One Tick Hit: Rocky Mountain Spotted Fever associated Myocarditis

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LEARNING OBJECTIVES

1. To educate clinicians on the diagnosis and treatment of Rocky Mountain Spotted Fever.
2. To encourage clinicians to be mindful of clinical complications that may manifest from an active infection.

CASE PRESENTATION

- 40 year old male with a past medical history of psoriasis presented to the ED during the summer with a rash, fever, facial swelling, body aches, and shortness of breath.
- He was diagnosed with tonsillitis and started on Amoxicillin 3 days prior to admission.
- Two days prior to admission, he developed a rash that started on his hands and spread to his arms, legs, and trunk. His PCP switched his antibiotic to Azithromycin and started him on prednisone.
- He denied sick contacts, recent travel, and insect bites. However, he did report exposure to a wooded area 1 week prior to admission.
- The patient's clinical presentation was concerning for myocarditis secondary to rocky mountain spotted fever, so he was started on empiric Doxycycline for possible tick-borne illness.

PHYSICAL EXAMINATION

- Vital Signs: Temp 101.3, HR 122, BP 116/72 O2: 97% on room air
- He was diaphoretic. Rash was erythematous, macular varying from 0.5-4.0 cm, non-tender, and non-pruritic located on the hands, upper and lower extremities, and trunk.
- On auscultation had distant heart sounds.

LABORATORY DATA

WBC	**23.7**	4.5-11.0 10*3/uL
Neutrophil %	**81.1**	**50.0-70.0%**
Sodium	**133**	136-145 mmol/L
Creatinine	**1.26**	0.4-1.20 mg/dL
Troponin	**2.66**	<0.04 ng/mL
BNP	**823**	<=100 pg/mL

- Rapid strep, rapid mono, RSV, Influenza A and B - negative
- C. difficile PCR, stool cultures, and blood cultures were negative.
- IgM tick related serologies for Rocky Mountain Spotted Fever, Lyme, Babesia, and Ehrlichia were negative.
- Respiratory panel, EBV, HIV, CMV, Coxsackie A, and RPR were negative.

DIAGNOSTIC TESTS

- EKG revealed sinus tachycardia @ 123 bpm with no ST, T wave changes.
- Chest XRAY showed no acute airspace disease.
- CTA Chest was negative for pulmonary embolism, but revealed mild fluid overload.
- Echocardiogram revealed a mildly reduced ejection fraction of 46-50%.
- A pharmacological stress test was negative for ischemia.

PATHOPHYSIOLOGY

- The *Rickettsia rickettsia* is a gram-negative, obligate intracellular bacterium that is responsible for majority of cases of RMSF.
- In the eastern United States, transmission to humans occurs via a bite from the *Dermacentor variabilis* tick (American Dog tick). Most cases occur in the spring and early summer months, in patients who have frequents exposure to dogs, reside near wooded areas, and/or areas with high grass.

- Patients typically present with fever, headache and malaise. They develop a rash between the 3rd and 5th day of illness. The rash usually begins palms and soles and spreads to the trunk.
- The bacterium has a tropism for vascular endothelial cells which leads to increased vascular permeability. In response to this damage, the host responds resulting in a variety of clinical manifestations including encephalitis and myocarditis.
- Patients may also present with thrombocytopenia, acute kidney injury, and elevated liver enzymes.

SUMMARY/CONCLUSIONS

- Throughout his hospital stay, the patient's symptoms improved with treatment with Doxycyline. The patient was evaluated by Infectious Diseases as well as Cardiology. His troponin levels, WBC count and BNP trended down. He was also afebrile at the time of discharge.
- The diagnosis of RMSF is mostly clinical given that an antibody response is not detectable via serologic testing during the first 5 days of symptoms. It is imperative to make this diagnosis and empirically treat with Doxycycline, given that the disease severity can range from mild to lethal. A definitive diagnosis requires good follow up from the patient, with skin biopsy or antibody titer at 14 to 21 days after symptom onset.