Prophylactic Tactics: Antibiotics after Tick Bite for Prevention of Tickborne Diseases

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A 10 year old boy comes to the ED in Kentucky. He pulled an attached tick off his leg a few hours ago and threw it away. Now his mother is worried that he might have a tickborne disease. Should he be given prophylactic antibiotics?

Throughout the warm weather months, scenarios like this occur in urgent care centers and primary care offices across the country—sometimes creating confusion among health care providers about the proper approach to management. Moreover, parents who are anxious about tickborne diseases may specifically request antibiotics.

Insufficient clinical data exists regarding the efficacy of antibiotic prophylaxis for Rocky Mountain spotted fever (RMSF), anaplasmosis, ehrlichiosis, tularemia, and babesiosis. Moreover, preventive treatment for RMSF has been shown to delay but not prevent the onset of symptoms in laboratory animals. Therefore, antibiotic prophylaxis after a tick bite is not recommended to prevent these diseases.

Lyme disease is transmitted by *Ixodes scapularis* ticks in the northeastern and upper Midwestern states and by *Ixodes pacificus* ticks in the northern Pacific region. A 2001 New York study found that a single dose of doxycycline after *I. scapularis* tick bite was 87% effective at preventing Lyme disease. Therefore, a one-time dose of doxycycline is warranted after a tick bite for adults and children ≥ 8 years of age when all of the following conditions are met:

1) Doxycycline is not contraindicated (due to pregnancy, allergy, etc.).
2) Lyme disease is common in the county and state where the patient lives or has recently traveled.
3) The tick was likely attached ≥ 36 hours. This can be determined by patient history or presence of tick engorgement. A tick that is not engorged at all has been attached only for a short time and is very unlikely to transmit *Borrelia burgdorferi.*
4) Prophylaxis can be started within 72 hours of the time that the tick was removed.
5) The tick is likely an adult or nymph *Ixodes scapularis* (aka deer tick or blacklegged tick).

The recommended dose for children ≥ 8 years of age is 4 mg/kg up to a maximum of 200 mg. Of course, providers must use clinical judgment and balance the risks and benefits when prescribing any medication. Doxycycline can cause photosensitivity, nausea, vomiting, and rash even after a single dose.

In the example above, the patient does not live in an area at risk for Lyme disease so prophylaxis for Lyme disease is not indicated. States that are highly endemic for Lyme disease and where prophylaxis would potentially be indicated include: Connecticut, Delaware, Maine, Maryland, Massachusetts, Minnesota, New Hampshire, New Jersey, New York, Pennsylvania, Vermont, Virginia, and Wisconsin. Lyme disease may occur in other states, but unless the local infection rate of *Ixodes* ticks with *B. burgdorferi* is very high (≥ 20%), the risk is not sufficient to warrant routine prophylaxis for tick bites.

For children under 8 years of age, tick bite prophylaxis for Lyme disease is not recommended. Studies of amoxicillin, penicillin, or tetracycline published in 1989-1993 reported that 10-day courses of these antibiotics were effective at preventing Lyme disease. Amoxicillin is currently used to treat Lyme disease in young children. However, due to its short half-life, a full 10-day course would be necessary for proper prophylaxis. In this situation, the risks appear to outweigh the benefits – an estimated 8 adverse reactions to the medication would occur (including one serious event) for every 10 cases of early Lyme disease prevented.

Patients who do not receive antibiotic prophylaxis can be counseled that the risk of Lyme disease after a single tick bite remains low. For example, a meta-analysis of tick bite prophylaxis found that the risk of infection among placebo groups

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Left to right: Adult female, adult male, nymphal, and larval *Ixodes scapularis* ticks.

These ticks are commonly known as blacklegged or deer ticks.

was only 2.2%, despite including only patients from highly endemic states (CT & NY) who had a confirmed *I. scapularis* bite. Additionally, Lyme disease is a treatable condition, and those who take appropriate antibiotics in the early stages of infection usually recover rapidly and completely. Furthermore, recommending the use of specific prevention measures – such as avoidance of tick-infested areas, showering soon after coming indoors, and using insect repellent – will reduce the risk of Lyme Disease and other tick-associated infections, thereby avoiding many of these situations.

Remember that it is important to counsel all patients about return precautions after a tick bite. Patients who develop fever, rash, or other concerning symptoms within days to weeks of a tick bite should see their health care provider as soon as possible. **Patients with signs or symptoms of Rocky Mountain spotted fever, anaplasmosis, or ehrlichiosis should be treated immediately with a full course of doxycycline, regardless of age**.

For more information about ticks and tickborne diseases, see www.cdc.gov/ticks. CDC has recently developed a user-friendly guide, Tickborne Diseases of the United States: A Reference Manual for Health Care Providers. This guide includes helpful pictures and range maps of ticks that transmit disease, along with information on diagnosis and management of tickborne diseases. Hard copies of the guide can be ordered and the CDC has an app, searchable by the term "Tickborne Diseases".

References

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Note: Portions of this article first appeared in the Emergency Nurses Association newsletter.