When Broad Spectrum Antibiotics Fail

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Disclosures

We have no disclosures or conflicts of interest to report
Patient Presentation
Patient Presentation

- 75 year old male

- PMH CAD S/p CABG, Hypertension, Hyperlipidemia and GERD

- Benign Social History: Former Smoker, Rare Alcohol use, No Drug Use, No travels, No ill contacts

- Presenting to an outside hospital with fever, chills and malaise for 5 days

- Non-productive cough and shortness of breath.

- Treated for a sinus infection 12 days ago with Amoxicillin-Clavulanate
  - 2 days left in prescription
Initial Exam

Vitals: T: 100.6  Pulse: 134  RR 24  BP 140/72  O2 Sat 80% on RA 94% on 3L NC  
GCS 15  
Pertinent Positives:
• Alert and Oriented though somewhat confused  
• Global Weakness  
• Tachycardia, regular, no murmurs  
• Diminished breath sounds bilaterally
Initial Labs

Summary

- Normal CBC
- Hyponatremia
- Acidosis (↓ CO2)
- AKI
- Elevated Lactate
- Elevated Procalcitonin
- Normal Troponin
- Blood Cultures pending

<table>
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<tr>
<th>Parameter</th>
<th>Value</th>
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<td>Calcium</td>
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<tr>
<td>ALT</td>
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<tr>
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<td>Albumin</td>
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<td>Total Bili</td>
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<td>Alk Phos</td>
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<td>Lactate Venous</td>
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<tr>
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<tr>
<td>Procalcitonin</td>
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<td>COVID-19</td>
<td>Negative</td>
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Imaging

Formal Read CXR
Bilateral perihilar and bibasilar opacity could be due to atelectasis, aspiration, pneumonia, or pulmonary edema.

EKG: Sinus Tachycardia with premature atrial complexes
Day 1

• Admit to Hospital
• Treated for community acquired pneumonia
  • Ceftriaxone + Azithromycin
  • 3L Bolus NS 0.9% (30cc/kg bolus)
  • Acetaminophen 1 Gm

Evening: Critical Labs: 1 of 2 blood cultures positive for Gram + Cocci.
Vitally: Febrile to 103.1 Sinus Tachycardia to 130s

• Started Vancomycin
• Another 1 Liter bolus given
Day 2-3

- Stable labs
- Increasing O2 Requirement: Nasal Cannula 4.5L

• Evening: Patient Still Sinus Tachycardia + Hypotensive + Confusion + Fever

• Another 1L Bolus
• Started Piperacillin- Tazobactam

• Later Evening: Bright Red Urine
Day 3

Morning: Not currently febrile... But Rigors, Tachycardia to 150s

**SUMMARY**
- Thrombocytopenia
- Hyponatremia, Hypokalemia
- Hypoglycemia
- Worse Acidosis
- ELEVATED LACTATE
- Elevated CRP
- Elevated ESR
- Elevated Procalcitonin

Lactate Venous 5.4 HH
CRP 24.8 H
ESR 12
Procalcitonin 3.15 H

Continued Piperacillin- Tazobactam and Vancomycin
Day 3 Continued

**Formal Read CTA Chest.**
Acute segmental and subsegmental PEs bilaterally with small bilateral pleural effusions. Bilateral Atelectasis.

- Increased work of breathing.
- Gray.
- Mottled.
- SPO2 88% on 6L Oxymask
- Intubated
Fast Forward

Continued Deterioration

Problem list at time of arrival to facility:
1. Septic Shock without a source
2. Acute Hypoxic Respiratory Failure
3. Metabolic Acidosis
4. Bilateral PE
5. Acute Renal Failure, Anuric
6. Severe Thrombocytopenia
7. Disseminated Intravascular Coagulopathy
8. Transaminitis
Current Therapies

- Antibiotics: Cefepime and Vancomycin
- Intubated
- Unresponsive, despite no sedation
- Norepinephrine drip
- Multiple blood product transfusions
- IVC filter placed
- Dialysis Initiated

It’s a bleak case, until...
The Finale

• Doxycycline was started and within 24 hours he awoke

• Dramatic and FAST improvement

Lab confirmed Acute Lyme Disease and Anaplasmosis Co-Infection
Lyme and Anaplasmosis Co-Infection
Co-Infection

- Lyme + Anaplasmosis (Human Granulocytic Anaplasmosis/ HGA) occurs in about 5% of cases

- Same Tick for transmission, *Ixodes scapularis*

- Top Six states with the highest incidence for HGA are Rhode Island, Minnesota, Connecticut, Wisconsin, New York, and Maryland

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*Anaplasma phagocytophilum* induces *Ixodes scapularis* ticks to express an antifreeze glycoprotein gene that enhances their survival in the cold

Comparison

Lyme

Extracellular spirochetal bacterium
Clinical Hallmark Erythema Migrans

Human Granulocytic Anaplasmosis

Obligate intracellular bacterium
Hallmark basophilic inclusion bodies
• Morulae
The Key:

Ld = Lyme Disease
HGA = Human Granulocytic Anaplasmosis
Ld/HGA = Lyme Disease + Human Granulocytic Anaplasmosis
Should: Cefepime + Piperacillin-Tazobactam + Azithromycin + Vancomycin have worked?
Take Home Points

• Tick borne disease in Wisconsin is exceedingly common and Co-Infections are possible

• Consider adding Doxycycline to failing septic shock cases early given difficulty in distinguishing a co-infection clinically


• Harold W. Horowitz, Maria E. Aguero-Rosenfeld, Diane Holmgren, Donna McKenna, Ira Schwartz, Mary E. Cox, Gary P. Wormser, Lyme Disease and Human Granulocytic Anaplasmosis Coinfection: Impact of Case Definition on Coinfection Rates and Illness Severity, Clinical Infectious Diseases, Volume 56, Issue 1, 1 January 2013, Pages 93–99, https://doi.org/10.1093/cid/cis852


• Images taken from Unsplash.com