What's Eating You? *Loxosceles reclusa* (Brown Recluse Spider)

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Loxosceles reclusa (the brown recluse spider) is a hunting spider that is often found in woodpiles and attics and under radiators. Human envenomation typically occurs when the spider's environment is disturbed. Most bites involve the extremities.[1] Bite reactions vary from small areas of erythema to large areas of ulceration and necrosis (Figure 1). Systemic reactions include shock, hemolysis, renal insufficiency, and disseminated intravascular coagulation.[2-4] The interaction between sphingomyelinase D in the venom and serum amyloid protein appears to play an important role in toxic reactions.[5]

The degree of morbidity caused by the bite is somewhat dependent on the area involved. Upper airway obstruction caused by envenomation of the neck has been reported.[6] It is important to note that most *L reclusa* bites do not cause serious reactions and can be treated with ice and elevation.[7-8]

Loxosceles arizonica, a related species of spider found in the Southwest, also has been implicated as a cause of shock,[9] and *Loxosceles rufescens* has been implicated as a cause of dermonecrotic arachnidism in Israel.[10] Other unrelated spiders may cause similar dermonecrotic reactions or systemic toxicity, which may be erroneously attributed to brown recluse bites.[11,12]

L reclusa varies in size from several millimeters to almost a centimeter across. Most of the spider's breadth is occupied by its long delicate legs (Figure 2, A and B). The body is small, relative to the overall size of the spider, and can be identified by the violin-case pattern on the cephalothorax (Figure 2, C and D).

Brown recluse spiders are most commonly found in the South Central United States, from Tennessee and Missouri to Oklahoma and Texas. In South Texas, they are quite numerous, and it is not uncommon to find several in one's house during a single week. Because of my interest in arthropods, my colleagues often bring me gifts of spiders, reduviids, and scorpions they have found in their houses. My prettiest brown recluse specimen was given to me by our pediatric dermatologist, Dr. Van Perry, who cleverly immobilized the spider with a shot of mouthwash as it scurried across his bathroom sink, thereby avoiding trauma to the spider's delicate body.

L reclusa envenomation should be suspected when a spider bite results in a significant area of dermal necrosis. Often, the spider is not available for examination, which has complicated the evaluation of therapeutic trials. However, better laboratory diagnostic techniques recently have become available. The diagnosis of *L reclusa* envenomation can now be confirmed by an enzyme immunoassay to detect *Loxosceles* venom in a skin biopsy or in plucked hairs obtained up to 4 days after the bite or by a passive hemagglutination inhibition test as long as 4 days after experimental venom injection.[13,14]

Although neutrophils are not directly activated by the venom, dermonecrotic reactions following brown recluse bites are mediated by neutrophils. Neutrophil activation may be dependent on the interaction between the venom and endothelial cells.[15] The venom induces α- and β-chemokines in both endothelial and epithelial cells, resulting in neutrophil activation.[16]

Histologic findings after *L reclusa* envenomation vary over time. Early biopsy results demonstrate a neutrophilic infiltrate. Later changes include "mummified" coagulative necrosis of the epidermis, adnexal epithelium, and superficial dermis. A neutrophilic bandlike infiltrate marks the border of the viable and nonviable skin. Large vessel vasculitis resembling polyarteritis nodosa may account for the extent of tissue necrosis resulting from some bites.[17]

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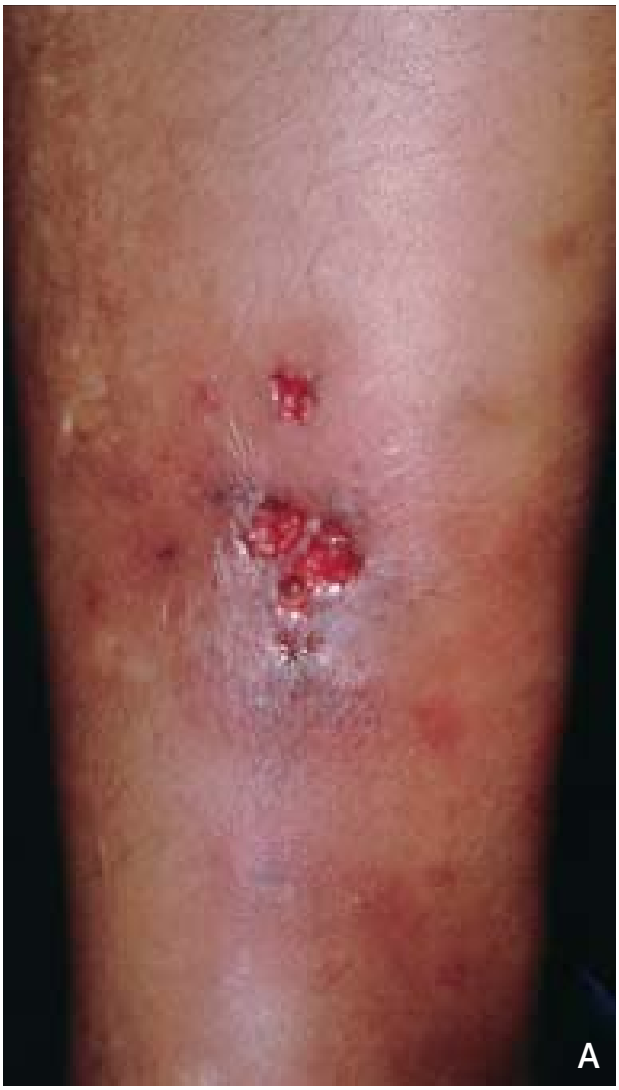
Optimal treatment to prevent dermonecrotic reactions remains elusive. Most bites do not require aggressive therapy. Very early intradermal injection of polyclonal anti-*Loxosceles* Fab fragments (raised against *Loxosceles deserta* spider venom) has been shown to attenuate necrosis in an experimental model. Efficacy diminished the longer treatment was delayed. The final time that demonstrated efficacy was 4 hours after envenomation.[18] Although some studies have been unable to demonstrate a conclusive benefit, hyperbaric oxygen therapy may decrease the final size of ulceration.[19] Results from studies using widely available agents such as dapsone and prednisone have been inconsistent. Some of these studies were limited by the failure of envenomation to produce consistent lesions. In studies in which I participated, we were able to produce consistent large eschars in an animal model with 20 µg of a standardized preparation of venom. There is some evidence to suggest that the combination of dapsone and antivenin may be superior to either agent alone.[20] In our studies of dose latency following envenomation, dapsone as a single agent, given as early as 2 hours after envenomation was no more effective than placebo and was associated with an increase in mortality in an animal model (Schmidt et al, unpublished data). Dapsone therapy is complicated by the potential for hemolysis, especially in individuals who have inherited glucose-6-phosphate dehydrogenase deficiency. We are currently studying other agents, such as colchicine. It is possible that the endothelial injury occurs so rapidly that no systemic agent will be of much benefit. Ice may provide symptomatic relief, and



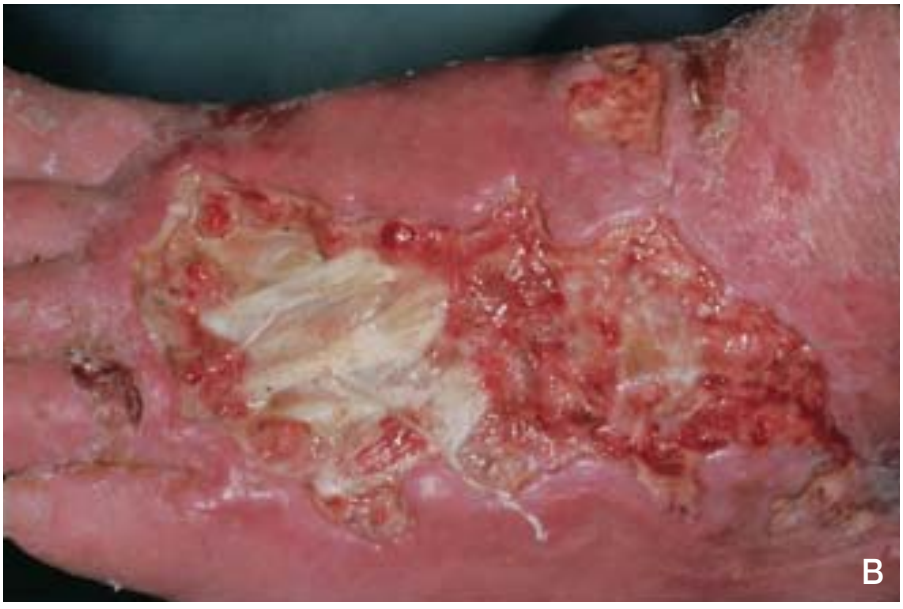


Figure 1. Necrosis may present as a dark leathery eschar or as an ulceration (A). Some instances of widespread tissue damage may be related to large vessel vasculitis (B). Figure B courtesy of Brooke Army Medical Center teaching file.

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Figure 2. Brown recluse spiders are characterized by long delicate legs (A and B) and a violin-case pattern on the cephalothorax (C and D).

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conservative debridement may be of some benefit. Hyaluronidase within the venom causes the eschar to spread in a gravity-dependent fashion; therefore, rest and elevation of an extremity has the potential to limit the spread of necrosis.

Systemic reactions may be more common in patients with minor appearing bite reactions. Presumably, the toxin in necrotic wounds is sequestered in the necrotic tissue, whereas it may be absorbed more thoroughly from lesser wounds, resulting in widespread endothelial injury and disseminated intravascular coagulation. One potential complication of therapy to prevent cutaneous necrosis is the possibility that preventing necrosis may increase the risk of disseminated intravascular coagulation. At present, this risk is purely theoretical because no therapy has been proven to be consistently effective in preventing necrosis. It may be prudent to exercise caution as more effective agents become available. The risk-benefit ratio may depend on the area of the body involved; a bite on the trunk may pose less threat of serious local morbidity than a bite involving the penis or eyelid. The decision to treat should be based on a risk-benefit analysis.

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