

Lyme disease, a case report

Enfermedad de Lyme, reporte de un caso

Maikro Osvaldo Chávez Moya¹ | ORCID: 0009-0000-6028-9377

Eirina Pernas Cano¹ | ORCID: 0009-0009-3749-4802

Gabriela González Pernas¹ | ORCID: 0009-0006-5379-0052

Dashiell González Abreu¹ | ORCID: 0009-0004-3157-6181

Leodanis Hernández Cabrera¹ | ORCID: 0009-0007-9109-9585

Neisy Pérez Ramos¹ | ORCID: 0000-0003-4559-7325

¹ Universidad de Ciencias Médicas de Villa Clara, Facultad de Medicina. Santa Clara, Cuba.

Submitted: 06-07-2025 | Revised: 07-09-2025 | Accepted: 18-10-2025 | Published: 20-10-2025

ABSTRACT

Introduction: Lyme disease is the most common vector-borne infection in the Northern Hemisphere, caused by spirochetes of the *Borrelia burgdorferi* complex and transmitted by Ixodes ticks. Its clinical presentation evolves from an early localized phase to stages of multisystemic dissemination. **Case Report:** a case is presented of a 38-year-old park ranger with early disseminated Lyme disease following occupational exposure to multiple tick bites. The patient developed erythema migrans on the thigh, unilateral peripheral facial palsy, first-degree atrioventricular block, and knee monoarthritis. The diagnosis was conclusively confirmed using two-tiered serology (ELISA and Western blot). Treatment with oral doxycycline for 21 days was initiated, resulting in a self-limiting Jarisch-Herxheimer reaction, and achieving the subsequent complete clinical resolution of all systemic manifestations. **Conclusions:** early recognition of systemic clinical manifestations and epidemiological history are vital for the accurate diagnosis of Lyme disease. Prompt antibiotic treatment ensures full recovery and a favorable clinical outcome.

Keywords: *Borrelia burgdorferi*; Doxycycline; Erythema Chronicum Migrans; Lyme Disease; Ticks.

RESUMEN

Introducción: la enfermedad de Lyme es la infección transmitida por vectores más común en el hemisferio norte, causada por espiroquetas del complejo *Borrelia burgdorferi* y transmitida por garrapatas del género *Ixodes*. Su presentación clínica evoluciona desde una fase localizada temprana hasta etapas de diseminación multisistémica. **Reporte de caso:** se presenta el caso de un guardabosques de 38 años con enfermedad de Lyme diseminada temprana tras la exposición ocupacional a múltiples picaduras de garrapata. El paciente desarrolló eritema migratorio en el muslo, parálisis facial periférica unilateral, bloqueo auriculoventricular de primer grado y monoartritis de rodilla. El diagnóstico se confirmó fehacientemente mediante serología de dos pasos (ELISA y Western blot). Se instauró tratamiento con doxiciclina oral por 21 días, presentándose una reacción de Jarisch-Herxheimer autolimitada, y logrando la posterior resolución clínica completa de todas las manifestaciones sistémicas. **Conclusiones:** el reconocimiento temprano de las manifestaciones clínicas sistémicas y el antecedente epidemiológico son vitales para el diagnóstico certero de la enfermedad de Lyme. El tratamiento antibiótico oportuno garantiza una recuperación íntegra y un desenlace clínico favorable.

Palabras clave: *Borrelia burgdorferi*; Doxiciclina; Enfermedad de Lyme; Eritema Migratorio; Garrapatas.

Introduction

Lyme disease was named after the town of Lyme, Connecticut, where it was first characterized in the mid-1970s during an investigation of an arthritis epidemic in that region. Although manifestations of this disease, including erythema migrans, have been previously described in Europe and the United States, this outbreak provided the first convincing epidemiological evidence of tick-borne transmission. (In the early 1980s, researchers isolated the causative agent—the spirochete *Borrelia burgdorferi*—from both ticks of the genus *Ixodes* and patients with Lyme disease.(2)

There are significant geographical differences in the causative species. In North America, the only known species that causes human disease is *B. burgdorferi sensu stricto*, whereas in Europe, at least five species can cause the disease (*B. afzelii*, *B. garinii*, *B. burgdorferi*, *B. spielmanii*, and *B. bavariensis*), resulting in a greater variety of clinical manifestations in Europe than in North America.(3,4) In Europe, *B. afzelii* and *B. garinii* are responsible for most cases, whereas in Asia, *B. garinii* predominates.(5)

The distribution of cases is bimodal with respect to age, with the highest percentage of cases concentrated among children aged 5–14 and adults aged 50–64.(6,7) The incidence of this disease continues to increase in several global regions, partly because of climate change, the recovery of white-tailed deer populations, and changes in human behaviors that increase human–tick interactions.(8,9)

Lyme disease is currently the most common vector-borne disease in the temperate Northern Hemisphere and affects hundreds of thousands of people annually in North America and Eurasia. (10) The global seroprevalence is estimated at 14.5%, with the highest reported prevalence in the temperate regions of Central and Western Europe and East Asia.(8)

This article aims to describe a case of Lyme disease and analyze its clinical and therapeutic aspects.

Case report

In April 2026, a 38-year-old male patient, a forest ranger with no significant medical history, presented to the emergency department with symptoms that had been present for 14 days, characterized by asthenia, generalized myalgia, a pressing frontal headache, and asymmetric arthralgia primarily affecting the right knee and left shoulder.

During the medical history interview, the patient reported that he had returned from the United States two weeks prior and had been working as a forest ranger there. While performing maintenance work in a forested area of that region, he suffered multiple tick bites three weeks before the onset of symptoms. Five days after this exposure, he noticed the appearance of an erythematous skin lesion on the anterior aspect of his right thigh, which gradually expanded and developed central clearing. The patient reported not having paid much attention to this lesion and did not seek care at any healthcare facility in the United States.

On admission examination, the patient had a temperature of 38.2 °C and a blood pressure of 115/75 mmHg. A giant erythematous macule approximately 16 cm in diameter was observed on the right thigh, with a typical target-like pattern characteristic of erythema migrans. Additionally, moderate swelling and functional limitations were noted in the right knee joint. Neurological examination revealed facial asymmetry consistent with left-sided unilateral peripheral facial palsy, classified as grade III on the House–Brackmann scale. No cardiac murmurs were auscultated, and no signs of meningeal irritation were evident.

Initial laboratory tests revealed markedly elevated acute-phase reactants (erythrocyte sedimentation rate (ESR) of 45 mm/h and serum C-reactive protein (CRP) concentration of 28 mg/L) along with mild leukocytosis (11,500/ μ L, 72% neutrophils) and mild abnormalities in liver function tests (AST concentration of 58 U/L and ALT concentration of 64 U/L). Hematocrit levels, platelet counts, renal function, and blood glucose levels remained within normal limits.

The 12-lead resting electrocardiogram showed a regular sinus rhythm with a prolonged PR interval of 0.24 seconds, which is consistent with first-degree atrioventricular block. Diagnostic arthrocentesis of the right knee yielded 15 mL of turbid synovial fluid () with inflammatory features (22,000 leukocytes/ μ L, 85% polymorphonuclear cells) and a negative bacterial culture at 72 hours.

Given the clinical and epidemiological suspicion, a two-step serological algorithm was applied: the initial enzyme-linked immunosorbent assay (ELISA) was reactive for total antibodies (titer of 2.8), and confirmation via Western blot demonstrated positivity for immunoglobulin M (IgM) in the 23, 39, and 41 kDa bands, as well as for immunoglobulin G (IgG) in the 18, 39, 41, 58, and 93 kDa bands, confirming an active infection with *Borrelia burgdorferi*.

The patient was diagnosed with Lyme disease in the early disseminated stage. Antimicrobial treatment was initiated with oral doxycycline (100 mg every 12 hours). During the first 24 hours, the patient experienced a transient fever spike of 39.1 °C with exacerbation of myalgia, a clinical presentation consistent with a Jarisch–Herxheimer reaction, which was successfully managed with ibuprofen and fluid and electrolyte support. After 72 hours of in-hospital telemetric monitoring, the atrioventricular block resolved spontaneously (the PR interval was controlled at 0.18 seconds); thus, the patient was discharged to complete a total 21-day course of home-based antimicrobial therapy.

At the four-week follow-up evaluation after discharge, the patient was completely asymptomatic, with resolution of the erythema migrans, full recovery of facial motility, resolution of the joint effusion, and normalization of aminotransferases and inflammatory markers.

This case report was written in strict accordance with the criteria established in the CARE (Case Reports) guidelines. This study was conducted in accordance with the ethical principles of the Declaration of Helsinki. The patient provided written informed consent for the publication of his clinical information for scientific purposes, ensuring the confidentiality of his personal data. Furthermore, the protocol was reviewed and approved by the Ethics Committee of the Faculty of Medicine at the University of Medical Sciences of Villa Clara.

Discussion

This clinical case is of exceptional significance because of the simultaneous presence of four major systemic manifestations of Lyme disease in its early disseminated phase: erythema migrans (cutaneous), peripheral facial palsy (neurological), first-degree atrioventricular block (cardiac), and acute monoarthritis of the knee (musculoskeletal). Although each of these conditions has been extensively documented in isolation, their concurrent presentation at the time of clinical onset is a rare phenomenon in the medical literature. This constellation of symptoms illustrates the remarkable invasive capacity and marked tissue tropism of spirochetes, underscoring the need for a comprehensive diagnostic approach to complex systemic presentations.(10,11)

From an epidemiological perspective, a critical point to discuss is the origin of the infection. Given that the case was reported from Cuba—a country where Lyme disease is neither endemic nor officially recognized as an indigenous condition—clarification of the exposure history was imperative. In this patient, the history of a recent trip to the United States and his direct work as a forest ranger in a highly endemic forest area unequivocally confirm that this is an imported case. (This finding is critical for public health; if the patient is not left Cuba, the diagnosis would imply the existence of an active local transmission cycle (competent vector and reservoir), which would constitute a finding of enormous epidemiological impact that would necessitate a reassessment of national entomological surveillance policies.(9)

This diagnostic approach requires the establishment of a rigorous differential diagnosis with other tick-borne zoonoses from the same ecological niche in North America, such as human granulocytic anaplasmosis (*Anaplasma phagocytophilum*), babesiosis (*Babesia microti*), and Powassan virus encephalitis. Although these conditions share the same vector (*Ixodes scapularis*) and may present with fever, headache, and myalgia, none of them produce the pathognomonic erythema migrans or the cardiac conduction abnormalities observed. Serological confirmation using the two-step algorithm (positive ELISA and Western blot with positivity for specific IgM and IgG bands) confirmed the exclusive etiology of *Borrelia*.(12,13)

Lyme carditis, manifested here as first-degree atrioventricular (AV) block with a PR interval of 0.24 seconds, raises an interesting therapeutic debate regarding inpatient versus outpatient management. International clinical guidelines recommend the use of intravenous ceftriaxone for high-degree AV blocks (second or third degree) or when the PR interval exceeds 0.30 seconds because of the imminent risk of progression to asystole.(In this case, since it involved a mild conduction delay that resolved spontaneously within the first 72 hours of continuous telemetric monitoring, the use of parenteral antibiotics was not warranted. Oral doxycycline was chosen, a strategy that proved to be fully effective and safe and in line with current protocols for hemodynamically stable patients with minor conduction disturbances, minimizing hospital costs and the risks associated with central venous access.(14)

Furthermore, the observed joint involvement should be interpreted as an early disseminated manifestation and not as late-stage Lyme arthritis or postinfectious reactive arthritis. Classic Lyme arthritis typically develops months or years after the initial inoculation as chronic intermittent oligoarthritis. In this patient, the simultaneous onset of monoarthritis with erythema and facial paralysis, coupled with the rapid resolution of synovial effusion following the initiation of antibiotic treatment, demonstrated direct and active bacterial invasion of the joint space in the early phase, ruling out a late-onset immune-mediated phenomenon.(14,15)

During the first hours of treatment with doxycycline, the patient developed a Jarisch–Herxheimer reaction, characterized by an acute fever spike and exacerbation of constitutional symptoms. This reaction occurs in approximately 10–15% of patients with Lyme borreliosis owing to massive lysis of spirochetes and the consequent release of proinflammatory lipoproteins. It is critical for clinicians to recognize the occurrence of this phenomenon and manage it with supportive care and nonsteroidal anti-inflammatory drugs to avoid mistakenly confusing it with a drug allergy, which would lead to unnecessary and harmful discontinuation of the antibiotic of choice.(16,17)

The limitations of this report must be acknowledged. Given that this is a single-case analysis, the clinical conclusions are not generalizable. Furthermore, the diagnosis was based exclusively on clinical-epidemiological criteria and indirect serological tests in the absence of molecular confirmation via polymerase chain reaction (PCR) or biological culture of synovial fluid or skin tissue. Since the exact species of *Borrelia* was not identified using sequencing techniques, confirmation of the pathogen's importance relies heavily on the epidemiological link to travel rather than on genotypic isolation of the strain, a standard that would have provided definitive analytical rigor to the study.(4)

Conclusions

The timely diagnosis of early disseminated Lyme disease depends primarily on a thorough clinical evaluation combined with a detailed epidemiological history of exposure to vectors in endemic areas. The simultaneous presence of erythema migrans, peripheral facial paralysis, atrioventricular block, and reactive arthritis underscore the multisystemic and potentially serious nature of this spirochetal infection. To achieve accurate diagnostic confirmation and avoid false positives, it is imperative to use a two-step serological algorithm, ensuring that the Western blot technique is interpreted only after an initial reactive enzyme-linked immunosorbent assay (ELISA).

Early antimicrobial treatment with oral doxycycline has proven highly effective not only in eradicating the causative agent but also in resolving acute cardiac and neurological manifestations without causing sequelae. Healthcare professionals must anticipate and manage transient inflammatory reactions, such as the Jarisch–Herxheimer reaction, appropriately and in a timely manner, thereby ensuring patient adherence and overall therapeutic success.

REFERENCES

1. Spach DH, Liles WC, Campbell GL, Quick RE, Anderson DE, Fritsche TR. Tick-Borne Diseases in the United States. *N Engl J Med*. 23 de septiembre de 1993;329(13):936-47. doi:10.1056/NEJM199309233291308
2. Farrell GM, Marth EH. *Borrelia burgdorferi*: another cause of foodborne illness? *Int J Food Microbiol*. diciembre de 1991;14(3-4):247-60. doi:10.1016/0168-1605(91)90117-8
3. Marques AR, Strle F, Wormser GP. Comparison of Lyme Disease in the United States and Europe. *Emerg Infect Dis*. agosto de 2021;27(8):2017-24. doi:10.3201/eid2708.204763
4. Pritt BS, Mead PS, Johnson DKH, Neitzel DF, Respicio-Kingry LB, Davis JP, et al. Identification of a novel pathogenic *Borrelia* species causing Lyme borreliosis with unusually high spirochaetemia: a descriptive study. *Lancet Infect Dis*. mayo de 2016;16(5):556-64. doi:10.1016/S1473-3099(15)00464-8
5. Stanek G, Wormser GP, Gray J, Strle F. Lyme borreliosis. *The Lancet*. febrero de 2012;379(9814):461-73. doi:10.1016/S0140-6736(11)60103-7
6. Bézay N, Wagner L, Kadlecsek V, Obersriebnig M, Wressnigg N, Hochreiter R, et al. Optimisation of dose level and vaccination schedule for the VLA15 Lyme borreliosis vaccine candidate among healthy adults: two randomised, observer-blind, placebo-controlled, multicentre, phase 2 studies. *Lancet Infect Dis*. septiembre de 2024;24(9):1045-58. doi:10.1016/S1473-3099(24)00175-0
7. Wagner L, Obersriebnig M, Kadlecsek V, Hochreiter R, Ghadge SK, Larcher-Senn J, et al. Immunogenicity and safety of different immunisation schedules of the VLA15 Lyme borreliosis vaccine candidate in adults, adolescents, and children: a randomised, observer-blind, placebo-controlled, phase 2 trial. *Lancet Infect Dis*. septiembre de 2025;25(9):986-99. doi:10.1016/S1473-3099(25)00092-1
8. Thomson MC, Stanberry LR. Climate Change and Vectorborne Diseases. Solomon CG, Salas RN, editores. *N Engl J Med*. 24 de noviembre de 2022;387(21):1969-78. doi:10.1056/NEJMra2200092
9. Davidson A, Davis J, Brestrich G, Moisi JC, Jodar L, Stark JH. Lyme Borreliosis Incidence Across Europe, 2015–2023: A Surveillance-Based Review and Analysis. *Vector-Borne Zoonotic Dis*. octubre de 2025;25(10):569-79. doi:10.1177/15303667251363125
10. Strle F, Strle K, Marques A, Henningsson AJ, Eikeland R, Lemieux JE, et al. Lyme borreliosis. *Nat Rev Dis Primer*. 26 de marzo de 2026;12(1):15. doi:10.1038/s41572-026-00691-0
11. Lantos PM, Rumbaugh J, Bockenstedt LK, Falck-Ytter YT, Aguero-Rosenfeld ME, Auwaerter PG, et al. Clinical Practice Guidelines by the Infectious Diseases Society of America (IDSA), American Academy of Neurology (AAN), and American College of Rheumatology (ACR): 2020 Guidelines for the Prevention, Diagnosis and Treatment of Lyme Disease. *Clin Infect Dis*. 23 de enero de 2021;72(1):e1-48. doi:10.1093/cid/ciaa1215
12. Sanchez E, Vannier E, Wormser GP, Hu LT. Diagnosis, Treatment, and Prevention of Lyme Disease, Human Granulocytic Anaplasmosis, and Babesiosis: A Review. *JAMA*. 26 de abril de 2016;315(16):1767. doi:10.1001/jama.2016.2884
13. Hoeve-Bakker BJA, Kerkhof K, Heron M, Thijsen SFT, Van Gorkom T. Evaluation of different standard and modified two-tier testing strategies for the laboratory diagnosis of Lyme borreliosis in a European setting. *Eur J Clin Microbiol Infect Dis*. diciembre de 2024;43(12):2397-406. doi:10.1007/s10096-024-04956-y
14. Yeung C, Baranchuk A. Diagnosis and Treatment of Lyme Carditis. *J Am Coll Cardiol*. febrero de 2019;73(6):717-26. doi:10.1016/j.jacc.2018.11.035
15. Smith RP. Lyme Disease. *Ann Intern Med*. mayo de 2025;178(5):ITC65-80. doi:10.7326/ANNALS-25-01111
16. Shapiro ED. Lyme Disease. Solomon CG, editor. *N Engl J Med*. mayo de 2014;370(18):1724-31. doi:10.1056/NEJMcip1314325
17. Butler T. The Jarisch–Herxheimer Reaction After Antibiotic Treatment of Spirochetal Infections: A Review of Recent Cases and Our Understanding of Pathogenesis. *Am Soc Trop Med Hyg*. 11 de enero de 2017;96(1):46-52. doi:10.4269/ajtmh.16-0434

FUNDING

No financing

CONFLICT OF INTEREST

None

AUTHORSHIP CONTRIBUTIONS

Conceptualization: Maikro Osvaldo Chávez Moya, Neisy Pérez Ramos, Gabriela González Pernas, Eirina Pernas Cano.

Research: Leodanis Hernández Cabrera, Neisy Pérez Ramos, Gabriela González Pernas, Eirina Pernas Cano, Dashiell González Abreu.

Drafting - initial draft: Maikro Osvaldo Chávez Moya, Leodanis Hernández Cabrera, Gabriela González Pernas, Eirina Pernas Cano, Dashiell González Abreu.