Concurrent babesiosis and serological evidence of Lyme disease in a young patient

Mark Adler*, Thein Swe* and Akari Thein Naing*

*Department of Internal Medicine, Interfaith Medical Center, NY, USA; †Department of Internal Medicine, Interfaith Medical Center, NY, USA

ABSTRACT

Human babesiosis co-infected with Lyme disease in a young patient is an important condition. Here, we describe a case of a 39-year-old male patient with concurrent babesiosis and Lyme disease. Co-infections of tick borne diseases are often difficult to diagnose and under-reported, and resulting in significant morbidity and mortality to patients. While co-infections have been infrequently described, it is of paramount importance that clinicians should be able to diagnose early and treat them effectively according to the patient geographical area and history of tick bite.

1. Introduction

Tick-borne diseases can be caused by several types of pathogens such as bacteria, viruses and protozoa. These infections tend to occur after the bite of an infected tick in an endemic area.

Babesiosis (caused by Babesia microti) and Lyme disease (caused by Borrelia burgdorferi) are common in Northeastern and Great Lakes regions of the USA although simultaneous infections in a young patient have been reported infrequently. Co-infections are possible because B. microti and B. burgdorferi possess the same rodent reservoir and are transmitted by the same vector, which is the deer tick (Ixodes scapularis).[1]

A study showed that about 66% of subjects had antibody against B. microti as well as B. burgdorferi.[2] Another study suggests that among volunteers at high risk for infection on Long Island, New York, 13% had antibodies against more than one tick-borne organism, however, only five patients had evidence of dual infection.[3] In the particular area of southern New England, between 9.5% and 14% of serum samples obtained from subjects reacted against both B. burgdorferi antigen and B. microti antigen.[4,5]

2. Case presentation

A 39-year-old male without any significant past medical history came to the emergency department (ED) and reported generalized headaches for eight days and fever for four days. Headache was constant and 8/10 in severity. The patient did not have nausea, vomiting, neck stiffness or photophobia. The patient denied aura, dizziness, blurred vision, syncope, prior similar episodes of headache, prior trauma, history of sexually transmitted disease, chest pain, palpitation, joint pain, skin rash, neurological deficit, urinary or bowel problems. He was in a monogamous relationship with his wife and used condoms regularly. He had not traveled out of the USA recently and he lived in New York but recalled a history of tick bites twice on Long Island, Hampton area, three weeks before. He was not taking any medications at home except acetaminophen as needed for headache. He did not have any blood transfusions.

Initial vital signs included temperature 102.7°F (39.2°C), pulse rate 109 beats per minute, respiratory rate 20 breaths per minute, blood pressure 110/68 mm Hg, and oxygen saturation 98% on room air.

Central nervous system examination showed the patient to be awake, alert and oriented to time, place and person with normal motor power (5/5), normal sensation, vibration and position sense. Cranial nerves were intact. Co-ordination functions, reflexes and gait were within normal limits. There was no neck stiffness, Kernig’s sign or Brudzinski’s sign. The remaining physical examinations such as head and neck, cardiovascular, lungs and genitourinary examinations were within normal limits except mild pallor. Abdominal examination was normal except for splenomegaly.

The initial laboratory reports showed white cell count (WBC) 4400 μl–1 (normal = 4500–11,000) with 75.9% neutrophils, 13.3% lymphocytes, absolute neutrophil count 3,300 μl–1, absolute lymphocyte...
count 600 µl⁻¹, eosinophil and basophil count 0 µl⁻¹, hemoglobin 9.8 g dl⁻¹, hematocrit 29.7%, platelet count 67,000 µl⁻¹ without any clumped platelets, erythrocyte sedimentation rate of 78 mm h⁻¹, and C-reactive protein level of 159 mg l⁻¹, absolute reticuloocyte count 42,500 µl⁻¹, haptoglobin <10 mg dl⁻¹ and lactate dehydrogenase (LDH) 327 IU l⁻¹. The patient’s electrolytes were within normal range. Liver function tests revealed bilirubin 1.8 mg dl⁻¹, aspartate transaminase 63 IU l⁻¹, alanine transaminase 54 IU l⁻¹ and alkaline phosphatase of 85 IU l⁻¹. Urinalysis showed small blood with two red blood cells per high power field. Meningitis was ruled out with normal lumbar puncture results. Tests for human immunodeficiency virus, syphilis, Epstein-Barr virus, herpes virus, chlamydia, gonorrhea and human granulocytic Ehrlich (HGE) immunoglobulin (Ig)M and IgG were negative. Upon examination of peripheral blood smear, Babesia species was found in red blood cells. Serological tests for Babesia microti IgM and IgG antibody were strongly positive with titers of 1:320. Concurrent Lyme infection was also diagnosed with presence of Lyme IgM kilo-Daltons (kDa) bands of 23 and 41, and IgG kDa bands of 18, 23, 30, 39, 41, 45, 66, 93 along with positive western blot confirmation test. Lyme disease IgG /IgM antibodies were 3.72 immune system ratio (ISR).

3. Treatment, outcome and follow-up

Doxycycline 100 mg per os twice daily for 14 days was given to the patient for Lyme disease. Azithromycin 500 mg per os for the first day and then 250 mg per oral daily from second day for a total of 10 days, and atovaquone 750 mg per oral twice daily for total of 10 days were prescribed for babesiosis. One week later, the patient’s symptoms resolved. Patient was discharged and recommended to follow up in the infectious disease clinic but patient was lost to follow-up.

4. Discussion

Babesia is a protozoan parasite that stays in red blood cells (RBC) and causes lysis of host RBCs. The two main organisms that cause human babesiosis are B. microti in the Northeastern and Midwestern regions of the USA and B. divergens in Europe. Symptoms can start one to six weeks after the bite of an infected tick (Ixodes scapularis) and the severity of the disease depends on the patient’s immune status. These symptoms may range from asymptomatic to fever (91%), fatigue (91%), chills (77%) and diaphoresis (69%), headache, and in severe cases, death can occur. Pancytopenia is common. Factors that are related with severe outcome include male sex, serum alkaline phosphatase level greater than 125 U l⁻¹, and WBC greater than 5 x 10³ l⁻¹.[8]

Lyme disease, which is caused by Borrelia burgdor-feri, is transmitted by the bite of deer tick Ixodes scapularis. Lyme disease can cause flu-like illness, erythema migrans rash, arthritis and, infrequently, carditis or neuropathy. The disease manifestation can be more severe and prolonged if there is concurrent Lyme disease and babesiosis due to immunosuppressive action of babesiosis and synergistic inflammatory response to both a parasitemia and spirochetemia.[4] Clinicians treating patients with Lyme disease should consider co-transmissible enzootic diseases such as babesiosis and human granulocytic ehrlichiosis especially in areas where tick borne diseases are common.[4] Furthermore, usual antibiotic treatments for Lyme disease such as doxycycline, amoxicillin, or zithromax are not sufficient to treat babesiosis. Thus, anti-parasitic therapy with atovaquone is recommended.[9]

Concurrent infection of Lyme disease and babesiosis in a young patient is usually an underreported condition. Sweeney et al. [10] reported a case of coinfection in a 68-year-old woman who is a western Wisconsin resident who presented with four weeks of fever and chills. The literature showed another case from Ontario describing a 59-year-old man with concurrent Lyme disease and babesiosis.[1] Both diseases tend to occur more in overlapping geographic areas such as northeastern USA, upper Midwest, New Jersey, New York, Minnesota, and Wisconsin. In an animal model study, the application of permethrin-treated cotton could be a preventive measure of transmission of the pathogens that can cause human babesiosis and Lyme disease by testing in mice.[11]

In conclusion, two tick borne diseases in one patient need to be diagnosed and reported. Understanding the outcome of tick borne diseases and their endemic areas will be a valuable knowledge for clinicians. A high degree of suspicion is needed not only for a single infection but also for dual pathology for a better and life-saving management.

Disclosure statement

No potential conflict of interest was reported by the authors.

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