

Comprehensive review of Lyme disease in Ecuador with a detailed case study of a patient from Esmeraldas

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Abstract

Lyme disease, caused by the bacterium *Borrelia burgdorferi*, is the most prevalent tick-borne illness worldwide, yet its presence in Ecuador remains under-researched and under-diagnosed. This case report highlights the clinical presentation, diagnostic challenges, and treatment of Lyme disease in a 49-year-old female patient from Atacames, Ecuador. The patient presented to the outpatient clinic with pain in the right upper limb, particularly in the elbow joint, accompanied by a history of tick infestation. Serological tests, including ELISA showing elevated IgM titers. The patient showed significant improvement with a two-week course of doxycycline. This case emphasizes the need for increased clinical awareness and research on Lyme disease in Ecuador to enhance diagnosis, treatment, and epidemiological reporting.

Keywords: Lyme disease; Tick infestation; Ecuador; *Borrelia burgdorferi*; Antibiotic treatment; Review; Case report; Ibarra; Atacames; Ecuador

1. Introduction

Lyme disease is a tick-borne infection primarily caused by the bacterium *Borrelia burgdorferi*. It manifests with a variety of symptoms, including skin lesions, arthritis, and systemic symptoms (Burgdorfer *et al.*, 1991). This case highlights the importance of considering Lyme disease in patients with a history of tick exposure and persistent cutaneous symptoms (Wormser *et al.*, 2006).

Lyme disease is the most prevalent tick-borne illness worldwide, with numerous cases reported across South America and a confirmed case in Ecuador (Steere, 2001). Lyme borreliosis is caused by the spirochete *Borrelia burgdorferi*, first identified in 1982 and classified within the order Spirochaetales (Burgdorfer *et al.*, 1991). Transmission to humans occurs through the bite of *Ixodes* ticks (Dickinson Meneses & Batlle Almodóvar, 1997). Clinically, Lyme disease is a multisystem disorder, affecting various organs such as the skin, joints, central nervous system, and heart (Willis, 1991).

Diagnosing Lyme disease is challenging because many patients do not recall being bitten by a tick, and up to 50% of those affected do not exhibit the characteristic erythema migrans rash (Wormser *et al.*, 2006). Therefore, immunological testing is required for diagnosis, typically using ELISA to detect IgG and IgM antibodies against *B. burgdorferi*, followed by a Western blot assay (Miranda *et al.*, 2009).

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Regarding Lyme disease management, a course of 10 to 14 days of doxycycline is preferred. In late stages, treatment can be extended to one month. Alternative options include amoxicillin and cefuroxime, both administered for 14 days (Talbot *et al.* 2023).

The epidemiology of Lyme disease in Ecuador remains unknown due to a lack of research interest from both public and private sectors. The absence of awareness about the disease leads to a lack of clinical suspicion and exclusion from differential diagnoses. Consequently, academic and regulatory bodies in Ecuador do not prioritize Lyme disease, nor is it included in the list of communicable diseases, resulting in its omission from epidemiological reports (Subsistema de Vigilancia SIVE-Alerta, 2019). Additionally, diagnostic resources are not available at a national level.

2. Case Presentation

A 49-year-old female patient presented to the outpatient clinic at the San Roque Health Center in Imbabura Province, Ecuador, with pain in the right upper limb, particularly in the elbow joint.

During the initial physical examination, crusty and suppurative lesions were observed on the posterior side of the right arm, with diameters of approximately 4 cm and 3 cm, respectively, exuding serohematic fluid surrounded by circular erythema.

The patient was a seasonal farm cattle worker in Atacames, a town in the province of Esmeraldas, located in the coastal region of the country. She noticed a tick attached to her right arm for at least three days after she had been cleaning cattle of ectoparasites (ticks). After removing the tick, she experienced the progression of intense erythema at the site of the tick removal. She received a topical antibiotic cream in the first days after noticing the erythema at a local medical center, but there was no improvement.

The patient then moved with her family to the Andean region, specifically to San Roque in Imbabura Province, and was reassessed at San Roque Health Center. Given the history of tick infestation and the patient's epidemiological background, Lyme disease was suspected. Other differential diagnoses considered included Leishmaniasis and tick-borne diseases such as babesiosis and anaplasmosis. Further testing was performed, and an ELISA test confirmed elevated IgM values for *Borrelia burgdorferi*.

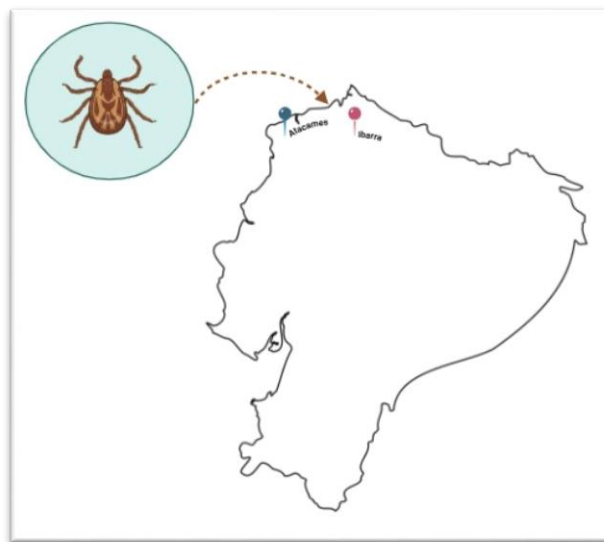


Figure 1 Map of Ecuador displaying the locations of probable Lyme disease infections. Colored pins mark the cities of Atacames and Ibarra, situated in the provinces of Esmeraldas and Imbabura, respectively

Management focused on Lyme disease was effective, and there was a substantial improvement in the patient's clinical condition. The initial treatment included doxycycline for 2 weeks.

During a week follow-up visit, the patient reported that the lesions persisted and the pain had increased, making elbow flexion and active movements difficult. The lesions had grown in size, and the amount of serohematic fluid produced had increased (Figure 2A).



Figure 2A The image clearly shows the lesions' elevated and rough texture, with one lesion appearing more pronounced and ulcerated than the other. An erythematous region is noted on the bigger lesion

The next 5 days follow-up physical examination revealed an ulcer with excavated edges and a meliceric base, approximately 5 cm in diameter, and another crusty lesion, 3 cm in diameter, showing signs of healing. Small masses were also observed on the anterior side of the arm (Figure 2B).



Figure 2B The image reveals an ulcer with excavated edges and a meliceric base, approximately 5 cm in diameter. Additionally, there is another crusty lesion, 3 cm in diameter, showing signs of healing

On the last assessment the following week, both arthritis and dermatological symptoms showed significant improvement, indicating that the focused treatment with doxycycline was effective (Figure 2C).



Figure 2C The lesions are noted to be dry, developing a whitish crust, and are resolving with no erythema observed

3. Discussion

Lyme disease is globally recognized in North America, Europe, and Asia, primarily transmitted by Ixodes ticks, such as *Ixodes scapularis* and *Ixodes ricinus*. In Latin America, its epidemiology is emerging, influenced by ecological and geographical factors. Various Ixodes tick species, including *Ixodes parvicinus*, *Ixodes loricatus*, and *Ixodes aragaoi*, are potential vectors for *Borrelia burgdorferi* and are found in countries like Argentina and Brazil (Lucca *et al.*, 2024).

In Ecuador, a study in the Quijos River valley in northwest Pichincha identified *Rhipicephalus microplus* as the most common tick species. Additionally, *Ixodes boliviensis*, *Ixodes montoyanus*, and *Amblyomma mixtum* were also detected. Overall, ticks were found on 133 out of 139 farms surveyed, resulting in a tick prevalence of 95.7% (Paucar *et al.*, 2023).

The first documented case of Lyme disease in Ecuador involved a 12-year-old child diagnosed with neuroborreliosis through ELISA and Western Blot tests. The patient had visited a zoo in the city of Ibarra, Imbabura Province, three months earlier and reported feeling a tick bite on the right side of the neck. Additionally, the patient had been in contact with various animals, including horses, cows, and dogs (Alarcón-Guzmán *et al.*, 2004). In the case presented in this article, the tick infestation occurred in Esmeraldas, a neighboring province to Imbabura, located 300 km apart (Figure 1).

On the other hand, a study by McCown and Monterroso (2011) found no evidence of the disease in an epidemiological study of 100 canines in the cities of Manta and Guayaquil. However, this study did not include Esmeraldas and Imbabura, highlighting the need for further research in these provinces. This underscores the possibility that *Borrelia burgdorferi* could be present in these areas (McCown and Monterroso, 2011).

In South America, other countries have also reported the presence of *Borrelia burgdorferi* and Lyme disease. For instance, Bolivia has confirmed cases of Lyme borreliosis and tick-borne relapsing fever. Chile has shown an emerging interest in Lyme disease through tick surveillance and reported cases. In Peru, there have been reported but not confirmed clinical cases. Colombia provided the first molecular evidence of *B. burgdorferi* ss in bats. French Guiana confirmed three cases of Lyme disease out of twenty-six suspected cases. Studies have identified *Borrelia* species in ticks and humans in Uruguay, indicating potential tick vectors despite limited research. In Paraguay and Bolivia, few studies exist, but geographical proximity to endemic regions necessitates further research (Lucca *et al.*, 2024).

On regard of patient clinical presentation, the day of reassessment, the erythema did not present as the classic "bull's-eye" pattern. Instead, it exhibited characteristics such as a central ridge and an erythema that gradually subsided (Fig 2a-2c). However, erythema migrans skin lesions can have a wide variety of presentations, including those seen in our case, such as central constrictions, diffuse erythema, and multiple lesions (Centers for Disease Control and Prevention, 2024).

4. Conclusion

Lyme disease is a complex condition that can present with dermatological and joint manifestations. This case illustrates the importance of a broad differential diagnosis in patients with a history of tick exposure and persistent cutaneous symptoms. Early intervention and appropriate treatment are crucial for the successful management of this disease. Many cases could remain undiagnosed, leading to chronic, prolonged cardiac, rheumatologic, and neurological conditions. Risk factors such as tick exposure should prompt consideration of this disease. Careful clinical evaluation and appropriate follow-up are essential for an accurate diagnosis and effective treatment. Further research is needed to determine the true prevalence of Lyme disease in Ecuador and to identify potential tick vectors and their distribution. This research would aid in the development of targeted prevention and control strategies, ultimately improving patient outcomes and reducing the burden of this emerging infectious disease.

Compliance with ethical standards

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Disclosure of conflict of interest

No conflict of interest to be disclosed.

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