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Septic Shock Caused by Rocky Mountain Spotted Fever in a Suburban Texas Patient with Pet Dog Exposure: A Case Report

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
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Conflict of interest: None declared

Patient: Female, 45
Final Diagnosis: Rocky mountain spotted fever
Symptoms: Altered mental state • ataxia • dyspnea • fever • headache
Medication: —
Clinical Procedure: —
Specialty: General and Internal Medicine

Objective: Unusual clinical course
Background: Rocky Mountain spotted fever (RMSF) is associated with high mortality and requires prompt identification and treatment to ensure better outcomes.
Case Report: We describe an advanced case of RMSF in a 45-year-old female patient with pet dog exposure who presented with altered mental status, dyspnea, and ataxia progressing to septic shock and acute hypoxic respiratory failure requiring intubation and mechanical ventilation.
Conclusions: This case illustrates the importance of keeping RMSF in the differential diagnosis in patient populations outside of the usual geographic areas of incidence in the appropriate clinical setting.

MeSH Keywords: Dermacentor • Rhipicephalus sanguineus • Rocky Mountain Spotted Fever • Tick-Borne Diseases

Full-text PDF: <https://www.amjcaserep.com/abstract/index/idArt/909636>

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Background

Rocky Mountain spotted fever is caused by *Rickettsia rickettsii*, a gram-negative intracellular bacterium that infects vascular endothelial cells. It is transmitted via tick bite. In general, the primary vector in Eastern United States is the American dog tick, *Dermacentor variabilis*, while the primary vector west of the Mississippi is the Rocky Mountain wood tick, *Dermacentor andersoni*. In the Southwest, the common brown dog tick *Rhipicephalus sanguineus* also transmits the disease. However, the prevalence of RMSF is low in Texas (2.3–6.6 cases per million in 2014) [1]. The classic presentation is a febrile illness with a headache, rash predominately on the palms and soles, and a history of tick bite 2–14 days prior to symptom onset [2–7]. We report a delayed RMSF diagnosis in a 45-year-old female patient who presented with altered mental status, septic shock, acute hypoxemic respiratory failure, transaminitis, acute systolic congestive heart failure, and acute kidney injury.

Case Report

A 45-year-old female presented to a Houston, Texas area Emergency Department (ED) one July day with a 7-day history of fevers associated with headache, arthralgias, nausea, fatigue, and neck pain. On initial physical examination, she was tachycardic but afebrile. No rash was noted. Laboratory values were within normal limits and a head computed tomography (CT) was unremarkable. Clinical diagnosis of viral illness was made, and she was discharged from the ED.

Two days later, she presented to another ED with worsening confusion, combativeness, dyspnea, and ataxia. The patient's spouse mentioned that the patient had sustained multiple recent bug bites from her pet dogs sleeping in her bed. He acknowledged that the dogs were not up to date on their monthly flea and tick medication. The patient had no recent history of travel, hiking, or outdoor exposure.

On examination, the patient was tachycardic (heart rate 135 bpm) and hypotensive (blood pressure 84/53 mm Hg). She was toxic in appearance and a maculopapular rash was noted on her abdomen. No bites or ticks were noted on the patient. Her blood pressure remained low despite fluid resuscitation. Magnetic resonance imaging (MRI) of her brain was unremarkable and a lumbar puncture (LP) showed 16 WBC/HPF (reference: 0–5/CMM), 49 mg/dL protein (reference: 15–45 mg/dL), 51 mg/dL glucose (reference: 40–70 mg/dL), 32.91 mg/dL albumin (reference: 10–30 mg/dL) and 4 RBC/HPF (reference: 0–1/CMM). The patient was empirically started on vancomycin, meropenem, acyclovir, and doxycycline for suspected meningitis. Overnight, she developed a fever to 38.5°C (101.3°F). She was admitted to the intensive care unit (ICU) for further

evaluation and management. Laboratory evaluation showed leukocytosis (WBC 15.21 k/uL, reference: 3.8–10.8 k/uL), lactate 2.1 mmol/L (reference: 0.5–2.2 mmol/L), decreased kidney function (creatinine 1.3 mg/dL, reference: 0.5–1.10 mg/dL) thrombocytopenia (PLT 116 k/uL, reference: 3.8–10.8 k/uL), anemia [(Hb 9.3 g/dL, (reference: 11.7–15.5 g/dL), HCT 26.8% (reference: 35.0–45.0%)], abnormal liver function [AST=89 U/L (reference: 10–35 U/L), ALT=99 U/L (reference: 6–29 U/L), AP 212 U/L (reference: 33–115 U/L), t-bili 0.8 mg/dL (reference: 0.2–1.2 mg/dL)]. The following other values were noted: pro time (PT) 16.5 sec (reference: 12–15 sec), prothrombin time (PTT) 37.4 sec (reference: 23–36 sec), International Normalized Ratio (INR) 1.3, d-dimer 11.28 ug/mL (reference: 0.0–0.4 ug/mL), fibrinogen 268 mg/dL (reference: 200–450 mg/dL), albumin 2.3 g/dL (reference: 3.5–5.0 g/dL). Fibrinogen also dropped to 177 mg/dL overnight, consistent with her clinical picture of evolving septic shock.

Despite intervention, her condition worsened, and she required intubation for acute hypoxic respiratory failure. A chest CT showed small bilateral pleural effusions with adjacent mild pulmonary alveolar and interstitial edema with atelectasis. Given her dyspnea, an echocardiogram was performed which showed ejection fraction 49%, mildly reduced left ventricular systolic function with mild global hypokinesis.

A full infectious workup was performed. Positive findings were *R. typhi* IgM 1: 1024 (normal <1: 64), *R. Rickettsii* IgM 1: 1024 (normal <1: 64), IgG 1: 128 (normal <1: 64), and echovirus Ab 1: 80 titer (normal <1: 80). The Rickettsial titers were repeated for possible cross-reactivity and *R. typhi* antibodies were noted to be negative (<1: 64). Antibiotics were de-escalated to doxycycline alone for the remainder of her hospitalization with clinical improvement. Her fever resolved, and she was extubated on hospital day 2. She was transferred from the ICU to the floor, and was discharged home on hospital day 7 with 2 more weeks of doxycycline.

Follow-up with the Infectious Disease clinic showed resolution of symptoms, and per the consultant, there was no need to repeat titers to document clearance.

Discussion

Rocky Mountain spotted fever (RMSF) is an infectious disease caused by the bacterial agent *Rickettsia rickettsii*. *Rickettsia rickettsii* is transmitted to humans through the bite of an infected tick. Human infections in the United States are reported throughout most states, but are more frequently reported and endemic in North Carolina, Oklahoma, Arkansas, Tennessee, and Missouri.

The incubation period for RMSF is 3–12 days. Clinical symptoms can be highly variable ranging from non-specific symptoms to the classic triad of fever, rash, and headaches. Generalized myalgias, chills, and gastrointestinal symptoms like nausea/vomiting, diarrhea, and anorexia have been reported [1–6]. Because of non-specific symptoms, RMSF can be misdiagnosed as an acute viral syndrome, meningitis, or gastroenteritis. As the disease progresses, a generalized maculopapular rash may be observed that tends to concentrate on the hands and feet, and can progress to petechiae in the more severe form of disease [7].

Further progression of the disease can manifest as encephalitis, non-cardiogenic pulmonary edema, acute respiratory distress syndrome, coagulopathy, and septic shock like our patient scenario. Ataxia and seizures can also develop [2,3,8,9].

Treatment of RMSF should be initiated as early as possible as studies have shown that delay in treatment can be associated with adverse outcomes and even mortality [7,10–12]. Kirkland et al. [10] in their retrospective study of 94 patients with RMSF showed that patients in whom treatment was initiated within 5 days of symptom onset were significantly less likely to die compared with those in whom treatment was initiated after 5 days of symptom onset (6.5% versus 22.9%). In cases where there is high clinical suspicion, such as in patients from endemic areas presenting with fever, headache, or myalgia during the spring or summer, empiric treatment should be initiated pending the results of RMSF testing [2,3,7,9].

In our case, the patient lived in a suburban area of Houston, Texas, and hence was not from the usual endemic setting. However, her spouse reported that their pet dogs were not current on their monthly flea and tick medication. While her spouse denied the dogs had any signs of sickness, the patient had no other clear risk factors for acquiring the disease, having no recent travel, hiking, or outdoor exposure. It is possible the dogs merely carried the infected ticks into the house, and they may not have actually been infected themselves. Furthermore, given the patient's reported history of insect bites from her pet dogs, the finding of a maculopapular rash on her abdomen, and the rapid clinical deterioration during the interim time between her ED visit and admission to our institution, high clinical suspicion for RMSF led to immediate administration of doxycycline on admission. The patient responded very well to the treatment for RMSF, along with adequate supportive care. Doxycycline is the drug of choice for both adults and children for the treatment of RMSF [1,7,10].

Conclusions

This case illustrates the importance of keeping RMSF in the differential diagnosis in patient populations outside of the usual geographic areas of incidence in the appropriate clinical setting.

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