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Development of osteomyelitis secondary to a snakebite: Case Report

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ABSTRACT

The Viperidae family is responsible for most of the venomous snakebites in Anatolia. Toxicity symptoms may be local such as edema, hyperemia, blisters, necrosis, lymphadenopathy, and ecchymosis or hematological, including high white blood cell (WBC), neutrophilia, decrease in hemoglobin, thrombocytopenia, international normalized ratio (INR) elongation, and increase in creatine kinase (CK), tumor necrosis factor alpha (TNFα), and lactate dehydrogenase (LDH). Antivenom therapy should be provided if hyperemia continues and/or edema does not regress. Complications are very low in envenomation cases related to Viperidae bites with proper treatment and follow-up. Otherwise, complications can progress to necrosis, acute renal failure, compartment syndrome, amputation, and death may be seen. However, no report in the literature has described osteomyelitis as a late complication of snakebite. In this study, we present an osteomyelitis case caused by snakebite culminating in amputation because of the inadequate treatment.

Key words: *Snakebite, osteomyelitis, treatment, amputation, Viperidae*

Introduction

The Viperidae family is responsible for most of the venomous snakebites in Anatolia. It is not always possible to diagnose venomous snake bites. Nonspecific findings are usually all that we can rely upon [1,2]. Toxicity symptoms may be local, such as edema, hyperemia, blisters, necrosis, lymphadenopathy, ecchymosis or hematological, such as high white blood cell (WBC), neutrophilia, decrease in hemoglobin, thrombocytopenia, international normalized ratio (INR) elongation, and increase in creatine kinase (CK), tumor necrosis factor alpha (TNFα), and lactate dehydrogenase (LDH) [1,4].

Antivenom therapy should be provided if hyperemia continues and/or edema does not regress. Hematological follow-up along with local findings provide a clearer picture of the extent of envenomation and the treatment options. The initial signs of venomous snake bites in the blood are neutrophilia and leukocytosis. In addition, hemoglobin levels tend to increase before beginning to decrease after 4–6 h [2]. After the immediate effects of the venom, WBC starts to decrease to normal levels. However, this decrease does not mean that the effects of the venom have been completely resolved.

The co-occurrence of specific enzymes in the venom plays a specific role in the clinical appearance [2,4-6]. Hyaluronidase accelerates the dissemination of venom through the tissues. Another enzyme is phospholipase A, which causes hemolysis by converting lecithin to lysolecitihin. These proteolytic enzymes

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destroy the endothelium of the vessels at the snake bite location, and are responsible for causing hemorrhagic edema, blood leakage out of the vessel, and systemic bleeding [2].

Complications are very low in envenomation cases related to Viperidae bites with proper treatment and follow-up. Otherwise, complications progressing to necrosis [5], acute renal failure [6], compartment syndrome [6-8], amputation [1,6-8], and even death [8] may be seen.

In this study, we present an osteomyelitis case caused by snakebite culminating in amputation because of the inadequate treatment.

Case Report

A 58-year-old female patient who had been bitten by a snake on her anterior left ankle 14 years ago presented to our department. Necrosis was formed in the bite zone. The open wound of the patient, who had not received any treatment at the time, closed secondarily in about 45 days. In the second year following the closure, the wound opened, but closed secondarily again. There were intermittent wound influx for 5 years and whenever the wound started to close, it opened again soon after. The patient has not got any other infection or open trauma history. In physical examination, it was seen that there was a granulated open wound sized 4x2,5 cm and a secondary healing scar sized 8x7 cm around the open wound (Figure 1). The patient stated that she has been unable to walk and move her ankle for the last five years. Concerning the laboratory results, hemoglobin level was 11.3, WBC 9700 mm3, platelet 320000 U/L, blood glucose 97, HbA1c 6.1. The patient did not have any additional disease (diabetes, ischemic arterial disease, etc.), except the standing open wound. Osteomyelitis of talus, calcaneus, 1-5 proximal metatarsal bones, distal tibia, and septic arthritis of tibiotalar joint were detected in two-way plain radiographs and contrast magnetic resonance imaging (MRI) (Figure 2). The patient could not walk and was using a wheelchair. Bone scintigraphy was not performed for diagnosis of osteomyelitis because osteomyelitis was clear in contrast MRI.

During the treatment, the patient was seen by with orthopedic clinicians. Osteomyelitis curettage was not performed because there was osteomyelitis in all bones

Figure 1. Appearance of the foot.

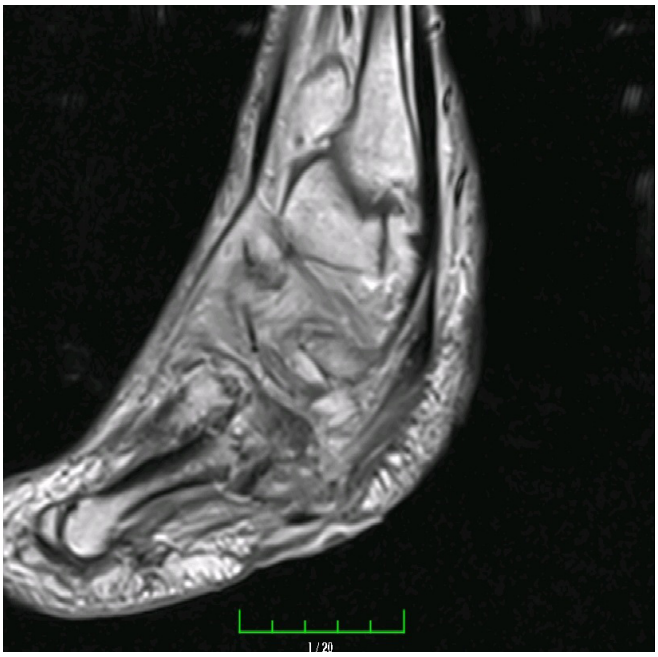

Figure 2. MRI image of the foot.

in the distal half of the leg. The bones with osteomyelitis were excised up to the healthy regions and closure of the stump was planned.

The patient was operated under spinal anesthesia. Tibia and fibula were amputated below the knee and the stump was closed. The extremity was sent to pathology. Chronic inflammatory reaction and bone osteomyelitis were detected in the pathology.

After the surgery, the patient healed without any complications.

Discussion

This case study demonstrated that snakebites may cause osteomyelitis if the patient is not treated and followed properly. Besides the lack of proper treatment, another reason for this complication is not referring to the hospital until osteomyelitis is formed.

The enzymes found in the venom of snakes enter the blood together with the venom and are responsible for the clinical appearance [1,2,6,9]. Antivenom therapy is important for regression of the clinical findings and healing without complications. Antivenom therapy should be provided if hyperemia continues and/or edema does not regress [9]. The initial signs of venomous snake bites in the blood are neutrophilia and leukocytosis. In addition, hemoglobin levels tend to increase before beginning to decrease after 4–6 h [2]. After the immediate effects of the venom, the WBC count starts to decrease to normal levels. However, this decrease does not mean that the effects of the venom have completely been resolved [9].

The most frequent complication (10%) is necrosis [5], but this percentage may decrease with adequate and timely antivenom therapy [2,9]. Timing and planning of the debridement change according to the localization of necrosis. Conservative debridement is more appropriate in areas such as the hand and fingers, which have rich in vascular-neural networks in regions however early debridement is recommended in areas such as leg and trunk [6] but it was also suggested to wait until the formation of a secondary infection [2,9].

In snakebite cases, the process, which starts with immediate antivenom therapy, should continue with reconstruction after cessation of envenomation symptoms. Secondary healing of necrosis, grafting or flap options for reconstruction may be considered. Cases without reconstruction may result in amputation [1,6-8].

The history of the patient revealed that symptoms related to the snakebite such as edema, hyperemia, ecchymosis, and necrosis were present. Despite the presence of snakebite related symptoms and a description of a snake as the animal that caused the injury, no antivenom therapy was applied. The patient described that the local symptoms, except necrosis of the ankle, had disappeared in 2-3 weeks time. Secondary healing of the necrosis occurred in 1.5 months and an attack of acute osteomyelitis developed at the second year following the snakebite. The open wound and discharge was recurrent over the last 5 years, which indicates osteomyelitis formation. The history of patient is both very long-standing and subjective, but the detailed anamnesis of the patient indicates that the patient has not suffered any other infection or open trauma.

Despite the presence of snakebite and envenomation symptoms, there was no information about the genus of the snake in the history of the patient. However, the snake is accepted as a member of Viperidae family since members of Viperidae family are frequently found in the region where the patient lives and the patient has not traveled to other areas.

In literature, there is no report of osteomyelitis as a late complication of snakebite. The possibility of penetration of the venom into the bones is very low, because the teeth of the snake are quite short. However, necrosis caused by envenomation might induce the formation of an open wound, which might help the establishment of pathogens in the bone. Therefore, first acute and then chronic osteomyelitis might develop because of the snakebite.

In addition to the absence of antivenom therapy, appropriate debridement and antibiotic therapy for the necrosis had not been applied. Thus, microorganisms most probably settled and grew first on the necrosis area, then in the subcutaneous tissue and finally in the bone. Necrosis that formed on the skin caused osteomyelitis formation because of the lack of appropriate antibiotic therapy and debridement, which finally resulted in the amputation of the leg.

Appropriate treatment is important in snakebite cases. Complications leading to amputation may be seen in incomplete and / or improper treatments. Although rare, snakebite cases that are not treated appropriately may cause osteomyelitis.

Conflict of interest statement

The authors have no conflicts of interest to declare.

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