Early Treatment of Lyme Disease Prompted by Histopathologic Analysis of the Abdomen of an Engorged Tick

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To the Editor:

Lyme disease is caused by spirochetes of the *Borrelia burgdorferi* sensu lato species complex and transmitted to humans by the bite of the *Ixodes scapularis* tick. It was first classified as a nationally notifiable disease in 1991, and the incidence has risen remarkably since then. More than 63,000 cases are reported annually to the Centers for Disease Control and Prevention; however, this number reflects severe underreporting, as the true incidence of the disease is projected to be closer to 476,000 cases per year. Additionally, 95% of US cases occur in the Northeast and upper Midwest. Given the pervasiveness of Lyme disease, early and reliable diagnostic methodology is critical, especially in cases in which the timeline of inoculation is unclear. We present a case of Lyme disease that was discovered during a routine dermatologic visit.

A 77-year-old White man with no relevant medical history presented to a dermatology clinic in west-central Virginia for a routine skin check. Physical examination revealed a well-appearing patient without overt skin abnormalities. However, on closer evaluation, a 0.2×0.1-cm engorged black *I scapularis* tick was visualized on the left lateral upper back. There was a surrounding zone of erythema that measured less than the 5-cm-diameter criterion for erythema migrans.

Upon questioning, the patient reported that he was unaware of the tick and could not provide a timeline for inoculation. To ensure proper treatment, the tick was removed in the office and a specimen was sent for histopathology. The arthropod was formalin fixed and paraffin embedded, and it was examined using hematoxylin and eosin and Warthin-Starry stains. Histopathology of the specimen revealed a blood-engorged arthropod. Warthin-Starry stain of the abdomen of the tick highlighted tiny strandlike spirochetes within the gut that were compatible with *B burgdorferi* (Figure). This finding prompted treatment with a 3-week course of doxycycline. Following treatment, erythema resolved. The patient experienced no sequelae.

Lyme disease can cause a range of serious complications if left untreated, including arthritis, neurologic deficits, and heart block. During the early stages of disease, the sensitivity and specificity of diagnostic methods such as serologic testing are limited. The gold standard for the diagnosis of Lyme disease comprises culture and subsequent confirmation by polymerase chain reaction. However, cultivation of *B burgdorferi* is challenging. The Centers for Disease Control and Prevention recommends 2-tiered serologic antibody analysis, which has 27% sensitivity during the first week of cutaneous symptoms, and involves an enzyme-linked immunoassay followed...
lymphocytes) have a rash or have had an engorged tick attached and engorged tick are unaware of the timeline of their exposure. Histologic analysis of a removed tick could aid in early clinical decision-making—ie, when the diagnosis is unclear and treatment guidelines vary by region and circumstance. Improved sensitivity and specificity of diagnosis can prevent unnecessary antibiotic treatment, which is associated with adverse effects and escalation of antibiotic resistance.

REFERENCES

13. Galan and colleagues reported that Warthin-Starry staining of prepared sections of the abdomen of a tick allowed for detection of B burgdorferi with a sensitivity of 71% and specificity of 83%. This technique did not delay the final biopsy report and may be a promising adjunct to the diagnosis of early Lyme disease.

Anecdotally, many patients who present with an attached and engaged tick are unaware of the timeline of their exposure. Histologic analysis of a removed tick could aid in early clinical decision-making—ie, when the diagnosis is unclear and treatment guidelines vary by region and circumstance. Improved sensitivity and specificity of diagnosis can prevent unnecessary antibiotic treatment, which is associated with adverse effects and escalation of antibiotic resistance.