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CASE REPORT

# Giant Erythema in a Child with Lyme Disease

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**Abstract:** Herein we report a case of Lyme borreliosis in a pediatric patient, highlighting the diagnostic challenges associated with this condition. An 11-year-old girl was admitted with high fever, headaches, abdominal pain, and a progressing rash. Initial symptoms included small rashes that vanished with antihistamine treatment, but maculopapular rashes later emerged on the trunk and limbs, prompting further investigation. Differential diagnosis included toxic erythema, Stevens-Johnson syndrome, and Lyme borreliosis. Despite no reported tick bite and initial doubt due to the season, Lyme borreliosis was confirmed by serologic testing, diagnosing the patient with early disseminated Lyme disease. The diagnostic complexity was increased by the rash's atypical presentation – large, homogeneous papular rashes. This case emphasizes the necessity for physicians to adeptly gather detailed histories and employ thorough, up-to-date diagnostic methods. Effective correlation of clinical findings with laboratory results and ongoing patient observation proved critical for an accurate diagnosis. This report underscores the importance of recognizing atypical presentations of Lyme borreliosis in children and the need for careful differential diagnosis.

**Plain language summary:** We report the case of a 11-year-old girl diagnosed with Lyme disease, caused by tick bites that are often painless and hard to detect. This makes diagnosis challenging, especially in children. Her illness began with a small rash that disappeared with treatment. Over a few days, she developed a high fever, headaches, abdominal pain, and extensive rashes on her body.

Initially, we considered other conditions like toxic erythema. However, new rashes kept appearing, prompting reconsideration. Despite no known tick bite, Lyme disease was suspected. A blood test confirmed Lyme disease, and she was treated with the antibiotic doxycycline. She improved significantly within 10 days, and no new rashes appeared after 2 weeks.

This case highlights the need to consider Lyme disease even without a known tick bite. It underscores the importance of careful observation, detailed patient histories, and thorough testing to accurately diagnose and treat this disease in children.

**Keywords:** erythema migrans, borreliosis, differential diagnosis, ticks

## Introduction

Lyme borreliosis presents unique challenges in pediatric care due to the predominantly painless nature of tick bites, which can lead to delayed detection of the bite site and late diagnosis. A common symptom is erythema migrans, but it does not always present in the classic form, complicating the diagnostic process. In children, atypical skin manifestations require thorough laboratory investigation.[1–3] Differential diagnosis can be particularly challenging, and while a skin biopsy can be very helpful, it is not universally accessible. Therefore, physicians must have strong skills in taking detailed histories – including epidemiological and travel histories – along with effective clinical reasoning and up-to-date diagnostic methods. Correlating clinical findings with additional test results can be time-consuming, making careful and ongoing observation of the patient crucial for an accurate diagnosis. We wish to share a complex diagnostic case that highlights these challenges.

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# Case Report

A girl, aged 11 years and 8 months, was admitted to the infectious diseases department of the city hospital with a rash on her trunk and limbs, high fever, headache, periodic abdominal pain, and one episode of loose stools.

## Medical History

The illness began 7 days prior with a small rash on her left foot, which disappeared after her mother applied a cream. The following day, a rash appeared on her right foot near the ankle, which also vanished after antihistamine treatment. By the fourth day, maculopapular rashes appeared on her trunk, and by the fifth day, she became lethargic. On the sixth day, the rashes grew larger, and her temperature was 37.1°C. By the seventh day, the rashes had further expanded, her temperature rose to 38.0°C, and she experienced headaches, lethargy, and abdominal pain, leading her to seek medical help.

## Life History

She grew and developed normally for her age, though she had a history of urticarial rashes after eating greenhouse cucumbers. Otherwise, there was no significant past medical or travel history. She lived in an urban area endemic for Lyme borreliosis, with infected ticks commonly found in local parks.

## Examination

The patient was moderately ill with hyperthermia, toxicity, and exanthematic syndromes. She was alert and active, with pale pink skin and several notable rashes: a large papular rash on the right side of her trunk, measuring 16×34 cm (Figure 1); four macular rashes on her right chest, each up to 1 cm in diameter (Figure 2); two polymorphous papular rashes on her inner thigh, up to 3 cm in size; a large papular rash on her left leg, measuring 56×15 cm (Figure 3).

Her mucous membranes were pink and moist, with a normal pharyngeal wall and non-enlarged, clean tonsils. Her peripheral lymph nodes were unchanged, and her respiratory and cardiovascular exams were normal.

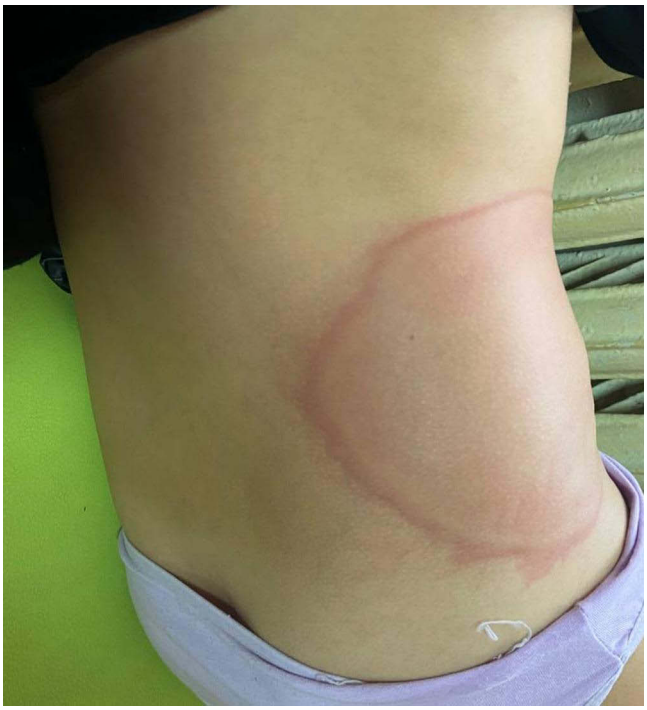

**Figure 1** A large papular rash on the right side of the patient's trunk, measuring 16 by 34 cm.

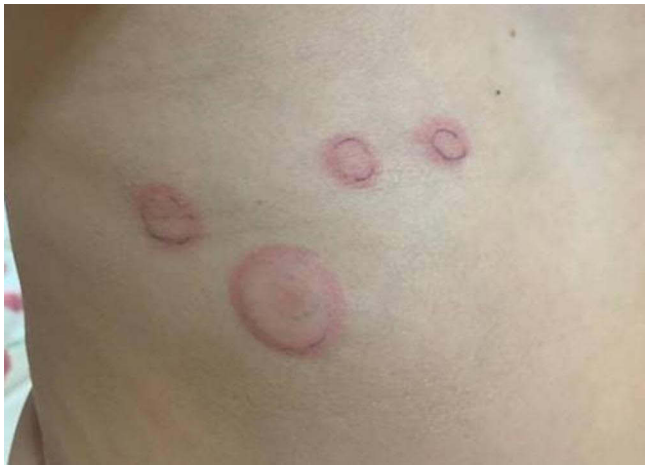

**Figure 2** Four macular rashes on the right side of the patient's chest, each measuring up to 1 cm in diameter.

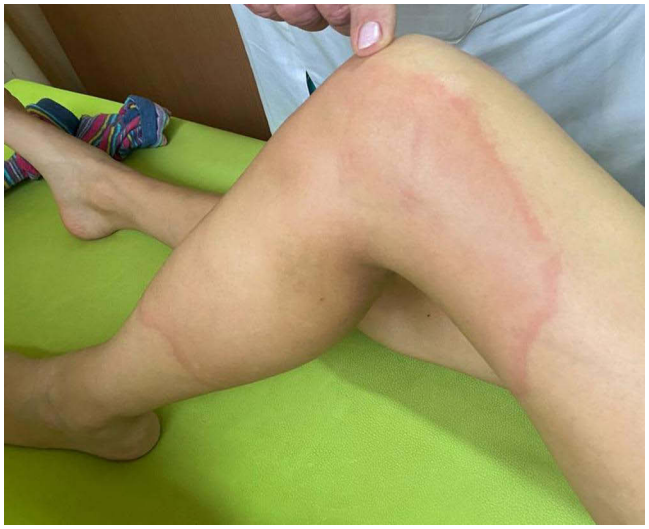

**Figure 3** A large papular rash on the left leg, measuring 56 by 15 cm.

## Laboratory Results

Tests showed an increased number of stab neutrophils (13%) but no urine abnormalities. Initially diagnosed with toxic erythema, she was prescribed prednisolone (2 mg/kg/day). However, new rashes appeared, prompting further investigation.

## Differential Diagnosis

Upon admission, the differential diagnosis included toxic erythema, Lyme borreliosis, and Stevens-Johnson syndrome. Rickettsioses were not considered due to their extreme scarcity in Europe.[4] The patient's parents denied any tick bites and attributed the rash to allergy to new clothing and greenhouse radishes. Initially, Lyme borreliosis was doubted due to the timing in March, lack of tick bite, and rash characteristics. However, the rapid appearance and characteristics of new rashes suggested otherwise. Stevens-Johnson syndrome was also considered but further ruled out due to the absence of typical features like mucous membrane involvement and itching.

## Final Diagnosis

On the tenth day after admission (seventeenth day of illness), serological testing for Lyme disease was performed. The first-tier enzyme immunoassay yielded an equivocal result, with a total Ig value of 1.1 (reference range: 0.80–1.19 for equivocal). However, the second-tier immunoblots were positive, showing 2 reactive bands for *Borrelia burgdorferi* IgM (p39, p41) and 5 bands for IgG (p18, p20, p21, p41, OspC [*Borrelia afzelii*]). Consequently, the girl was diagnosed with early disseminated Lyme disease, erythema form. Prednisolone was discontinued, and doxycycline therapy was initiated.

## Hospital Course

After the initiation of antibiotic therapy, her condition improved, with the rashes becoming paler and itchy. Over the next few days, her condition continued to improve, and by the fourteenth day, no new rashes appeared. She was discharged with instructions to continue doxycycline for 14 days and to undergo follow-up blood tests after completing the antibiotic therapy.

# Discussion

This clinical case is noteworthy due to the unique challenge of identifying a rash that was extensive, multiple, and migratory. Firstly, it is essential to discuss whether this was an atypical presentation of Lyme borreliosis. We believe it was! Evidence for this included uniformly pink patches with raised bright red edges that increased in size over time, with some reaching enormous dimensions (particularly on the lateral surface of the trunk and lower limb). Only on the 7th day of the illness did typical Lyme disease rashes of erythema migrans appear on the anterolateral surface of the chest. Observing the patient over time revealed hyperpigmentation at the rash sites and slight itching, which is characteristic of borreliosis. The atypical course in our patient involved a combination of typical and atypical skin changes, with the latter predominantly featuring large erythema.

Skin manifestations of Lyme borreliosis are of interest mostly to small groups of researchers. It should be noted that the heterogeneous skin symptoms of Lyme borreliosis have been studied in children,[5] and a practical approach to disease recognition has been proposed. The complexity and clinical characteristics of the skin syndrome, seroreactivity to *Borrelia burgdorferi sensu lato*, and post-treatment outcomes were studied in a retrospective study of 204 children observed from 1996 to 2011 in Austria.[6] It was found that erythema migrans was the most common manifestation (44.6%), followed by erythema migrans with multiple lesions (27%), borrelial lymphocytoma (21.6%), and chronic atrophic acrodermatitis (0.9%). Additionally, it was noted that erythema migrans with multiple lesions and lymphocytoma are characteristic of the pediatric age group, while chronic atrophic acrodermatitis is rare.

Another research group studied the features of isolated and multiple erythema migrans and concluded that patients with multiple erythemas were mostly younger (preschool) boys, less frequently reported tick bites, had a longer incubation period, and predominantly ring-shaped rashes.[7] In our case, the clinical skin symptoms were fundamentally different.

Multiple erythema migrans in a child, initially appearing as macular erythema around the left eye and ear, later verified as multiple erythema migrans and borrelial lymphocytoma has been reported.[8] Importantly, the diagnosis was based not only on clinical and laboratory data but also on biopsy findings. The latter is a tool that provides information not only on the histopathological features of the lesions but may also suggest the type of pathogen. For example, a study performed in adults,[9] where skin biopsy samples were cultured and subsequently examined by PCR for the presence of borreliae, demonstrated *B. afzelii* in 96.8% of cases and *B. garinii* in 3.2%. Positive PCR results are correlated with the size and central clearing of the erythema. It should be noted that skin biopsy in children has not been widely implemented, but in complex diagnostic situations, it can accurately interpret the diagnosis.

The study results that demonstrated the dependence of skin symptoms on the type of pathogen also attracted attention.[10] When *B. afzelii* was identified, migratory erythema tended to be larger and presented as annular erythema; with *B. garinii*, the rash was of homogeneous color and smaller size. Our patient was found to have *B. afzelii*, but the rash was enormous and homogeneous in character.

It is evident that the heterogeneity of skin changes in the erythema form of Lyme borreliosis necessitates careful diagnosis and differential diagnosis in each individual case. Under such circumstances, the need to introduce skin biopsy

to verify the diagnosis and reduce the likelihood of adverse outcomes with timely diagnosis and specific therapy is highlighted. The effectiveness of the applied antibacterial therapy can be an additional diagnostic criterion, as in our case.

## Data Sharing Statement

This is a case report without statistical analysis of the raw medical record data. All medical data involving the patient were documented in the patient's medical records. If necessary, more detailed imaging data or laboratory data can be provided by the corresponding author upon reasonable request.

## Ethics Statement

Ethical review and approval were not required for the study involving human participants in accordance with the local legislation and institutional requirements. Written informed consent was obtained from the patient's father for the publication of any potentially identifiable images or data included in this report.

## Informed Consent for Publication

The patient's father agreed to publish her medical data including imaging data and laboratory data, and signed the informed consent.

## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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## Disclosure

All the authors declare that they have no conflicts of interest in this medical case report and have not received any financial support.

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