

A CASE OF NEGLECTED SNAKEBITE COMPLICATED BY NECROTIZING FASCIITIS AND LOWER LIMB AMPUTATION

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ABSTRACT

Background: Snakebite is considered an underreported health issue in the rural areas of the 3rd world countries that was recently recognized by the world health organization as a neglected tropical disease. **Case presentation:** In the following case study, we are discussing a case of a female patient who was bitten by an unidentified snake where she sought non-specialized medical advice who prescribed non-specific management. Moreover, a traditional local snakebite therapist performed multiple local incisions. The condition was complicated by the development of necrotizing fasciitis in her right foot that ascended to the level of the thigh. Surgical consultation was done where the patient received Rocephin 2g\24H and Tavanic 500mg/24h in addition to surgical debridement of the necrotic tissue. However, below-hip limb amputation was performed as a salvage procedure for the patient life. **Conclusion:** the early administration of antivenom could prevent the development of complications by neutralizing the effect of the venom. This could be achieved through providing training to primary health care physicians working in rural and remote areas on the proper management of snakebites. In addition, it is essential to ensure a sufficient supply and proper storage of the antivenom in those areas.

Keywords: Snakebite, necrotizing fasciitis, Viperidae family, Naja haje

INTRODUCTION

Snakebite is considered as challenging wildlife health issue that affects the poor rural communities of low- and middle-income countries located in the tropical and subtropical areas with an accumulative incidence of 5.4 million snake bites worldwide every year that progress to envenomation in 2.7 million cases with an annual death rate of 3% to 5.1% of the total cases. Most of those cases are in Africa, Asia, and Latin America, with around 435K to 580K cases requiring medical intervention and treatment in Africa only. However, numbers from Africa are underestimated due to underreporting of cases as well as bite sequelae. Around 9% to 15.3% of the total cases may progress to express morbidities to envenomation in the form of amputation and permanent disabilities (WHO, 2021a). Though, it has just been recognized by the world health organization as a neglected tropical disease (NTDs) (WHO, 2021b) .

In the following case study, we will highlight an unusual case of a snake bit who is complicated with the compartmental syndrome as a consequence of delay in providing specific management because of seeking a folk remedy

that was recommended by the patient relatives who believe in traditional medicine rather than modern medicine.

CASE

A 20-year-old housewife who is a resident of a rural neighbourhood of Edfo city in upper Egypt was referred to the NECTR in early January with a history of snake bite in her right leg, just above her ankle. As the patient was bitten, she sought medical advice from a local rural hospital where she was advised to use an unknown ointment for local pain relief and apply cold fomentation. The condition progressed to severe pain at the site of the snake bite in association with swelling and bruising of the foot. Following, the patient visited an antichrist who had done multiple local incisions at the site of the swelling. The swelling ascended to the leg and thigh in association with ecchymosis, tenderness, redness, and oedema in addition to the feeling of generalized fatigue .

On admission, the patient was conscious and oriented to time, and place with a pulse rate of 90/minute, blood pressure of 120/70 mmHg, a respiratory rate of 18/minute and no signs of hemodynamic instability, however, her skin

showed signs of anaemia in the form of pallor that was confirmed by CBC that revealed her haemoglobin level of 7.1g/dl. Though, the patient denied having a history of bleeding from her gums, epistaxis, hemoptysis, hematemesis, melena, vaginal bleeding, breathing difficulty, focal neurological deficit, or unconsciousness. The local examination showed swollen left lower limb associated with skin and subcutaneous tissue necrosis where a swap was done and sent for culture and sensitivity (Fig.1&2)

The patient investigations revealed anaemia associated with leucopenia with absolute neutrophilia with the following values of Hb, Leucocytic count and neutrophile 7.1 g/dL, $20.9 \times 10^3/\text{mm}^3$ and 91%, correspondingly. As well, as an elevation of the kidney function tests in the form of elevated creatinine 2.25 mg/dL and serum urea 70 mg/dL with urine output of 2500ml/12h and CVP 8 mmHg. The patient albumin and total proteins showed decreased values (2.5 g/dL, and 5.4 mg/dL, respectively). The serum electrolyte levels were normal except for ionized calcium which showed decreased value (7.2 mg/dL). Other laboratory investigations were normal, including ABG, CRP, aspartate aminotransferase, alanine aminotransferase, random blood sugar, bleeding and clotting profiles. As well, the patient viral serology for hepatitis B, hepatitis C, and human immunodeficiency virus was negative. Urine examination was normal except for the presence of albumin (2+), and pus cells 6-8 HPF with 24-hour urine protein 0.4 g., however, the urine culture was sterile. Other investigations were unremarkable including a CT examination of the chest, ultrasound examination of the abdomen and Electrocardiogram

As the coagulation profile revealed normal values with no evidence of hemolysis or haemorrhage, antivenom and plasma transfusion were not recommended as a management line. Instead, consultation with the general surgery department was done where the patient was diagnosed with necrotizing fasciitis of the right lower limb complicating snake bite due to delay and malpractice of management. Meanwhile, the patient received 2 units of packed RBCs, Rocephin 2g\24H, Tavanic 500mg/24H and albumin 1g\kg\8h. In addition,

an arrangement for transfer to the general surgery department was done to proceed with surgical debridement of the necrotized tissue (Fig.3). However, as the infection spreads upwards, limb amputation was done as a life-saving procedure for the patient.

DISCUSSION

Snakebite envenomation is a recognized neglected tropical disease that commonly affects agriculture workers and rural residents, especially in summer and hot climates (The Lancet, 2017). Most of the affected victims were aged between 15-45 years with a median age of 30.4 years and a male predominance among victims (Gouda, Elnabarawy and Badawy, 2017) .

This could be attributed to the fact that snakes prefer to conceal themselves either as part of hibernation during cold seasons or to save themselves from predation except for executing the physiological process of reproduction and feeding (Todd, Amiel and Wassersug, 2009; Mebert, 2011; Lutterschmidt, Lucas and Summers, 2022).

This agrees with our case concerning age and geographical distribution. where the victim is in her early twentieth and is living in one of the rural areas of Upper Egypt. However, the gender and seasonal distribution showed differences that could be rationalized by the fact that the snake was forced to terminate its hibernation state due to the destruction of its habitat as part of the construction process in the victim's adjacent house as mentioned by the patient relatives by deep investigation.

Concerning the attack sites, it was observed that the majority of victims of snake bites were attacked in sites closely related to the foot and ankle in almost 72% of the snake bite victims (Cavazos et al., 2012; Kim et al., 2019), with most patients showing no or minimal manifestations of the snake bite. However, those who manifest show wide variability in manifestations ranging from local tissue reaction and necrosis proceeding to coagulopathy, neurotoxicity, rhabdomyolysis, renal failure, and shock (Jin et al., 2008).

The patient felt the bite of an unknown snake -that was not captured for identification- in her left leg just above the ankle level where she developed local symptoms in the form of

severe localized pain in addition to swelling and bruising that later progressed to ecchymosis in association with tenderness, redness, and oedema in addition to the elevated kidney functions. These manifestations were similar to those caused by the bites of the Viperidae family (**Abd El-Aziz et al., 2020; Barish and Arnold, 2022**), of which the *Naja haje* is the most suspected due to its geographical distribution on the wet margins of the Nile valley (**Masood, 2012**). In addition, Viper bites are characterized by the intense local reaction and swelling that may threaten the blood supply of the tissue if a tight fascial compartment is affected and consequently lead to tissue necrosis and infection (**Mehta and Sashindran, 2002**) .

Moreover, tissue infection is facilitated by tissue damage resulting from the digestive and/or cytotoxic effects of the venom toxins on tissues. Besides, the mouth, fangs and venom of the snake comprise gram-negative rods that could aid the progression of infection leading to the development of cellulitis as well as necrotizing fasciitis (**Guimarães et al., 2004; Tsai et al., 2017; Severyns et al., 2018**).

In our case, we believe that another source of infection may coexist, as the patient had visited a local traditional therapist who had done multiple local incisions at the bite site. Where we cannot guarantee the sterilization of the instrument used or the hygiene of the local environment where the incisions were done. Therefore, necrotizing fasciitis was suspected as extensive local tissue destruction ascending to the level of the thigh was observed in association with impending renal failure .

Eradication of the source of infection is considered the main line of management in such cases in the form of extensive debridement of all easily removable tissues with the cover of antibiotics for both gram-negative bacilli and anaerobes (**Edlich et al., 2010**). However, the surgical team went for below-hip limb amputation as a salvage procedure where the infection was resistant to antibiotic treatment and the spread of the infection was unlikely to be stopped and could threaten the patient's life.

The dreadful sequel in this patient may be contributed to several factors including the dose of injected snake venom in addition to the snake species. however, the most important factor is the delay in receiving proper management including the early administration of antivenom

and broad-spectrum antibiotics (**Narvencar, 2006**) .

CONCLUSION

In conclusion, necrotizing fasciitis is an uncommon unpredictable complication of snake bites of the Viperidae family mainly due to the severe local tissue destruction by the cytotoxic and digestive enzymes within the venom in addition to the contamination of bite sites by gram-negative and anaerobic bacteria that can be introduced within the wound either as a primary contaminant of the snake bite or secondary to wound contamination from the external environment. However, the early administration of antivenom could neutralize the local tissue necrotizing effect of the venom and consequently decrease the probability to develop necrotizing fasciitis.

RECOMMENDATION

In light of the information provided, it is advisable to organize awareness campaigns in rural regions to educate individuals on the appropriate management of snakebites. Additionally, it is crucial to enhance the accessibility of anti-snake venom supplies in primary healthcare facilities located in high-risk areas. Moreover, it is important to improve the clinical skills of primary healthcare staff in these high-risk regions by developing local policies and conducting regular training sessions to ensure effective management and referral of snakebite cases.

INSTITUTIONAL REVIEW BOARD STATEMENT:

After obtaining written informed consent from the patient, the case study was conducted in accordance with the declaration of Helsinki. The research protocol was approved by the Ethics research committee at Faculty of Medicine, Cairo University under reference number (N-245-2023).

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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التهاب اللقافة الناخر وبتز الطرف السفلى الناتج عن عضات الافاعي – دراسة حالة

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الملخص العربي

صنفت منظمة الصحة العالمية مؤخرا لدغات الافاعي والثعابين كأحد المشكلات الصحية قليلة الاهتمام في المناطق الاستوائية وبخاصة في المناطق الريفية في دول العالم الثالث. في دراسة الحالة محل البحث نناقش حالة مريضة تعرضت للعض من ثعبان مجهول حيث طلبت المشورة من مركز طبي غير متخصص والذي قام بوصف علاجات اولية وعلاوة على ذلك فقد أجرى معالج محلي للدغات الافاعي تشريطا لمكان الإصابة كأحد العلاجات التقليدية المتعارف عليها محليا ضد عضات الافاعي والثعابين. ونتيجة لما سبق فقد أصيبت المريضة بالتهاب اللقافة الناخر في الساق اليمنى والذي انتشر صعودا الى مستوى الفخذ. وعند وصول المريضة الى المركز القومي للسموم الإكلينيكية والبيئية -جامعة القاهرة تم العرض على قسم الجراحة حيث تلقت المريضة عقار (Rocephin 500mg&2g Tavanic) / ٢٤ ساعة بالإضافة إلى إجراء الإنضار الجراحي للنسيج النخري. ثم تم إجراء بتر جراحي للطرف السفلي الأيمن كإجراء احترازي لإنقاذ حياة المريض. الخلاصة: يعد حقن مصل الثعبان مبكرا للمصابين بعضات الافاعي والثعابين أحد الوسائل المساعدة في منع حدوث المضاعفات عن طريق تحييد تأثير السم. ويمكن تحقيق ذلك من خلال توفير التدريب لأطباء الرعاية الصحية الأولية العاملين في المناطق الريفية والناحية على طرق تشخيص وعلاج لدغات الافاعي والثعابين. بالإضافة ضرورة ضمان الإمداد الكافي والتخزين المناسب لمصل الثعبان في تلك المناطق.