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Beneath the Surface: The Search for Answers in a Necrotic Leg Lesion

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Abstract

This case report discusses the diagnostic challenges associated with a necrotic lesion on the left lower leg of a 28-year-old female located in Northern Virginia, initially suspected to be caused by a brown recluse spider bite (loxoscelism). The lesion evolved from a blister to a necrotic eschar after several weeks, and despite clinical features consistent with a spider bite, the patient's geographic location and lack of risk factors for loxoscelism led to the exclusion of this diagnosis. Cross-specialty consultations, including dermatology, infectious disease, and plastic surgery, were involved in the management of the wound. Histopathological analysis revealed shallow ulceration with fat necrosis but no signs of vasculitis or fungal infection, suggesting a resolving infectious process of trauma rather than a venomous bite. The patient was managed with topical silvadene and compression therapy, with progressive healing observed over several weeks. This case highlights the importance of a comprehensive diagnostic approach and the role of geographic and clinical context in diagnosing necrotic skin lesions.

Keywords

Necrotic Skin Lesion, Lower Extremity Ulcer, Soft Tissue Infection, Diagnostic Challenge, Case Report

1. Introduction

Necrotic skin lesions pose a significant diagnostic and therapeutic challenge due to their broad differential diagnosis and overlapping clinical features. They may result from vascular compromise, infectious agents, inflammatory dermatoses, or envenomation, with each etiology necessitating a distinct management approach [1] [2]. Depending on the underlying etiology of the lesion, treatment may war-

rant surgical or non-surgical interventions. For example, lesions with an underlying arterial etiology may be managed with revascularization through surgical bypass or percutaneous procedures, vasodilators, or compression. On the other hand, conservative management through compression treatment is the standard of care for lesions with a venous etiology. Surgical interventions are rarely used due to a history of poor healing [2]. Accurate diagnosis is critical, as misidentification can lead to delayed healing, unnecessary treatments, or complications such as secondary infection or scarring. One condition often implicated in necrotic ulcers is loxoscelism, the cutaneous manifestation of a brown recluse spider bite (*Loxosceles reclusa*). Characteristically, it presents with a central necrotic eschar surrounded by erythema and can resemble other dermatologic pathologies [3]. However, many suspected cases occur in non-endemic areas, where the spider is rarely found [3] [4]. Misdiagnosis in these regions may lead to anchoring bias, inappropriate treatment, or overlooked alternative causes. The importance of histological confirmation is noted by the fact that true envenomation typically exhibits vascular thrombosis and intense neutrophilic infiltrates, features often absent in cases misattributed to spider bites [5]. This report discusses a case involving a 28-year-old woman from Northern Virginia, where brown recluse spiders are not native. She developed a necrotic ulcer of uncertain etiology, which prompted an extensive multidisciplinary workup. Initial suspicion of loxoscelism was reconsidered in light of her geographic location, clinical progression, and negative infectious workup. Ultimately, histopathological findings and therapeutic response favored trauma or a resolving infectious process. This case highlights the importance of combining geographic epidemiology, specialty collaboration, and tissue biopsy in approaching necrotic ulcers of unknown cause.

2. Case Presentation

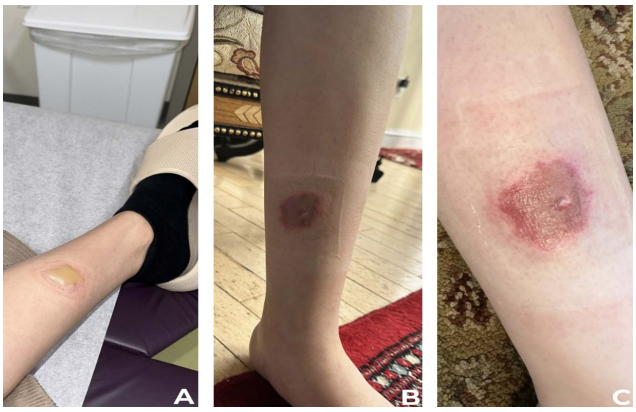

Figure 1. Clinical progression of the patient's necrotic lesion during and after urgent care. (A) Initial presentation on November 11, 2023, characterized by a shallow ulcer with a yellowish fibrinous exudate, surrounded by mild erythema; (B) Intermediate healing stage with a a protective dressing has been applied, and the surrounding skin remained slightly erythematous on November 24, 2023; (C) Advanced healing stage, with significant re-epithelialization, slightly decreased erythema, and the formation of a healthy wound bed on November 28, 2023.

A 28-year-old female presented to urgent care in November 2023 with a painful, enlarging blister and surrounding erythema on her LLE (Figure 1). The patient woke up to sharp pain during the night and noticed the lesion the next morning. The patient uses a heating pad on her leg nightly and notes she may have slept on her remote. No other associated symptoms were noted. The patient has pets, but no known history of an insect bite. She has a history of celiac disease but no other significant medical history. Upon examination, the patient was neurovascularly intact distally. Urgent care cultured the lesion and the patient initiated treatment with 500mg cephalexin three times per day for 7 days and Bactrim twice a day for 7 days. The patient was instructed to take 600 mg of Motrin for pain as needed and change her wound dressing twice a day.

The patient returned to urgent care 9 days later. She completed her Bactrim treatment, but was still treated with cephalexin for an alternate medical reason. The patient denied other symptoms, including fever and chills. The lesion was tender to palpation, but no spreading erythema or drainage. The size of the wound remained stable, as seen in Figure 2. The patient's culture was negative, and the medical team believed infection was unlikely based on these results and the lack of improvement with two antibiotics. They suspected a local inflammatory reaction and initiated clobetasol ointment.

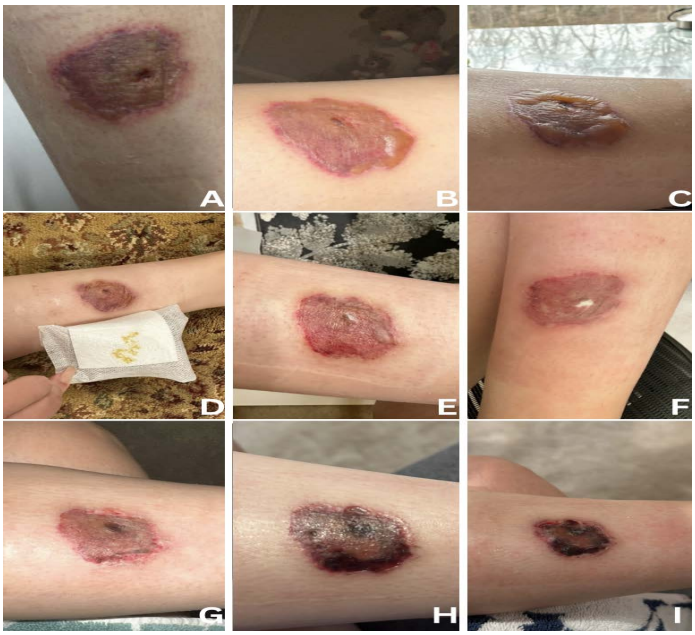

Figure 2. Clinical progression of the patient's necrotic lesion over multiple revisits to urgent care. (A) Lesion at the second urgent care visit on December 1, 2023; (B) Appearance of the lesion on December 3, 2023, showing tissue growth; (C) Lesion on December 7, 2023, with growth with height; (D) Progression on December 8, 2023, demonstrating yellow oozing of fluid out of tissue; (E) Lesion on December 10, 2023, signs of tissue growth and repair; (F) Lesion on December 11, 2023, showing a sign of white pigmentation in the center of the wound; (G) Lesion on December 13, 2023, signs of color change at center to black; (H) Appearance on December 14, 2023, shows gradual changes to black around borders; (I) Lesion on December 15, 2023, with continued progression of black necrosis.

The patient saw Internal Medicine two and a half weeks later. At this time, the patient was treated with doxycycline and clobetasol ointment for the necrotic lesion on her LLE (Figure 3). The patient noted continued pain, but denied pruritus, spreading erythema and warmth. A referral was sent to Dermatology.

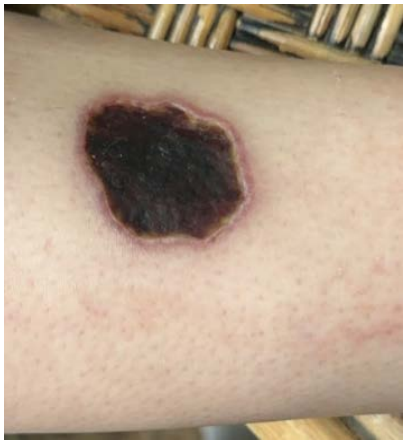

Figure 3. A Lesion on 12/22/23 after the initial Dermatology appointment.

The patient's Dermatology visit was 1 week later. At this time, the patient was treated with clobetasol ointment twice weekly. The patient presented with a 5 cm plaque of thin eschar and a thin rim of localized erythema (Figure 4). The lesion remained painful, and the patient continued to deny symptoms including other rashes. A 3.5 mm punch biopsy was performed.

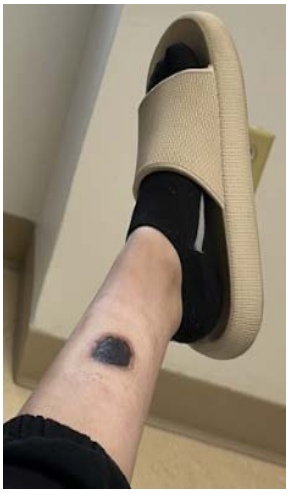

Figure 4. Lesion at dermatology visit 12/26/23.

About one week later, the patient was seen by Emergency Medicine for increasing pain and pressure when ambulating (Figure 5). At this time, the patient had not received biopsy results from Dermatology. The patient presented with secondary irritation from bandages and was instructed to treat with ibuprofen for pain as needed.

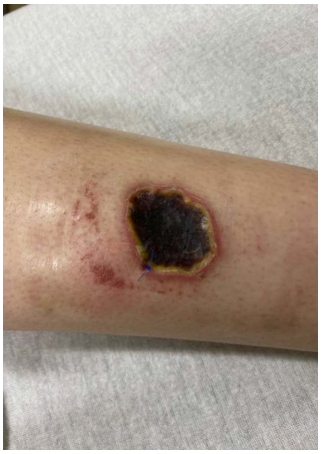

Figure 5. Clinical presentation of patient's lesion at emergency medicine visit on January 3, 2024.

Two days later, the patient was seen by Plastic Surgery. At this appointment, the lesion measured 3 cm × 3.3 cm and was not progressing (**Figure 6**). The patient also received biopsy results indicating a shallow ulcer with scant associated inflammation. The neighboring epidermis appeared completely uninvolved based on the sharp borders present upon histological examination. Some debris was noted in the papillary dermis, below the area of ulceration. This region had associated inflammatory infiltrate including few lymphocytes, histiocytes, and neutrophils. The subcutaneous tissue exhibited focal, likely reactive, fat necrosis. The pathology had no indication of vasculitis, vasculopathy and pyoderma gangrenosum. Pathologists were unable to determine a clear etiology but suspected trauma, a resolving arthropod assault, or an infectious process. Based on these results, Plastic Surgery recommended silvadene on the wound twice a day and lidocaine cream adjacent to the wound for pain as needed. Compression and elevation were encouraged. Future in-office debridement was discussed in the case that the wound did not auto-debride.

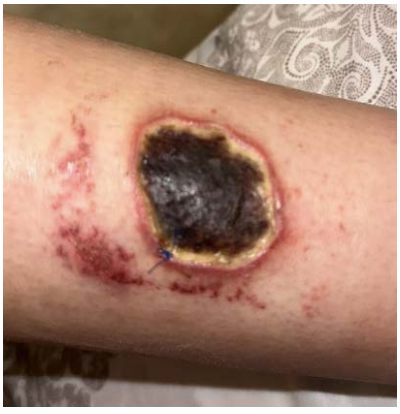

Figure 6. Lesion one day after patient's plastic surgery appointment 1/5/24.

About a week later, the patient was seen with Infectious Disease. It was reviewed

that the patient had no recent travel history out of the country. Small pruritic lesions surrounding the eschar were progressing to bullae (Figure 7). After examination, Infectious Disease noted the initial lesion appeared to be a spider bite. Leishmania, fungal infection and trauma were ruled out based on patient history. Skin tuberculosis was unlikely due to lack of nodules and ulceration. Excision biopsy and consult for broad range bacterial/fungal and TB PCR were discussed at the appointment, but no biopsy was performed. The lesion was still painful and Plastic Surgery was contacted to initiate debridement.

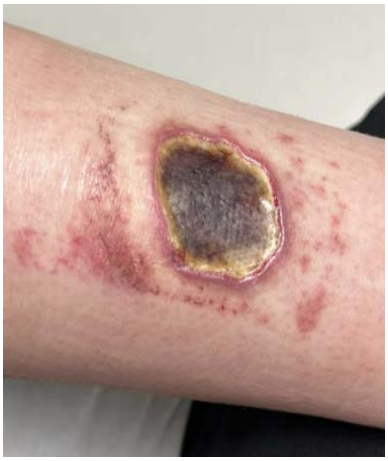

Figure 7. Lesion at infectious disease appointment 1/11/24.

The patient was seen one week later by Rheumatology. The lesion had not increased in size and was occasionally painful and pruritic (Figure 8). Lab results revealed a positive ANA, which they shared may be related to the patient's history of celiac disease.

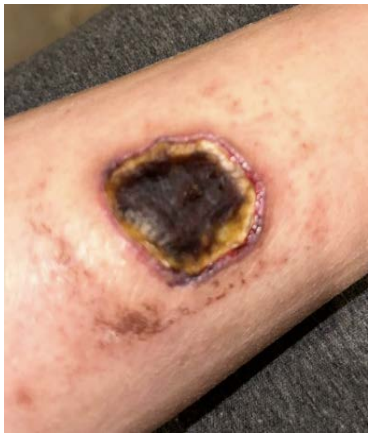

Figure 8. Lesion the day of the Rheumatology appointment 1/18/24.

The wound remained stable in size at the patient's Plastic Surgery appointment the following week (Figure 9). They noted a slight decrease in surrounding erythema and occasional bleeding along the wound edges. At this time, the eschar

appeared more yellow than black. The wound was debrided at the appointment and the patient was instructed to continue silvadene twice daily and compression. The patient returned about two weeks later for a follow-up appointment. Granulation tissue was noted, and the surrounding erythema decreased, but the patient still experienced occasional pain. Hyperbaric O_2 was discussed, but was not initiated due to concerns that insurance would not cover the treatment. Two weeks later, the patient had another follow-up appointment with Plastic Surgery. The wound was slowly improving with central granulation tissue and re-epithelialization around the wound edges. Silver nitrate was applied to areas of hypergranulation at the appointment, and the patient was instructed to continue Silvadene and compression.

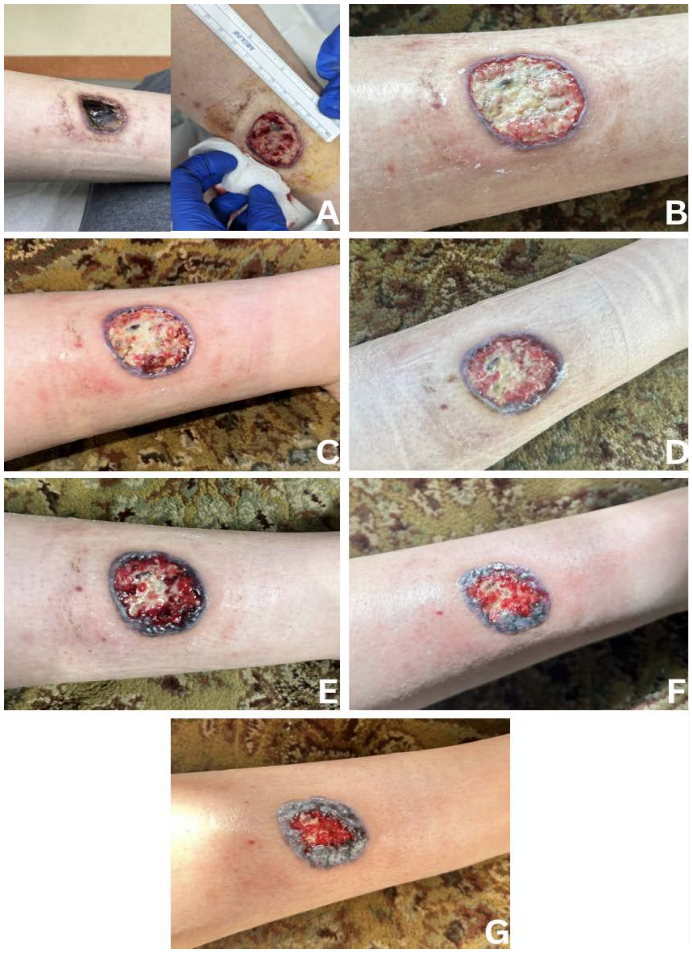

Figure 9. Clinical progression of the wound following debridement by Plastic Surgery. (A) Wound presentation before and after debridement on January 24, 2024; (B) The wound shows early healing with the presence of fibrinous yellow slough and a well-demarcated erythematous border 6 days later; (C)-(D) Progressive reduction of slough with increased granulation tissue and peripheral epithelialization approximately two weeks post-surgery; (E) The wound continues to granulate, with a more defined, hyperpigmented, blackish-gray border approximately three weeks post-surgery; (F)-(G) Advanced healing stages, showing reduced fibrin deposition, wound contraction, and epithelial regrowth along the margins after approximately four weeks post-surgery.

3. Discussion

This case underscores the diagnostic complexity of necrotic ulcers, particularly when typical systemic findings or exposure histories are absent. The patient's lesion was initially presented as a blister, eventually progressing to a central eschar with surrounding erythema. While the clinical pattern raised early concerns for loxoscelism, geographic and clinical inconsistencies argue against it. Brown recluse bites are exceedingly rare in Northern Virginia and confirmed envenomation cases are typically accompanied by systemic symptoms or geographic exposure to endemic regions [3] [4]. The patient denied any such exposure and had no systemic complaints such as fever, malaise, or lymphadenopathy. Significantly, histopathologic findings from the punch biopsy were non-specific. The lesion showed shallow ulceration, focal fat necrosis, and a mild inflammatory infiltrate composed of neutrophils, histiocytes, and lymphocytes, with no evidence of vasculitis, fungal elements, or vascular thrombosis. Genuine recluse spider bites tend to demonstrate vascular thrombosis and prominent dermal neutrophilic infiltrates [5], neither of which were observed here. This finding strongly supported an alternative etiology, likely traumatic or infectious in origin. Specialty consultations played a pivotal role in narrowing the differential. Dermatology initiated the biopsy and recognized the lack of systemic features or widespread skin involvement. Infectious disease ruled out fungal, parasitic and mycobacterial infections (e.g., Leishmania, TB) based on clinical and travel history. Rheumatology evaluated a positive ANA and ultimately attributed it to the patient's underlying celiac disease, rather than an autoimmune dermatosis. Plastic surgery performed debridement and wound management, noting that granulation tissue developed post-debridement, supporting healing rather than progressive necrosis.

From a vascular standpoint, arterial and venous ulcers were considered but were inconsistent with the presentation. Arterial ulcers typically manifest with cold, pale extremities, delayed capillary refill, and diminished distal pulses [1] [2]. These signs were absent on the exam. Venous ulcers usually present above the medial malleolus with edema, hemosiderin staining, and shallow, irregular borders, also not seen here [6]. The location of the lesion and lack of vascular stigmata made a mixed arterial-venous pathology unlikely. Over the following weeks, the wound was managed conservatively with topical Silvadene, compression therapy, and ultimately silver nitrate to address areas of hypergranulation. These interventions led to progressive re-epithelialization. The delayed yet steady improvement aligns with trauma-related ulcers or self-limited inflammatory processes, which often resolve with appropriate local wound care [6]. Overall, this case highlights the diagnostic complexity of necrotic ulcers, particularly when clinical findings reinforce involvement from multiple specialties. The absence of classic systemic signs contributed to delays in establishing a definitive diagnosis. This underscores the need for a more structured diagnostic algorithm to guide evaluation of atypical ulcer presentations. Additional limitations included the lack of advanced imaging, such as CT or angiography, which could have helped rule out vascular pathology.

These challenges point to broader implications for clinical practice, emphasizing the importance of refining diagnostic protocols to reduce uncertainty and improve outcomes in similar cases for future research.

Consent for Publication

Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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