


The White Water Rafting Trip

Olga DeTorres, Pharm.D., FASHP, BCPS, BCIDP
O'Connor Hospital
San Jose, CA

The background of the slide is a solid blue color. In the lower right quadrant, there are several faint, concentric circular ripples that resemble water droplets or ripples on a pond, adding a thematic touch to the presentation.

White Water Rafting Trip

History of Present Illness:

- 52 year old Indian male presents to the ED on 7/10/21 with right thigh pain & redness that started about 5 days prior
- 7 days prior the patient had gone white water rafting in Colorado
- Reported exposing the thigh to river water
- Event organizers provided participants with wet suits that covered their bodies but stopped just above their knees

History

- At the end of the day when he took off his wet suit he noticed an insect bite on his right thigh. He thought it was bee sting.
- He started having pain, developing an area of redness that markedly worsened a few days later
- During the 24 hours prior to coming to the ED he started experiencing high fevers

History

- When he got back to California went to see his primary care provider who prescribed Augmentin
- He was then referred to a general surgeon who performed incision & drainage
- There was not much drainage, but due to a high fever he presented to Regional Medical Center ED.
- He was transferred to O'Connor Hospital due to insurance reasons...

History

- In the ED he was diagnosed with severe sepsis:

Temperature of 103 ° F

HR 128

BP 100/68

RR: 18

O2 sat: 98% on Room Air

WBC 12.2 K

Lactate 2

- Blood cultures were drawn

- Initial Treatment:

Ceftriaxone 1 gm & Vancomycin IV loading dose

Labs

Labs drawn in ED:

- NA 139
- K 3.6
- CL 108*
- CO2 19*
- BUN 8
- CREATININE 0.64
- ANIONGAP 12
- GLUCOSE 125
- C-reactive Protein 8.8

Physical Exam

- Constitutional: Alert awake, looks uncomfortable
- Physical exam is normal except for Right lower thigh, area with surrounding redness measuring ~ 2.5 cm



Past Medical History

- HTN, Hyperlipidemia, DM Type II
- No known allergies
- No history of tobacco or alcohol abuse
- Social History: Lives with his family
Works in a restaurant
- Review of Systems:
All other systems reviewed and were negative

Medications Prior to Admission

Aspirin 81 mg EC tablet

Atorvastatin (LIPITOR) 20 mg tablet

Glimepiride (AMARYL) 1 mg tablet

HYDROcodone-acetaminophen (NORCO) 5-325 mg

Ibuprofen (MOTRIN) 600 mg tablet

MetFORMIN (GLUCOPHAGE) 500 mg tablet

Baclofen (LIORESAL) 10 mg tablet

Nitroglycerin (NITROSTAT) 0.4 mg SL tablet

Hospital Course

- Patient was admitted to the Med/Surg floor
- Home medications were resumed except for:
 - Insulin was started in place of oral hypoglycemics
 - Enoxaparin was started for DVT prophylaxis
- Ceftriaxone was changed to Zosyn
- Vancomycin IV therapy was continued
- Infectious Disease was consulted the following day (Hurray for the Calvary!)

Hospital Course

ID Consultation

Physical Exam:

- About the same status with a new area of swelling
- Open wound, probed for culture; tender but no crepitation
- Cellulitis of the right thigh with an infected insect bite wound

Assessment:

- Concern for *Pseudomonas* or *Aeromonas* infection
- Exposure to river water & insect bite in Colorado
- Sepsis on presentation from cellulitis

Treatment:

- Switched antibiotics from Piperacillin/Tazobactam to Meropenem due to poor clinical response

Hospital Course

07/11/21

- BP 115/83 HR 72 Temp 36.3 °C (97.3 °F) Oral
- RR 18 O2 sat: 100 %
- WBC 4.79
- Blood cultures were negative

Surgical Consult:

- Procedure: Incision and drainage of abscess, debridement of his right thigh wound at the skin & subcutaneous level, around 2 cm diameter with packing

What was his diagnosis?



Microbiology Results

➤ *Yersinia pestis* (!)



Plague in Colorado



- Prairie dogs, squirrels, chipmunks & other rodents can carry the fleas that carry plague or become infected themselves
- Humans & pets can be infected with plague from flea bites if they are infected
- Animal coughs, bites & blood can also transmit the infection

Plague in Colorado

- Colorado reported 22 human cases of plague from 2015 to 2020
- The state recorded its first death since 2015 in July 2021 from the disease
- In July 2021 San Miguel, El Paso, Boulder, Huerfano, La Plata, & Adams Counties, all reported finding plague in animals & fleas

Plague

- *Yersinia pestis* is a Gram-negative, non-motile, coccobacillus bacterium
- It is a facultative anaerobic organism that can infect humans via the oriental rat flea (*Xenopsylla cheopis*)
- Human symptoms of the plague consist of sudden onset of high fever, chills, headache, nausea, extreme pain & swelling of lymph nodes, occurring 2 - 7 days after exposure

Treatment

- *Yersinia pestis* strains are susceptible to aminoglycosides, quinolones, tetracyclines, β -lactams, cephalosporins, & carbapenems
- For years, the only antibiotics approved by the FDA for treatment of plague were Streptomycin & Doxycycline
- Streptomycin is considered the gold standard treatment but is not widely available in the United States
 - Associated with significant adverse effects
 - Requires drug level monitoring
- Doxycycline is an acceptable & low-cost treatment alternative
 - Disadvantage: It is bacteriostatic & may have limited efficacy for serious infections

Fluoroquinolones

- Fluoroquinolones, including ciprofloxacin, were approved (2016) by the FDA for treatment of plague based on animal & *in vitro* studies
- Clinical experience with these agents has been limited
- Five patients with culture-confirmed plague were enrolled & treated with oral ciprofloxacin for 10 days at a weight-calibrated dosage of ≈ 15 mg/kg twice daily (range 13–17 mg/kg), with a maximum dose for adults of 750 mg twice daily¹
- All became afebrile within 2 days. At 14 days, all had been discharged & returned to their normal activities.

Fluoroquinolones

- Fluoroquinolones have pharmacokinetic properties that make them attractive for the treatment of plague:
 - Bactericidal activity
 - Good oral bioavailability
 - Excellent tissue penetration
 - No need for drug monitoring
 - An established safety record
 - Inexpensive - available as a generic product
- *In vitro* assays suggest that ciprofloxacin is comparable to streptomycin & superior to doxycycline for killing of intracellular *Y. pestis*²
- Efficacy has been demonstrated in rodent & nonhuman primate models³

Hospital Course

- Patient was discharged 3 days later on oral Ciprofloxacin for a 10-day course
- Wound care was performed weekly at the Wound Clinic for 6 weeks

Acknowledgements

- Michael Nguyen, M.D.
Department of Pathology
O'Connor Hospital
- For his assistance in providing the photographs of the wound

References

1. Apangu T, Griffith K¹, Abaru J, et al. Successful treatment of human plague with oral ciprofloxacin. *Emerg Infect Dis* 2017; 23(3): 553-5.
2. Wendte JM, Ponnusamy D, Reiber D, et al. *In vitro* efficacy of antibiotics commonly used to treat human plague against intracellular *Yersinia pestis*. *Antimicrob Agents Chemother*. 2011;55:3752–7.
3. National Institute of Allergy and Infectious Diseases. Treatment of pneumonic plague: medical utility of ciprofloxacin [cited 2016 Jun 13]. <http://www.fda.gov/downloads/AdvisoryCommittees/CommitteesMeetingMaterials/Drugs/AntiInfectiveDrugs/AdvisoryCommittee/UCM297865.pdf>