Rocky Mountain High Titer: An Unusual Delay In Surgical Clearance

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Introduction

Rocky Mountain spotted fever (RMSF) is a bacterial infection caused by the bite of an infected tick, primarily through the American Dog Tick for the Northeastern US region, through the pathogen Rickettsia rickettsii. Rickettsia rickettsii are a genus of obligate intracellular bacilli which are broadly divided into four groups: the ancestral group, the Spotted Fever group, the typhus group, and the transitional group. Of these, the Spotted Fever group contains the largest number of separate species, and only the ancestral group does not contain pathogenic species. Current serological testing does not efficiently distinguish between the different species in the Spotted Fever group. Rickettsial testing available in New Jersey at the clinical level includes primarily PCR-based methods for fluid, eschar, and punch biopsy.1,2,3

Of the 1200 RMSF cases annually,4 fewer than 30 confirmed or probable cases are reported from New Jersey annually.2 However, anthropogenic influences, such as land use and agricultural practices, along with climate change factors like temperature, precipitation, and seasonal shifts, are expected to advance the start, prolong the duration, and expand the geographical range of tick activity; the number and range of host species has also increased. In New Jersey, from 2017 to 2019, the incidence of Spotted Fever Group Rickettsiosis diseases increased annually, with case rates only declining in 2020 and beyond, attributed to the COVID-19 pandemic restricting human travel and surveillance.5 Peak infections occur from May to August but inoculation can occur at any time ticks are active.3

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<td>Spotted Fever Group</td>
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<td>138</td>
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<td>Rickettsiosis</td>
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Table 1. Human Cases of Tickborne Diseases In New Jersey6

Case Presentation

A 47-year-old female presented in December seeking medical clearance for neurosurgery. Her major concerns included a petechial rash on the thighs, abdomen, and back radiating down to the feet and hands; arthralgia in the knees and ankles; ecchymoses on the forearms, gluteal region, and toes; and intermittent fever not present today; symptoms started roughly 4 months previously. She denied nausea, vomiting, foreign travel, history of rheumatic disease, or immunocompromising conditions. Her medications include omeprazole, cyclobenzaprine, butalbital, ethinyl estradiol, and acetaminophen. Her abdominal pain, joint tenderness, warmth, swelling, stiffness, and muscle ache, as well as a petechial rash, abdominal bruising, and fatigue. At the time, there was a question of differentiating between thrombocytopenic causes, leukopenic causes, or bone marrow suppression. She was started on oral doxycycline and PCR testing was ordered which demonstrated RMSF 1.80 (normal: 0.9).

At her next visit one month later, her adherence was unclear so was started on IV ceftriaxone in addition to doxycycline. One week later, she reported her rash had improved and the subsequent week her IgG was negative and IgM was 1.38. However, the following week, she reported worsening rashes over a 48-72 hour cycle and continuing headache, so was switched to tetracycline. Her RMSF IgG continued to be negative and IgM was 1.27. The subsequent week, although her rash was improving, she continued to increase IgM to 2.28 but IgG continued to be negative. Babesia microti IgG was also positive. Other arboviral, tick-borne, and autoimmune testing was negative. Finally, a week later, continued tetracycline improved her rash and her RMSF IgM titer decreased to 0.69. At this point she was cleared for surgery which was successful.

0.69

Discussion

Clinically, RMSF is difficult to diagnose in the early stages due to its non-specific signs and symptoms, including fever, headache, rash and sore throat. Therefore, patients are initially treated for RMSF based on clinical signs and symptoms, patient history and travel history, with laboratory results later used to confirm the diagnosis, normally via PCR or IFA.4

Despite the initial low index of suspicion of Rocky Mountain Spotted Fever and other tick-borne diseases in December in a woman who was not an outdoors enthusiast, her primary infection was missed for four months and led to substantial delays in care of roughly 6 months. Fortunately, in this case, she did not experience severe sequelae related to the infection and her spinal surgery was successful.

Citations


Figure 1. Average number of reported cases of spotted fever rickettsiosis by month of onset in the US, 2017-2021

Figure 2. RMSF Serology Testing Results

Figure 3. Patient Presentation

Figure 4. Rickettsial Disease Diagnostic Testing