Unknown: Biopsy of a persistent pruritic papule on the back of a 75-year-old man

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Answer: Tick-bite dermatitis

Figure 1

Figure 2

Figure 1. In the center of the biopsy, there is a downward epidermal tunnel containing keratin material. In the deep part, the thick hyaline structure (black arrows) represents the chitinous wall of the mouthpart (hypostome) of a tick.

Figure 2. In higher magnification: within the chitinous wall shows several barb-like projections (green arrows) that serve as anchor during feeding.

Note the tick mouthparts in the dermis. Figures 1 and 2 show remnants of the tick hypostome (mouth part) with thick chitinous wall as well as several sharp barb-like projections (green arrows in Figure 2) on the hypostome that serve to anchor the tick during feeding.

Discussion

Ticks are ectoparasitic arachnids that survive by a process of hematophagy in which they attach to a host and feed off the host’s blood. Often found in tall grass located in wooded or forested regions, a tick will attach to its host by inserting its cutting mandibles, known as chelicerae, and feeding tube, known as a hypostome, into the skin of the host. Covered with sharp barbs, the hypostome anchors the mouth firmly in place while the tick feeds
for a few hours to several days before detaching [1, 2]. Once it has finished feeding and detaches from the host, a female tick will find a mate and lay thousands of eggs.

Classified by body type, ticks can be divided into two main families, the *Ixodidae*, otherwise known as hard-bodied ticks, and the *Argasidae*, or soft-bodied ticks [3]. Commonly known hard ticks include those in the *Dermacentor*, *Amblyomma*, and *Ixodes* genera, whereas soft-bodied ticks include those in the *Ornithodoros* genus. Hard-bodied ticks have visible anterior mouthparts and a hard dorsal plate known as a scutum. This group of ticks is also known for attaching to a different host for each phase of the life cycle, from larva to nymph to adult. Soft-bodied ticks, on the other hand, are characterized by retroverted mouthparts and lack a scutum.

Although hard ticks are more commonly associated with disease transmission, both hard and soft ticks are important vectors of disease and together they transmit a wide variety of pathogens, including bacteria, protozoa, and viruses [1, 2]. Figures 1 and 2 show a remnant of the tick hypostome that pierces the skin during feeding, as well as several anchoring barbs. Whether this remnant belongs to a hard or soft tick cannot be unequivocally determined because the mouthparts of hard and soft ticks are similar [3]. The two families of ticks can be usually distinguished by examining the intact body of the tick for the presence or absence of a scutum. The only part of a tick that may be seen in a skin biopsy is the mouthpart, hypostome.

Whereas hard ticks feed for extended periods up to several days or weeks and can grow to accommodate large volumes of ingested blood, soft ticks feed more rapidly, on the order of several minutes to days. This has important implications in terms of the spread of disease. For example, *Ixodes scapularis* requires 24 to 48 hours of feeding time before *Borrelia burgdorferi*, the causative agent of Lyme disease, can be transmitted whereas *Ornithodoros* requires less than an hour to transmit the spirochete that causes relapsing fever. Thus, prompt removal or an attached tick is important. The most common site of attachment varies between individual species, with *Ixodes* preferring the trunk, *Amblyomma* preferring the lower extremities, and *Dermacentor* preferring the head, neck, or upper trunk [4]. In addition to preferred attachment site, there is considerable variability among tick species in terms of body size, shape, color, and location of origin.

Within the medical community, these ectoparasites are most notorious for the transmission of a variety of pathogens that can cause a spectrum of clinical presentations. In fact, ticks are second only to mosquitoes as vectors of disease in humans, causing more than 100,000 cases of illness worldwide [5]. Tick-borne diseases tend to be species and region specific. For example, *Ixodes scapularis* is well known for its association with Lyme disease and babesiosis in the Northeastern United States, whereas *Dermacentor andersoni* is the primary vector for Rocky Mountain spotted fever in the Western states. Antibiotics in the tetracycline family are most often the treatment of choice for tick-borne diseases.
In addition to spreading tick-borne pathogens, tick attachment may also cause a hypersensitivity reaction at the location of the bite. These reactions have a wide variety of presentations and may appear as nodular, papular, or vesiculobullosus lesions. The patient may present with an expanding erythematous plaque that may be confused with erythema migrans. However, unlike erythema migrans, hypersensitivity reactions are highly pruritic, tend not to display central clearing, and reach a maximum diameter within two to three days [4].

Histologically, tick bite reactions often display endothelial swelling as well as a wedge-shaped perivascular chronic inflammation composed of eosinophils and CD30+ lymphocytes [4]. On occasion, one may find intravascular eosinophilic deposits within areas of the reaction. In these cases, it can be difficult to distinguish tick-bite hypersensitivity from the histological findings in cryoglobulinemia [6]. Whereas their presence is obviously helpful in diagnosis, tick mouthparts (Figures 1 and 2) are a relatively uncommon finding on biopsy. Clinical history as well as the extent and type of inflammatory infiltrate prove to be valuable clues when distinguishing between these two disease processes [6]. Once the diagnosis is made, treatment for hypersensitivity reactions can involve topical or intralesional corticosteroids.

References


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