Thrombogenic Vasculopathy With Diffuse Neutrophilic Inflammation: A Histologic Manifestation of a Tick Bite

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We describe 5 cases of tick bite reactions with dermal necrosis and sparse interstitial to dense diffuse dermal neutrophilic infiltrates associated with thrombogenic vasculopathy. Tick bite reactions classically consist of moderately dense perivascular infiltrates composed of an admixture of inflammatory cells. Each of our patients had embedded tick parts, with interesting histologic features.

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Ticks are ectoparasites that cause dermatologic disease directly through physical trauma to the skin, salivary secretions, or remnant body parts, as well as indirectly through transmission of disease. Lyme disease, Rocky Mountain spotted fever, tularemia, and babesiosis are diseases transmitted by ticks.[1] Similar to other arthropod bites, the histopathology of a primary tick bite consists of a perivascular infiltrate composed of lymphocytes, neutrophils, histiocytes, plasma cells, and eosinophils in varying amounts.[2] We describe 5 patients with thrombogenic vasculopathy with dermal necrosis and surrounding sparse interstitial to dense diffuse dermal neutrophilic inflammation, an uncommon histologic reaction to embedded tick parts.

Case Reports

Patient 1—An 81-year-old man presented one week after sustaining a tick bite in his left buttock. The bite site appeared as an eroded and crusted 3- to 4-mm papule that contained embedded tick part remnants. His past medical history was significant for multiple skin cancers, actinic keratoses, and malignant melanoma.

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Patient 2—A 76-year-old man presented 4 days after sustaining a tick bite in his left thigh. The bite site appeared as a crusted 4-mm erythematous papule that contained embedded tick part remnants. His past medical history was significant for multiple actinic keratoses and basal cell carcinoma.

Patient 3—A 49-year-old man presented 48 hours after sustaining a tick bite in his left hip. The bite site appeared as a 4-mm focally necrotic and erythematous papule that contained embedded tick part remnants. His past medical history was significant for arthritis and recurrent herpes simplex infection.

Patient 4—A 67-year-old man presented 36 hours after sustaining a tick bite in his left thigh. The bite site appeared as a 3-mm focally necrotic papule with surrounding erythema that contained embedded tick

Figure 1. Embedded tick part remnants surrounded by a zone of dermal necrosis, interstitial neutrophilic inflammation, and intraluminal eosinophilic deposits in the capillaries (H&E, original magnification ×4).

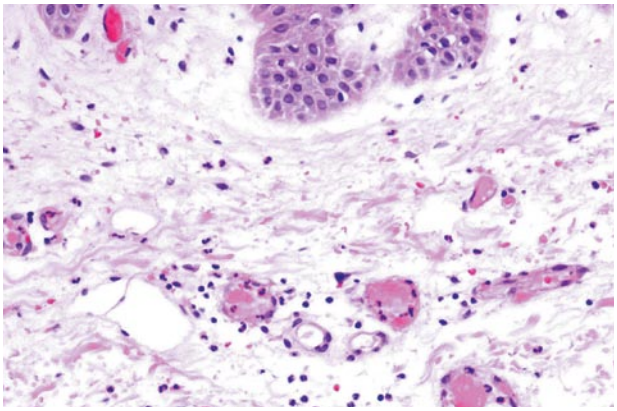

Figure 2. Thrombogenic vasculopathy consisting of intraluminal eosinophilic deposits with surrounding interstitial neutrophilic inflammation of capillaries (H&E, original magnification ×40).

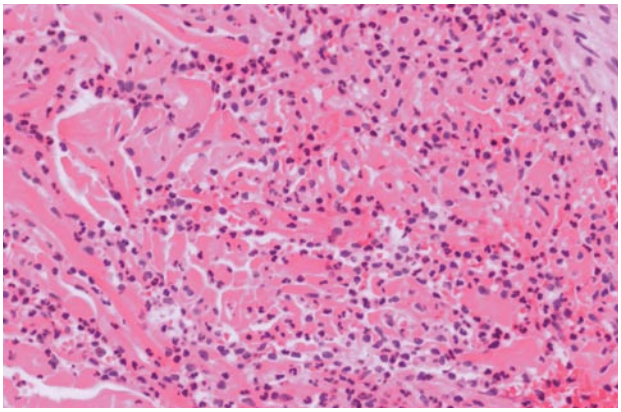

Figure 3. Diffuse dermal neutrophilic inflammation with scattered eosinophils, lymphocytes, and extravasated red blood cells and histiocytes (H&E, original magnification ×40).

part remnants. His past medical history was significant for hypercholesterolemia.

Patient 5—A 79-year-old man presented 48 hours after sustaining a tick bite in his left arm. The bite site appeared as a 2-mm erythematous papule with intense surrounding erythema that contained embedded tick part remnants. His past medical history was significant for actinic keratosis, seborrheic dermatitis, rosacea, and Paget disease of the bone.

Microscopic Features

The biopsy results from all 5 patients demonstrated similar histologic features. In all patients, embedded tick part remnants were surrounded by a zone of dermal necrosis (Figure 1). The capillaries showed a thrombogenic vasculopathy consisting of intraluminal eosinophilic deposits (Figure 2). These deposits stained strongly with periodic acid-Schiff stain. The adjacent dermis demonstrated sparse interstitial to dense diffuse dermal neutrophilic inflammation admixed with eosinophils, histiocytes, and rare lymphocytes (Figure 3).

Comment

These 5 patients presented with an interesting reaction to embedded tick part remnants. Each patient showed dermal necrosis and a predominantly diffuse dermal neutrophilic reaction in the bite area, which differs from the typical reaction of a wedge-shaped perivascular and interstitial infiltrate of lymphocytes, neutrophils, and eosinophils.[3] This finding, in association with the finding of thrombogenic vasculopathy in each of our cases, makes this tick bite reaction unusual.

Predominant neutrophilic infiltrates classically are associated with diseases such as Sweet syndrome, rheumatoid neutrophilic dermatosis, bowel-associated dermatosis-arthritis syndrome, and Behçet syndrome.[4] Although our cases exhibit diffuse dermal neutrophilic infiltrates, the presence of tick part remnants distinguishes them from other diseases. Other arthropod bite reactions also can resemble tick bite reactions because perivascular infiltrates composed of lymphocytes, neutrophils, eosinophils, histiocytes, and plasma cells may be present (Table).[2,3,5] In particular, the brown recluse spider, mosquito, and beetle can produce bite reactions that contain neutrophilic infiltrates with associated vasculitis or epidermal or subcutaneous necrosis.[3] However, the absence of thrombogenic vasculopathy or tick part remnants differentiates these bite reactions from what we have described. To ensure a correct diagnosis, we suggest the pathologist examine multiple deeper sections through the tissue block, looking for tick part remnants if a tick bite is suspected.

Our cases also exhibit intraluminal eosinophilic deposits demonstrating positivity with periodic acid-Schiff staining. Although these deposits resemble those seen in cryoglobulinemia, none of our patients had a history of cryoglobulinemia or connective tissue disorders, hepatitis C, or malignancies, which often are associated with cryoglobulinemia.[4] Galaria et al[6] and Stefanato et al[7] described similar thrombogenic vasculopathy following tick bites containing tick part remnants. Each of our cases also contains retained tick parts and therefore may support the hypothesis that thrombogenic vasculopathy following tick bites is caused by tick part remnants.

Our 5 cases show that diffuse dermal neutrophilic infiltrates in association with thrombogenic vasculopathy present an interesting histologic picture of tick bite reactions that may be related to the presence of tick part remnants.

Histopathologic Findings of Common Arthropods*[2,3,5]

	Histologic Findings											
Arthropods	Eosinophils	Neutrophils	Mononuclear Cells	Granulomatous Reactions	Perivascular Infiltrates	Fibrin Thrombi	Spongiosis	Dermal Edema	Vesiculation	Vasculitis	Necrosis	Retained Parts†
Arachnids												
Ticks	X	X	X	X	X	X		X		X	X	X
Mites												
Follicle mite	X	X	X	X								X
Dog, rabbit, cat mite	X		X		X		X					
Scabies	X	X	X				X		X	X		X
Chiggers	X	X	X	X			X	X				
Scorpions/ Spiders	X	X	X		X					X	X	
Insects												
Lice	X	X	X		X			X				X
Bees/Wasps	X	X	X	X							X	X
Bedbugs	X		X		X		X	X	X			
Flies/Gnats/ Mosquitoes	X	X	X		X			X	X		X	
Myiasis	X	X	X									X
Beetles	X	X							X		X	
Fleas	X	X	X		X		X	X	X			
Tungiasis	X		X								X	X
Moths/ Butterflies	X	X	X				X	X	X			X

*X denotes that the histologic finding is present in the reported arthropod. No entry indicates histologic finding is not present.
†Ticks: mouth parts; follicle mites: mite fragments; scabies: mite fragments, eggs, larvae, excreta; lice: body, nits; bees/wasps: stinger; myiasis: larvae fragments; tungiasis: exoskeleton, internal parts, ova; moths/butterflies: mouth parts, hair.

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