

The Expansion of Lyme Disease: A Case of Infection in the Absence of Known Exposure

Abstract

Lyme disease is a systemic infection caused by the spirochete *Borrelia burgdorferi* often carried by the *Ixodes* tick. It is associated with dermatologic manifestations, most notably the “bullseye rash” of erythema migrans. The disease can progress in stages to involve other organs such as joints, the heart, and the nervous system. Lyme disease continues to spread, with West Virginia (WV) cases increasing dramatically in the last 2 decades. As a result, physicians are likely to encounter this disease more often, making recognition and early treatment a top priority to prevent potentially dangerous sequelae. We present a case of a 60-year-old man who presented with multiple erythematous annular plaques and was subsequently diagnosed with Lyme disease. This case is unique because he had no known exposure to ticks, was treated for Lyme Disease, and subsequently developed a Jarisch- Herxheimer reaction (JHR).

Case Presentation

A 60-year-old Caucasian male presented to the walk-in clinic with fatigue, severe joint pain, and a faint rash on his trunk that had been present for 3 days (Figure 1). Although he denied tick exposure, he reported that he had been recently riding a Utility Task Vehicle (UTV) in southern West Virginia, after which his symptoms began. On physical examination, annular erythematous patches were noted along the trunk. Dermatology was consulted, and early disseminated Lyme disease was suspected. He was prescribed doxycycline 100mg twice daily (BID) and instructed to follow up with dermatology in 1 week.



Figure 1. Multiple erythematous patches on our patient consistent with Erythema Migrans

On follow-up in the dermatology clinic, the patient reported that he experienced fever and night sweats shortly after beginning doxycycline therapy. He noted that the eruption on his trunk had resolved. The presumed reaction after starting the doxycycline was JHR. For confirmation, Lyme titers were then obtained and were positive. He was continued on doxycycline 100mg BID for an additional 21 days.

Discussion

Borrelia burgdorferi is a spirochete capable of infecting humans, resulting in Lyme disease. It is commonly carried by the *Ixodes* tick distributed throughout the Northeast, Mid-Atlantic, and Great Lake regions.³ The incidence of Lyme disease is rising, specifically in West Virginia (Figure 2). In 2000, there were just over 20 cases of Lyme Disease reported in the state. By 2010, that number had increased to over 100 per year. The most recently published data from 2020 shows 1065 Lyme cases from 52 counties.² Due to this, it is important to maintain a high index of suspicion for Lyme disease if a patient presents with an annular erythematous rash and other symptoms such as joint pain, headaches, and fatigue, regardless of known exposure to a tick.

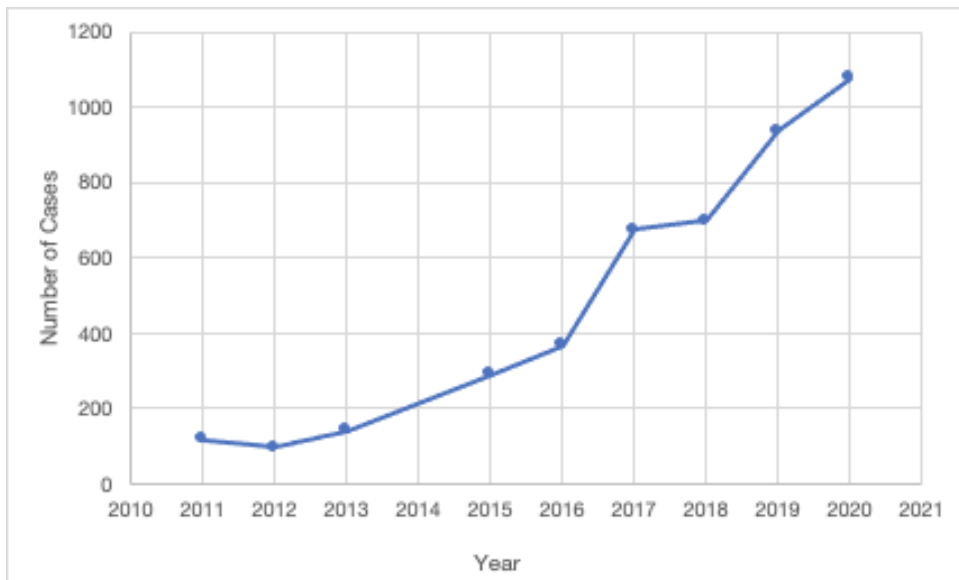


Figure 2. Incidence of Lyme Disease from 2011-2020, excluding 2014.^{2,9,10,11}

It is important to recognize and treat Lyme disease early, as it can progress to more serious systemic involvement. The most common presenting symptom is erythema migrans, the “bullseye rash,” in around 70% of cases.⁴ Degree of involvement is broken down into stages, including neurologic, cardiac, and joint disease (Figure 3). Early recognition and treatment decrease the chance of progression to later stages. Incidence of Lyme disease can also be decreased by thorough full-body tick checks if in an area of potential exposure, as research suggests that transmission of *Borrelia burgdorferi* increases as the time of tick attachment lengthens.⁶

Prophylactic treatment of Lyme disease with a known tick exposure >36hrs is generally appropriate, with a single dose of 200mg doxycycline in adults and 4.4mg/kg in children.⁷ Erythema migrans by itself is suggestive of *Borrelia burgdorferi* infection and warrants treatment with escalating antibiotics based on staging. For the early stages of the disease, the first-line treatment is doxycycline 100mg BID for 10 days. Doxycycline 100mg BID for 14-21 days is used for mild neurologic and carditis. Lyme arthritis treatment involves 100mg doxycycline BID for 28 days.⁸ It is also important to recognize the potential side effects of treatment, such as the potentially alarming JHR in our patient. JHR is an uncommon reaction classically associated with the treatment of syphilis but can occur after the treatment of any spirochete. It results from the destruction of the spirochete's cell membrane, releasing toxins into the bloodstream and causing a subsequent immune response. JHR usually begins within 10 days of Lyme disease treatment and occurs in 7-30% of cases. The reaction can have a broad presentation. JHR is usually a benign reaction that self-resolves in a few hours. Mild reactions often are limited to fever, chills, and a morbilliform rash. More severe reactions are possible and rarely include hypotension, pulmonary failure, and seizures.⁵ The treatment is conservative and limited to treating symptoms, as complications are rare.

	Associations	Timing
Stage 1- Localized	Erythema Migrans Headache Fever Myalgia Neck Stiffness	1-28 days
Stage 2- Disseminated	Headache Myalgia Fatigue Dizziness Chest pain Palpitations Dyspnea Joint Pain Cranial Nerve Neuropathy Encephalopathy Meningitis	3-12 weeks

Stage 3- Persistent	Arthritis Aseptic Meningitis Bell's Palsy Ataxia Seizures Hemiparesis Arrhythmia Heart Block	Months to years
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Figure 3. Staging of Lyme disease with associated symptoms

Conclusion

As Lyme disease cases in WV continue to rise, it is vitally important that it is recognized and treated early to prevent significant patient morbidity. Patients should be educated on tick bite prevention and what to do if they may have been exposed. Health care providers should counsel patients to use a quality insect repellent and to perform full-body tick checks where ticks may be encountered. They should also counsel patients on when they should seek medical attention. The CDC suggests using an insect repellent with at least 20% DEET is best, but other methods, such as clothing treated with permethrin, are also effective.³ Ticks are typically encountered in areas with long grass, brush, or timber from April to September. The most common presenting symptom is the bullseye rash of erythema migrans, but others may accompany it. However, as in our case, patients may present with Lyme disease symptoms without known tick exposure. Therefore, anytime a patient presents with an annular patch eruption, the *Borrelia burgdorferi* infection should be high on the list of differential diagnoses.

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