Dog tick (Rhipicephalus) causing Lyme disease in an adult human

Ashok Kumar Grover, Purneetha Singh, Saurabh Puri, Saurabh Jindal, Pankaj Nand Choudhary

Department of Internal Medicine, Max Super Specialty Hospital, Vaishali, Ghaziabad, Uttar Pradesh, India

ABSTRACT

Lyme disease is a tick-borne multisystem disorder transmitted by the family of Ixodes and caused by a spirochete, Borrelia. An early manifestation of the disease presents with skin lesions typically called Erythema chronicum migrans (ECM). Doxycycline should be the antibiotic of choice used for its treatment. However, we present the case of Lyme’s disease in an adult male with dog tick, Rhipicephalus as a vector.

Keywords: Borrelia, dog tick, Lyme disease, rhipicephalus, tick-borne disease

INTRODUCTION

Lyme disease is a tick-borne disorder caused by the spirochete Borrelia burgdorferi, Borrelia afzelii, and Borrelia garinii. It is a multisystem disorder that is transmitted by the bite of the ticks.[1] Borrelia burgdorferi is normally carried by mice, squirrels, birds, and other small animals.[2] The slow feeding habit of Ixodes ticks and their attachment with hosts for relatively longer periods allow sufficient time for pathogen acquisition and transmission.[3]

Skin lesions are often the first clinical manifestation of the disease; early identification of such lesions is important for prompt diagnosis and treatment, which can prevent systemic complications. Although the disease was previously reported only from endemic areas like the United States, Europe, the Middle East, and Southeast Asia, its incidence has steadily increased due to increasing migration.[4] Only a few cases have been reported in the literature from India, with none of them discovering a live tick on the body of the patient.

We report a case of a 68-year-old gentleman who presented with an unexplained fever of seven days, where a live dog tick, Rhipicephalus, was found on the anterior aspect of his right thigh on day 3 of his treatment. The purpose of this report is to emphasize the importance of history taking and meticulous examination, which helped us in finding the live tick with its possible source, and in identifying the pathognomonic cutaneous manifestation of Lyme’s disease.

CASE REPORT

A 68-year-old male, known hypertensive and diabetic with a history of coronary artery disease (post transcutaneous coronary angioplasty with stent placement), presented with complaints of high-grade fever with chills for the last seven days, associated with body ache, malaise, fatigue, and decreased appetite. Upon presentation, he was febrile (temperature 102°F) with a heart rate of 94/min and a blood pressure of 120/70 mmHg in the right arm supine position (while being on medication). There were no localizing symptoms, and systemic examination was
essentially normal. The patient had travelled to and back from Nainital over the last three weeks, and his fever began four days following his return. He did not give a history of any rash or insect bites during the trip.

Investigations revealed mild anaemia (Hb 10.1 gm/dl), leukopenia (TLC - 3.25 × 10^9/L), transaminitis (SGOT – 107 U/L, SGPT – 139 U/L), and a creatinine of 1.3 mg/dl; widal test was negative. He was empirically initiated on a broad-spectrum antibiotic (IV ceftriaxone). Blood and urine cultures were also sterile. Chest X-ray PA view revealed no abnormality, and USG of the whole abdomen showed liver hemangioma and raised bilateral renal echogenicity.

As the patient continued to have a fever with chills and preliminary investigations were normal, Doxycycline was added due to high clinical suspicion of tick-borne fever. The patient was examined in detail, and a painless 4.3 cm × 3.5 cm targetoid lesion was found just below his right knee, which had an erythematous margin with central darkness along with a small crusted lesion on the right shin [Figure 1]. A live hard tick was found on the anterior aspect of his right thigh [Figure 2]. It was carefully and completely removed using toothed forceps by the dermatologist; and then preserved and identified to be of the Rhipicephalus species (Dog tick) by National Center for Disease Control (NCDC) along with positive Rickettsial serology. On revisiting the history of animal exposure, he informed us about a pet dog at home who could be a possible source of the tick. Erythematous rash spreading centrifugally appearing like a bullseye was also noted all over the lower limbs and was identified as erythema chronicum migrans (ECM).

He was discharged on day 6 of admission with complete remission of fever, and Doxycycline was continued for a total of three weeks. On follow-up, the patient had completely recovered with clearance of the ECM.

### Discussion

Lyme disease is a tick-borne disease, causing multisystem inflammatory disorder.[4] Various species of tick of Ixodes family transmit the disease. The distribution of the disease also corresponds with the global distribution of Ixodes tick.[5] No cases have been previously reported with Rhipicephalus spp., a dog tick, acting as the vector of Lyme disease, as per our literature search. Borrelia is the causative organism that includes three pathogenic species: B. burgdorferi, reported from America, whereas B. afzelii and B. garinii, reported from Asia.[6]

Lyme disease is divided into three stages as per clinical manifestations: early localized disease, early disseminated disease, and chronic disease.[7] Skin is the most commonly involved organ in early localized disease. Pathognomonic lesion occurring at the site of inoculation after 7–15 days of tick detachment, that is, the ECM, is seen in early localized disease and appears as various hues of erythema, spreading centrifugally with central clearing, giving the appearance of a bullseye. It is the best clinical marker of the disease occurring in 60–80% of patients.[7] Musculoskeletal, cardiovascular, and neurological systems are involved in disseminated disease. Joint swelling and arthritis are common musculoskeletal manifestations, whereas lymphocytic meningitis, cranial neuritis, facial palsy, radiculoneuropathy are common neurological manifestations.[8] Cardiological manifestations include acute onset, high grade (2nd or 3rd degree) atrioventricular conduction defect occasionally associated with myocarditis.[9]

Diagnosis of Lyme disease is based on the clinical manifestation of ECM, which is sufficient to make diagnosis even in the absence of corroboratory laboratory tests.[10] Serology test, the commonly used modality, follows a two-step approach involving initial ELISA followed by western blot in case of reactive or equivocal cases.[11] The clinical manifestation of ECM, positive serology, and clinical improvement with Doxycycline established our diagnosis.

All patients with ECM, a primary manifestation of early localized disease, should be treated with Doxycycline or Amoxicillin or
Cefuroxime, to prevent progression of the disease along with shortening the duration of signs and symptoms.[12,13] Early disseminated disease i.e., patients having multiple erythema migrans lesion, carditis manifested by a heart block, neurologic abnormalities, or acute large joint arthritis, should also be treated with oral Doxycycline or IV Ceftriaxone or Cefotaxime, in case of hospitalization.[14]

**Conclusion/Key points**

Only a few cases of Lyme disease have been reported from India in the past, with no previously reported case with Rhipicephalus, a dog tick acting as a vector of the disease. The purpose of this case is to create awareness among the physicians regarding the cutaneous manifestations presenting in early localized disease, leading to early diagnosis and prompt initiation of treatment which shortens the duration of signs and symptoms with stopping the progression of the disease.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published, and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**

There are no conflicts of interest.

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