, D. C. : 1974)*, 126(1), 107-115. doi:10.1177/003335491112600115
- Levett P. N. (2001). *Leptospirosis*. *Clinical microbiology reviews*, 14(2), 296-326. doi:10.1128/CMR.14.2.296-326.2001
- McClain JBL, BALLOU WR, HARRISON SM, et al. Doxycycline Therapy for Leptospirosis. *Ann Intern Med*. 1984;100:696-698. doi: 10.7326/0003-4819-100-5-696
- Sharma, J., & Suryavanshi, M. (2007). Thrombocytopenia in leptospirosis and role of platelet transfusion. *Asian journal of transfusion science*, 1(2), 52-55. doi:10.4103/0973-6247.33447
- Toyokawa T, Ohnishi M, Koizumi N. Diagnosis of acute leptospirosis. *Expert Rev Anti Infect Ther*. 2011;9(1):111-21.
- Watching Out for Oregon's Well Water. (2019, May 2). Retrieved from <https://oehonline.org/watching-out-for-oregons-well-water/>.