Tick-borne Infections

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KEYWORDS

• Lyme • Ehrlichiosis • Anaplasmosis • Rocky Mountain spotted fever • Tick
• Tick-borne illness

HOSPITAL MEDICINE CLINICS CHECKLIST

1. A tick-borne illness (TBI) or ailment is an infection acquired through a bite of a tick infected with a spirochete, a protozoan, or a rickettsial parasite.
2. After attaching itself to the host and cutting the skin surface, the feeding tube is inserted and the exchange of pathogens occurs, leading to a TBI.
3. Most TBIs present clinically with nonspecific flulike symptoms of malaise, fever, chills, headache, and myalgias.
4. The rash of a TBI is nonspecific or nondiagnostic, and may be absent, transient, or even fleeting.
5. Lyme erythema migrans is the only manifestation that allows a clinical diagnosis without the need for confirmatory testing.
6. Non–erythema migrans Lyme disease requires 2-tier testing positivity to confirm the diagnosis. This testing involves enzyme immunoassay followed by acute and convalescent phase antibodies via Western blot.
7. The diagnosis of babesiosis is made based on epidemiologic data, symptoms, and risk factors with confirmation through microscopic examination of a peripheral blood smear showing the organisms as round or Maltese cross organisms within the red blood cells.
8. Ehrlichiosis is diagnosed by polymerase chain reaction (PCR) testing to *Ehrlichia* and *Anaplasma*, which are the causative organisms.
9. Rocky Mountain spotted fever (RMSF) is diagnosed clinically with confirmatory testing via PCR to *Rickettsia rickettsii*.

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10. Patients with factors that lead to a decreased immunologic response, with neurologic or cardiac symptoms, should be considered for hospital admission.
11. The preferred therapy for babesiosis is atovaquone and azithromycin.
12. The drug of choice for ehrlichiosis, Lyme disease, and RMSF is doxycycline.

DEFINITIONS

What is a tick-borne illness (TBI)?

A TBI or tick-borne ailment is an infection acquired through a bite of a tick infected with a spirochete, a protozoan, or a rickettsial parasite (**Box 1**). The spirochete causing a TBI is *Borrelia burgdorferi* and is associated with the *Ixodes* species of ticks. The *Ixodes* species are also responsible for causing babesiosis through the protozoan *Babesia* and ehrlichiosis through the spirochetes *Ehrlichia* species and *Anaplasma phagocytophilum*. However, Rocky Mountain spotted fever (RMSF) is caused by the rickettsia *Rickettsia rickettsii*, which is carried by *Dermacentor*, *Rhipicephalus*, and *Amblyomma* species of ticks.[1] **Table 1** lists tick species found in the United States that are associated with human disease.

What is the life cycle of a tick?

The most common ticks causing human illness go through 4 life stages. After hatching from their eggs (stage 1), the larvae (stage 2) must find a host to feed from. Although mostly known to feed on mammals, ticks can also feed on small birds, amphibians, and reptiles to survive. After feeding to complete the larval stage, they detach from their host and molt to nymphs (stage 3). These nymphs then feed until ready to undergo molting to adults (stage 4). The adult females are then ready to lay new clusters of eggs. Depending on the tick species, each life cycle or stage can take anywhere from months to years to complete.[2,3] **Table 2** shows the tick life cycle.

How do ticks spread pathogens?

After the tick attaches to the host and cuts the skin surface, the feeding tube is inserted. At this pivotal moment the exchange of pathogens occurs. If the host animal is harboring a pathogen, the tick ingests it along with the blood. If the tick is infected, it

Box 1
Risk factors for a TBI

- Dog ownership
- Rural residence in high-incidence area
- Exposure to a farm
- Human behavior
  - Failure to wear protective clothing
  - Failure to wear insect repellents
  - Failure to check for ticks