



CASE REPORT

Skin Necrosis, Diffuse Urticaria, and Cellulitis Due to Presumed *Loxosceles* Spider Bite

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The clinical manifestations of a recluse spider bite range from local erythema to necrotic skin reactions; bites rarely lead to a systemic disease known as viscerocutaneous loxoscelism. A 29-y-old female patient was admitted to the emergency department with a wound, swelling, and pain on her left leg and a rash on her whole body as a result of a spider bite. On physical examination, a round, hard, black, irregularly shaped necrotic area was found in the bite zone on the lower posterior part of the left thigh, as were lesions in the form of erythematous papules around the area. There was a color change around the lesion, extending from posterior to medial of the thigh, and a papule on a diffuse erythematous surface on the trunk and arms. At follow-up, the necrotic area had become more apparent. After approximately 1 mo, the necrotic area was surgically debrided and a flap was formed on the necrotic tissue area. In this article, a case that was thought to be caused by a *Loxosceles* spider bite and which started with erythema, progressed to lymphangitis, cellulitis, and severe necrosis, and was surgically debrided, was evaluated in light of the clinical findings and previously reported cases of verified loxoscelism. In patients with a history suggestive of a bite and with these clinical findings, the diagnosis of a bite by *Loxosceles* spp. should be carefully considered based on clinical and epidemiologic findings.

Keywords: presumed spider bite, emergency medicine, dermonecrosis, surgical intervention

Introduction

Although various *Loxosceles* species are common in the United States, very few recluse spider bite cases have been reported in the literature in Turkey and Europe.^{1–6} *Loxosceles reclusa*, known as the brown recluse spider, is the most common and medically significant species in the United States.⁷ The Mediterranean recluse spider *Loxosceles rufescens* is common throughout the Mediterranean region and has been accidentally introduced in numerous countries outside of its natural range (eg, Australia).^{1–4} The color of these spiders ranges from gray to orange-red, pale brown, and dusk. There is usually a violin-shaped marking on the dorsum of the cephalothorax.^{5,7,8} The clinical manifestations of the bites range from local erythema to necrotic skin reactions (known as necrotic arachnidism), and bites

rarely lead to a systemic disease known as loxoscelism (causing myalgia, arthralgia, hemolysis, hemoglobinuria, acute renal failure, amputation, and death).^{2,3,5,9,10}

Although a possible diagnosis of spider bite can be made based on the patient's medical history and physical examination findings, a definitive diagnosis can only be made by qualified verification of the species. Otherwise, the diagnosis of *Loxosceles* spider bite should be considered after other causes have been ruled out. History, clinical findings, and diagnostic tools can be used to rule out conditions that may cause skin necrosis. Bites and stings can cause skin necrosis.^{9,10} As a result of usually not being able to recognize a spider at the time of the bite, the diagnosis can often be overlooked by clinicians and occasionally mislabeled as a skin infection or cellulitis.¹¹

Cosmetic disorders resulting from presumed spider bite and dermonecrosis requiring surgical intervention are not commonly encountered, especially in young female patients. This study is presented to report a

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presumed loxoscelism case, which is extremely rare in Turkey, and to highlight dermonecrosis that started with erythema, leading to cellulitis, lymphangitis, and diffuse urticaria and which was treated surgically (flap).

CASE REPORT

A 29-y-old female patient who had no history of illness was admitted to the emergency department (ED) with a wound, swelling, and pain in the leg and a rash on the whole body as a result of a spider bite. In her medical history, the patient reported that she had been bitten by a brown spider on the upper part of her left knee 6 d earlier (Figure 1); 1 d after the bite, she had developed pain, blistering, and numbness on the back of the left thigh and a rash on her skin. The patient tried to treat the lesion with an application of cold compresses, analgesia (dex-ketoprofen tablet as a nonsteroidal anti-inflammatory drug), topical antibiotic cream, and oral antibiotics (cefuroxime 500 mg tablet) for a few days; however, she indicated that the lesion became gradually larger, the middle of it became black, the redness around the wound started to expand in the form of a ring, and the rash spread to her whole body.

The patient presented to our ED upon the progression of her symptoms. At the time of presentation, the patient's general condition was good; she was conscious, oriented, and cooperative, and her Glasgow Coma Score was 15. Vital signs (blood pressure 104/85 mm Hg, pulse 86 beats·min⁻¹, body temperature 37.2°C, and respiratory rate 22 breaths·min⁻¹) and oxygen saturation (95%) were normal.

On physical examination, in the bite zone on the lower posterior part of the left thigh, there was a round, hard, black, and irregularly shaped necrotic area with a diameter of 3 cm that was painful when touched, as well as lesions in the form of erythematous papules/plaques around the area. There was a color change (possibly lymphangitis) to a lighter color (brown) around the lesion, extending from the posterior to medial aspect of the thigh and a papule on a diffuse erythematous surface on the trunk and arms. Papule, plaques, and redness were detected around the lesion as well as on the arms and trunk. We interpreted them as urticaria (Figure 2A, B, C). The examination of other systems was unremarkable.

In the analysis of laboratory findings, white blood cell count was $6.25 \times 10^3 \cdot \mu\text{L}^{-1}$, hemoglobin (Hb) was 14.1 g·dL⁻¹, platelets $207 \times 10^3 \cdot \mu\text{L}^{-1}$, glucose was 131 mg·dL⁻¹, C-reactive protein was 8 mg·dL⁻¹, sedimentation rate was 4 mm·h⁻¹, and electrocardiography was evaluated as normal. By these findings, necrotic arachnidism, lymphangitis,

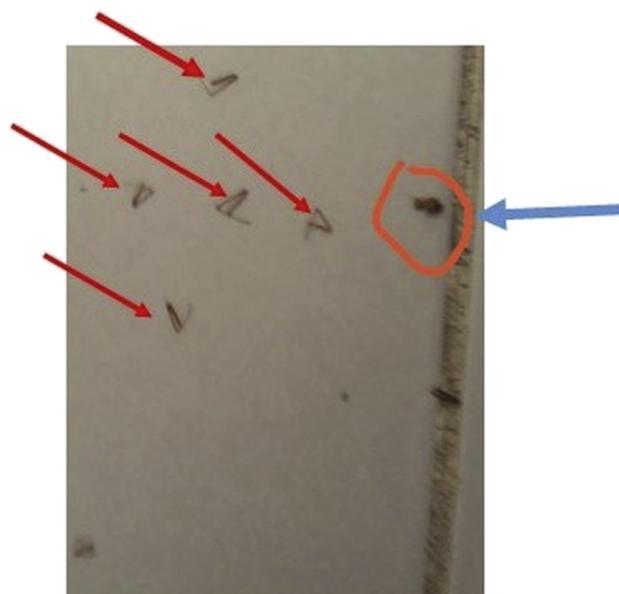


Figure 1. Body and feet of the spider that was killed. (Figure displayed is 6 cm wide; 1000% magnification.)

urticaria, and cellulitis caused by spider bite were considered.

Hydration, tetanus vaccine, 45 mg pheniramine hydrogen maleate ampoule, and 60 mg methylprednisolone ampoule (intravenous) were administered in the ED, and the patient was referred to the dermatology service for follow-up. In the dermatology department, where she was hospitalized, pheniramine hydrogen maleate 45 mg (for 2 d), intravenous methylprednisolone 40 mg (given for 8 d), and, with the recommendation of the infectious diseases department, ampicillin/sulbactam 1.5 g (intravenous, given every 6 h for 10 d) were started. On soft tissue ultrasonography, thickening in the subcutaneous soft tissue planes in the area lateral to the left thigh and an increase in heterogeneity and echogenicity were observed, and an image that may be compatible with cellulitis in the posterior-posterolateral subcutaneous tissue on the level of the middle third of the diaphysis of the left femur was detected on magnetic resonance imaging.

The patient was hospitalized and followed for 10 d. On the 10th day, a decrease in the diameter of the bite zone and regression of erythema was observed, and the necrotic lesion in the bite zone was persistent. The patient was discharged with a recommendation for outpatient follow-up. During the follow-up, at 19 d after the bite, skin necrosis and ring-shaped erythema continued in the same area; necrosis became more apparent on the 33rd day (Figure 3A and B). The necrotic area was debrided through plastic surgery and a flap was implanted in that

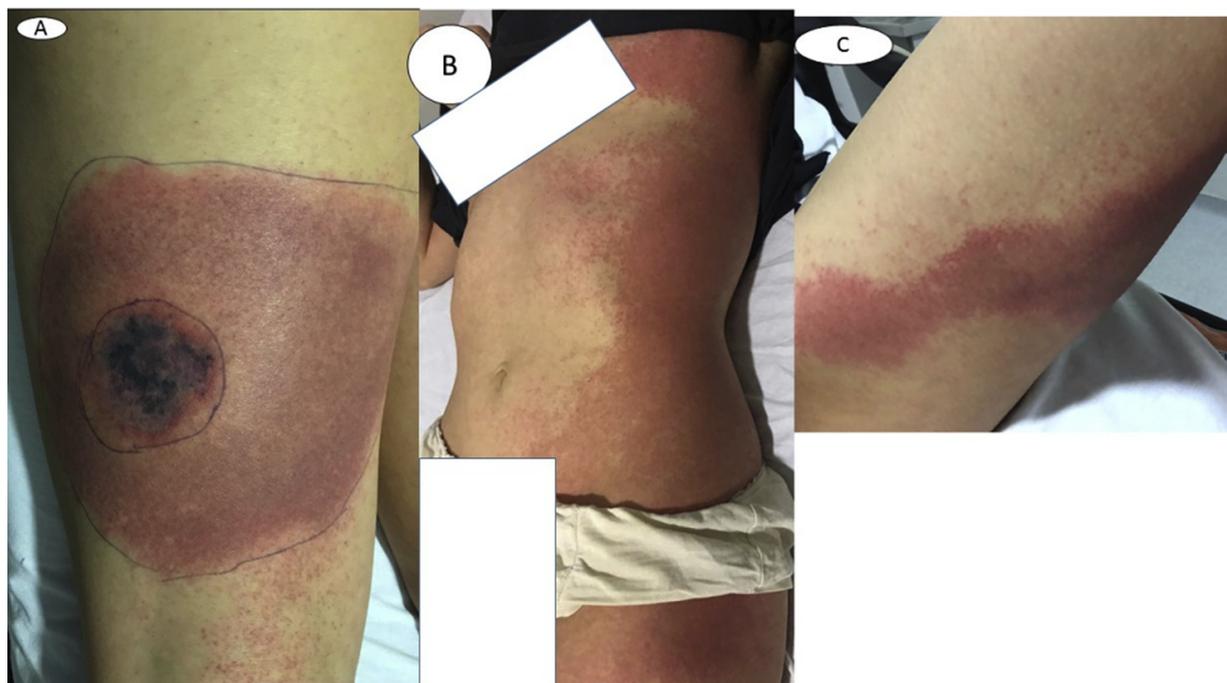


Figure 2. Physical examination findings are associated with a bite at the time of admission to the emergency department. (A) Skin necrosis in the bite zone and surrounding hyperemia, rash. (B) Skin eruption that spreads upward from the bite zone, cellulitis. (C) Hyperemia extending from the bite to a certain area (possible lymphangitis).

area. Follow-up and treatment of the patient were continued.

Discussion

In recent years, few cases of *Loxosceles* bite and associated clinical toxicity have been reported from Turkey. *L. rufescens* was recorded in several regions in Turkey.^{2,3,12,13} However, in Turkey, in 2 cases of reported spider bites, *Loxosceles* venom was detected in the patient's skin with enzyme immunosorbent assay and supported the diagnosis of *Loxosceles* bite.⁶

The verified identity of the spider is a key issue in suspected spider bites, and presumed identity is a common feature in reported loxoscelism. Identifying the spider itself is considered the only certain way to diagnose a *Loxosceles* bite. The characteristic appearance of many recluse spiders is an important clue.⁹ The spider assigned responsibility for the bite was not precisely identified by an expert, but the spider's color and appearance (Figure 1), the clinical history of the bite, and its progression (as evidenced by the provided photographic timeline) are typical for the recluse spider. In our case, the lesion gradually enlarged, the patient had severe pain in the leg and difficulty in walking, and the wound

on the skin ulcerated and turned into a necrotic lesion with large halo-shaped hyperemia around it and a black center (Figures 2 and 3). The patient herself could define the spider clearly and because she killed the spider, the remaining parts also supported this recollection.

However, there are important clues in the differential diagnosis to rule out other conditions that may cause dermonecrosis. Other factors accordant with the clinical presentation of a recluse spider bite are seasonality and location of the bite, as well as accompanying cutaneous conditions. Diagnostic criteria for brown recluse spider bites have undergone many changes. For that reason, revised diagnostic criteria have been defined.^{14,15} The original diagnostic criteria¹⁴ have been revised as a 4-level classification (putative, presumptive, probable, documented) of the probability of brown recluse spider bite, taking into account characteristics of the geographic location, physical examination features, and seasonality.^{15,16} A "documented" diagnosis includes ≥ 1 positive examination finding and a brown recluse spider identified by an arachnologist. Geographical location of the putative bite being in the known habitat of the brown recluse spider, the lesion having ≥ 1 positive examination characteristic, and no characteristics indicating an alternative diagnosis (negative examination characteristics) are defined as probable. Using the revised Sams criteria, it



Figure 3. (A) Nineteen days after the bite and (B) on the 33rd day, physical examination findings of the patient and the appearance of the lesion.

was determined that 43 of 45 “probable and documented” brown recluse spider bites occurred between April and October.^{15,16} Our case may conform to the definition of probable brown recluse spider bite according to the previously described 4-level classification of the probability of spider bite.¹⁵ Furthermore, the patient lacked negative examination findings to suggest an alternative diagnosis, and the bite occurred in May, which increased the probability of a diagnosis.

Recluse spider bite is characterized by systemic symptoms known as dermonecrosis and loxoscelism. Sphingomyelinase-D activity in *Loxosceles* venom is responsible for hemorrhagic and necrotic lesions.¹⁷ The bite of *L. rufescens* can cause a clinical picture known as cutaneous loxoscelism. A typical bite exhibits a characteristic pattern with itching, pain, and erythema within 6 h and an irregular, erythematous ring that limits the bite in 24 h. Typical bite wound progression begins with blistering followed by color changes, ulceration, and necrotic eschar. These skin findings were observed in our patient.^{5,9,12,18} Within 48 h, central necrosis may occur, starting as an area of central cyanosis that may form a blister and ulcerate. These findings give a typical blue-white-red concentric pattern to the lesion: erythema (red) around a pale area (white) of peripheral vasoconstriction with central necrosis or ecchymosis (blue). This describes the red, white, and blue color change sign associated with *L. rufescens* bites in Europe,³⁻⁶ which is generally observed in the early period (2–3 d). However, in our study, the patient presented after 6 d. Therefore, the red

and white color can be seen clearly and the blue discoloration mark is not clear (more dark purple) (Figures 2 and 3).

Although skin lesions and necrosis due to brown recluse spider bite have been reported, diffuse skin lesions along with necrotic lesions, cellulitis, and lymphangitis are rarely defined. In the case series, cellulitis and skin necrosis were the most common indications of local loxoscelism.¹¹ Our patient did not have neutrophils and elevation in white blood cell count and C-reactive protein. This may be due to the use of antibiotics by the patient. In the literature, the progression of skin necrosis due to *Loxosceles* spider bites are usually similar. In the previously reported case,³ the progression stages of erythema, plaque, and necrosis after the bite seem similar to our case, although the temporal progression may not be exactly matched. We think that there may be some differences depending on the case and the medical history that was taken. As mentioned previously, systemic envenoming occasionally occurs after *Loxosceles* bites; however, it did not develop in our patient, and only local effects develop in most envenomed patients.

The wound typically heals within 3 wk without leaving a permanent scar; however, 20% of bites may develop a necrotic ulcer that will remain symptomatic for a long time.^{10,19} It is also stated that only 10 to 15% of bites cause “major problems,” defined as unacceptable scarring, hospitalization, or chronic lesions.¹⁸ In our case, the wound was surgically debrided, and a flap was performed on the necrotic area.

There are many causes of dermonecrotic lesions. Bacterial and fungal infections, drug reactions, ecthyma gangrenosum, pyoderma gangrenosum, necrotizing fasciitis, thromboembolic phenomenon, focal vasculitis, Lyme disease, neoplasms, and chemical burns should be considered in the differential diagnosis. Other arthropods can inflict dermonecrotic lesions that are accompanied by significant color changes, edema, surrounding plaques, and cellulitis, especially centipedes and millipedes, and some infections due to ticks and mites.^{9,12,14,20-22} A study in Chile suggested that only 45% of presumed spider bites were inflicted by arthropods (17% linked to *Loxosceles*), with 44% of cases resulting from infection and 11% caused by physical or chemical agents.²³

History, clinical findings, and diagnostic tools can be used to exclude conditions that may cause skin necrosis. The medical history of the patient is the most important determinant, and physical examination findings and clinicians' experience may help eliminate more common causes of necrotic skin lesions, such as bacterial and fungal infections and diabetic and pressure ulcers. It has been suggested that, in circumstances in which a spider is not captured close to the site of injury at the time that the envenomation occurred, the term "probable arthropod envenomation" be used if other medical causes of "necrotic arachnidism" have been excluded.²⁴ In our case, the fact that the patient clearly described the spider bite (Figure 1), even if not fully, confirms that it was a spider bite. The patient did not describe any other possible arthropods (ticks, millipedes, or mites). Confirmatory diagnostic testing techniques for *Loxosceles* envenomation have been developed²⁵ but are not widely available for clinical use.

Management of recluse spider bites is initially elevation, immobilization, tetanus prophylaxis, local wound care with antiseptic dressing, and supportive treatment with painkillers. Mild bites and itchy urticaria lesions can be treated symptomatically with antihistamines. It has been suggested that infected bites with tissue destruction, such as cellulitis, should be treated prophylactically with antibiotics.^{9,26,27} Other alternatives in the treatment of *Loxosceles* spider bite include conservative wound management, hyperbaric oxygen, dapsone, glucocorticoids, vasodilators, and antivenin. These alternatives can be costly, painful, and/or toxic.^{3,5,10} None of these treatments have been proven to be effective in patients' recovery. Most bites are self-limiting and heal without intervention.^{3,5,10} Analgesic, antihistaminic, steroid, and antibiotic treatments were given to our patient because of itching, diffuse urticaria lesions, cellulitis, and skin necrosis. The clinical findings disappeared in 3 wk, except for skin necrosis. Skin necrosis was surgically debrided and the flap was performed on the necrotic area.

LIMITATIONS

The fact that the spider type was not precisely identified by an expert is an important limitation in this case. This can be described as a presumed brown recluse spider case. *Loxosceles* spider bite was considered the most likely diagnosis based on the patient's precise description of being bitten by a spider and on the seasonality of the spider bite, the geographic region where the bite occurred, clinical and physical examination findings, and diagnostic criteria, without the capture and identification of the spider by an entomologist. Poisoning by another arthropod or member of the family *Sicariidae* would be less likely. The patient did not describe any other possible arthropods (ticks, millipedes, or mites).

Conclusions

We report a case of envenoming due to a presumed *Loxosceles* spider bite, which is rarely seen in Turkey. We present this case to describe the typical features of the presumed *Loxosceles* spider bite and to highlight the unusually early and rapid progression of the disease in the patient. Symptoms can start with erythema and cause complications such as cellulitis, lymphangitis, and diffuse urticaria. Especially in a young patient, it may result in cosmetic defects and dermonecrosis treated surgically (flap). Such patients may need long-term follow-up in terms of dermonecrosis, and surgical intervention may be required. In patients with a history suggestive of a bite and with these clinical findings, the diagnosis of a bite by *Loxosceles* spp. should be carefully considered based on clinical and epidemiologic findings. Nevertheless, physicians should consider the far more common causes of skin ulcers and dermonecrosis before considering loxoscelism.

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