



Case Report

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Finger Necrosis Following Snakebite in an Endemic Region: A Case Report and Surgical Considerations

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Abstract

Snakebite envenomation remains a significant cause of morbidity worldwide, with local tissue complications representing a major determinant of long-term functional outcome. Severe manifestations such as progressive necrosis, compartment syndrome, and chronic non-healing wounds frequently require surgical and reconstructive intervention. We report the case of a 67-year-old male patient who developed extensive soft tissue necrosis following a snakebite to the right hand.

Despite timely systemic management, including antivenom therapy, progressive local tissue destruction occurred. Surgical treatment consisted of staged debridement followed by definitive reconstruction using fasciotomy and skin grafting. Satisfactory functional and aesthetic outcomes were achieved. This case underscores the critical role of plastic and reconstructive surgery in the management of severe local complications of snakebite envenomation. Early multidisciplinary collaboration and appropriate surgical timing are essential to minimize morbidity and optimize outcomes.

Keywords: Snakebite; Envenomation; Necrosis; Fasciotomy; Thromboplastin

Abbreviations: ICU: Intensive Care Unit; aPTT: Activated Partial Thromboplastin Time; INR: International Normalized Ratio

Introduction

Snakebite envenomation continues to represent a significant global public health problem, particularly in rural and resource-limited regions of the world [1,2]. According to the World Health Organization, snakebites are responsible for substantial morbidity and mortality each year, with survivors frequently experiencing long-term physical and functional sequelae [1]. While systemic manifestations such as coagulopathy, neurotoxicity, and cardiovascular instability often dominate the acute phase of clinical management, local tissue complications are increasingly recognized as a major determinant of long-term disability and quality of life [3]. Local effects of snake venom range from mild edema, pain, and blistering to more severe complications, including extensive soft tissue necrosis, compartment syndrome, secondary infection, and permanent functional impairment [4,5].

These local injuries are particularly devastating when they involve anatomically delicate regions such as the hand and fingers,

where limited soft tissue reserves and complex neurovascular structures predispose patients to stiffness, contracture, and functional loss [4]. The pathophysiology of venom-induced local tissue injury is multifactorial. Direct cytotoxic effects of venom components lead to myonecrosis and dermonecrosis, while endothelial injury results in increased vascular permeability, edema, hemorrhage, and microvascular thrombosis [6,7]. Inflammatory mediators further amplify tissue destruction and delay wound healing [6]. Importantly, several studies have demonstrated that local tissue damage may progress despite timely and adequately dosed antivenom therapy, underscoring the limited efficacy of antivenom in reversing established cytotoxic injury [2,7].

Delayed presentation, inappropriate first-aid measures such as prolonged tourniquet application, and limited access to specialized care further exacerbate local tissue damage [3,8].

These factors significantly increase the likelihood of surgical intervention and complex reconstruction [5,9]. In this context, plastic and reconstructive surgeons play a pivotal role in the multidisciplinary management of snakebite-related injuries. Timely debridement, fasciotomy when indicated, and appropriate reconstruction are essential to restore function and minimize long-term morbidity [4,9,10]. We present a case of finger necrosis following snakebite envenomation, with an emphasis on surgical decision-making and reconstructive outcome considering current evidence.

Case Presentation

A 67-year-old male patient with no significant past medical history presented to the emergency department after sustaining a snakebite to the lateral aspect of the third finger of his right hand while harvesting pistachios in an endemic rural area of Siirt, southeastern Türkiye. The patient initially perceived the injury as an insect bite, which contributed to delayed presentation. At initial presentation, the patient was prophylactically admitted to the

intensive care unit (ICU) due to confirmed snakebite envenomation. Management consisted of close clinical monitoring, antivenom administration, supportive care, and tourniquet application at a peripheral healthcare facility. Laboratory evaluation revealed mild coagulopathy, characterized by prolonged international normalized ratio (INR) and activated partial thromboplastin time (aPTT).

After five days of ICU monitoring and stabilization of systemic findings, the patient was referred to the plastic and reconstructive surgery department. Physical examination demonstrated marked swelling, severe localized pain, skin discoloration, and areas of progressive soft tissue necrosis at the bite site. Distal neurovascular status was preserved. The clinical appearance of the lesion at the time of admission is illustrated in Figure 1. Surgical exploration revealed well-demarcated necrosis limited to the skin and subcutaneous tissue. A necrotic area measuring approximately 2 × 2 cm was identified at the level of the distal interphalangeal joint of the third finger of the right hand.



Figure 1: The clinical appearance of the lesion at the time of admission.

Serial surgical debridement was performed to exercise all nonviable tissue and to establish a healthy, well-vascularized wound bed. Intraoperatively, the digital neurovascular pedicle was carefully assessed and found to be intact. Given the degree of swelling and concern for increased compartmental pressure, finger fasciotomy was performed to prevent further ischemic compromise. Following adequate demarcation of necrotic tissue and resolution of local inflammation, definitive reconstruction was achieved using a split-thickness skin graft. The graft demonstrated satisfactory take during early postoperative follow-up. The postoperative course was uneventful, with no evidence of infection, graft loss, or neurovascular compromise. At follow-up, complete wound healing was achieved, with preservation of finger function and an acceptable aesthetic outcome.

Discussion

Local tissue complications following snakebite envenomation remain a major therapeutic challenge and are frequently underestimated during the acute phase of management [3,5]. While systemic manifestations often receive primary clinical attention, local tissue injury plays a decisive role in determining long-term functional outcome, particularly when the hand is involved [4]. Previous studies have reported that local wound complications develop in approximately 10–44% of snakebite cases, with a substantial proportion of patients ultimately requiring surgical intervention [5,9]. The severity of local injury varies widely and depends on venom composition, bite location, time to treatment, and host factors [7].

Hand and finger bites are associated with a disproportionately high risk of functional impairment due to the confined anatomical compartments and limited soft tissue coverage [10]. Venom-induced local tissue injury is mediated by a combination of direct cytotoxic effects, endothelial damage, inflammatory cascades, and microvascular thrombosis [6,7]. Cytotoxic venom components cause dermonecrosis and myonecrosis, while endothelial injury leads to ischemia and progressive tissue loss [6]. These mechanisms explain why local necrosis may continue to evolve even after systemic stabilization has been achieved [7]. Multiple studies emphasize that antivenom therapy, although essential for the management of systemic envenomation, does not reliably prevent the development or progression of local tissue necrosis [2,7].

As a result, exclusive reliance on medical management may delay recognition of evolving tissue injury and postpone necessary surgical intervention [9]. The timing and extent of surgical management are therefore critical determinants of outcome. Delayed referral to tertiary care centers has been consistently associated with increased tissue loss, secondary infection, prolonged hospitalization, and more complex reconstructive requirements [8,9]. In contrast, early involvement of plastic and reconstructive surgeons allows timely assessment of tissue viability, controlled debridement, and prevention of secondary complications [4,10]. Plastic surgeons are frequently involved during the subacute or chronic phases of snakebite management, addressing complications such as non-healing wounds, exposed tendons or bone, joint stiffness, contractures, and contour deformities [9,10].

A staged surgical approach-initial debridement followed by delayed reconstruction once inflammation subsides and tissue viability is clearly established-is widely advocated to optimize reconstructive success and functional recovery [4,10]. From a regional perspective, venom characteristics are closely related to snake species distribution. In Türkiye, most clinically significant envenomations are caused by members of the Viperidae family. *Macrovipera lebetina* (Levant viper) is the most prevalent and medically important species in southeastern Anatolia, including the Siirt region, and is known for its potent cytotoxic and hemotoxic venom [8,9].

Other venomous species encountered in Türkiye include *Montivipera xanthina*, *Vipera ammodytes*, and *Vipera kaznakovi*, which share similar venom-mediated mechanisms of tissue destruction [8]. Several studies from Türkiye have demonstrated that bites caused by *Macrovipera lebetina* are associated with more pronounced local tissue necrosis and higher rates of surgical intervention compared with other regional species [9,10]. The present case is consistent with these findings and illustrates

that localized finger necrosis may develop despite appropriate antivenom therapy and intensive care monitoring. Early referral to plastic surgery enabled timely debridement and reconstruction, preventing secondary infection and preserving hand function [11].

Conclusion

Local tissue complications of snakebite envenomation can result in significant functional and aesthetic impairment if not managed appropriately. This case underscores the importance of early multidisciplinary collaboration and highlights the pivotal role of plastic and reconstructive surgery in achieving optimal outcomes. Originating from Siirt, a region in southeastern Türkiye where venomous snakebites remain relatively common, this report emphasizes that local tissue injury should be anticipated in endemic areas. Increased awareness of venom-induced local sequelae and timely referral to specialized centers are essential to minimize long-term morbidity, reduce reconstructive complexity, and preserve hand function.

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