

Case Report

Physiological Amputation of Limb (Limb Gangrene) after Tourniquet Application for 12 days following Snake Bite

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Abstract

Background: Application of tourniquet and herbs has been practiced since a long time in patients with different reptiles' and arthropods' bite at rural areas of the country, despite various cases of cellulitis and gangrene.

Objective: To report a case of limb gangrene following tourniquet and herb application for snake bite.

Case: A 20-years old farmer, who was bitten by a snake, presented to the Emergency department with complaints of blackish discoloration of his left forearm and hand. After clinical evaluation and investigations, patient underwent surgical intervention.

Twelve days following snake bite, patient felt pain, noticed bleeding from bite site, swelling over his left hand, palpitation, shortness of breath and inability to speak. For which, he sought help from a traditional healer who applied a tourniquet over his left elbow and some herbs over the bite site. He noticed blackening of his fingers, which rapidly progressed to involve his left hand and forearm up to the site of tourniquet. He underwent surgery for the gangrenous limb.

Conclusion: Development of gangrene following tourniquet is an unusual finding in modern day medicine. This case report shows the danger related to tourniquet application and need for measures to prevent such incidents in future.

Keywords: Amputation, Gangrene, Snake Bite, Tourniquet

Introduction

Tourniquet application for different reptile and arthropod bites is a common practice at rural areas of the country. In the developing world, snake bites are an occupational disease, occurring most commonly among rural male of agrarian society.^{1,2} The extremities³, especially the hand and foot,⁴⁻⁶ are usually bitten. Reports of major amputations proximal to the ankle are more common.^{4,7,8} In the upper limb, however, it is often the digit that are amputated.^{5,6} In a study at Philippines, tourniquets had been applied in 94% of cases and found to delay the onset of symptoms. However, its application can be associated with grave complications like cellulitis, ischemia and gangrene of limb or digit. We report the case of a male farmer who had above elbow amputation after a bite in the

hand by an unidentified snake.

Case

A 20-year old right-handed, non-diabetic and normotensive male farmer presented to emergency department of a tertiary care center with a dark, necrosed, swollen left upper limb (Figure 1) exuding offensive discharge. There was also history of nausea, vomiting and passage of dark urine.

Twelve days before the presentation, he had felt a sudden sting on his left thumb while packing a heap of grass in his farm. Within a few minutes, he started having abnormal sensations in his hand. Fang marks were noted in the dorsal surface of left thumb. Subsequently, there was a gradual onset of swelling which progressed from the left hand to mid-arm. Along with the local sign, he also had palpitation, shortness of breath and inability to speak. He sought help from a traditional healer who applied a multi-threaded jute tourniquet over his left elbow and some local herbs over the bite site.

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Two to three days after tourniquet application, he noticed blackening of his fingers. It progressed to involve his left hand and forearm up to the site of tourniquet within 3-4 days (figure 1). Due to difficulty in accessibility, it took three days for the patient to present to the hospital.

On local examination, left hand and forearm was black in color, foul smelling circumferential ulceration over the site of tourniquet application, cold on touch, radial pulse was absent, axillary lymph nodes were not palpable and muscle were mummified (Figure 2).

On systemic examination, his pulse was 94 bpm, blood pressure was 100/70 mmHg, was febrile, urine was dark. There was wet gangrene of the left upper limb below the elbow. A clinical diagnosis of limb gangrene with septicemia was made. He was optimized with intravenous fluid resuscitation, blood transfusion, tetanus toxoid administration and IV antibiotics (ceftriaxone and metronidazole).

After orthopedic consultation, he was planned for above elbow amputation and was admitted in orthopedic ward.



Figure 1: Gangrenous left forearm at presentation to BPKIHS 12 days after snake bite (Photograph taken after tourniquet removal)



Figure 2: Circumferential ulceration at the site of tourniquet application

Discussion

Snakebite is common in the Terai region of Nepal. Injury and mortality of humans due to snake envenomation is a serious public health problem in South-east Asia. It has been thought that at least 50,000 people in the region die of snake bites (this includes India, Bangladesh, Nepal and Pakistan) per year. There are abundant venomous snakes present in the region.⁹

Studies in the country have identified four species of snake responsible for the majority of fatal bites. These are the Indian cobra (*Naja naja*), common krait (*Bungaris caeruleus*), Russell's viper (*Viper ressellii*) and green pit viper. Most venomous snake-bites occur in villages, whereas antivenom is usually available only in urban hospitals. It often takes the snake-bite victim an hour or more to reach such a hospital. During this crucial interim period, the victim is usually looked after by untrained persons. The traditional first aid in such cases consists of one or more of the following: (a) 'tying up' the place above the bite; (b) incision of the affected area; and (c) suction (generally oral) of the contents of the wound. Two types of tying have been discussed. The first, a 'tourniquet' which is tied tightly so as to block the return of blood through vessels from the occluded limb to the heart. This is also referred to as 'hemostatic' or 'arterial tourniquet'. The second kind of tying is using a 'constriction band', which is

firm but not tight, in order to impede lymph flow.¹⁰

Do not use tourniquets because they obstruct arterial flow and cause ischemia. Constriction bands may be useful, especially when immediate medical care is not available. A constriction band is an elastic bandage or Penrose drain, thick rope, or piece of clothing wrapped circumferentially above the bite, applied with enough tension to restrict superficial venous and lymphatic flow while maintaining distal pulses and capillary filling. Apply the band snugly but loose enough to avoid arterial compromise. A constriction band can delay venom absorption without causing increased swelling.¹¹

Elapid venoms that are primarily neurotoxic and have no significant effects on local tissue may be localized by pressure-immobilization, a technique in which the entire limb is wrapped immediately with a bandage (e.g. crepe or elastic) and then immobilized. For this technique to be effective, the wrap pressure must be precise (40-70 mmHg in upper-extremity application and 55-70 mmHg in lower-extremity application).¹²

Abubakar et al⁴ reported 16 amputation cases from the savannah belt of Nigeria. All 10 amputations in the upper limb were minor while two of the six amputations in the lower limb were major. Abbas et al⁸ reported two major lower limb amputations in pediatric victims of snake bite. In contrast, ours is a report of major upper limb amputation following snake bite. We postulate that closer proximity of the upper limb to the heart and the relatively smaller muscle bulk would respectively, promote more rapid dispersal of snake venom (assuming a tourniquet is not used, as in our patient) and provide smaller amount of tissue necrosis for bacterial proliferation with consequent reduction of the likelihood of major amputation in the upper limb. Tissue necrosis is caused by the various enzymes in snake venom.

Compartment syndrome, the unhygienic prehospital intervention often sought by

victims in developing countries^{4,8}, delay in presentation⁴ and bacterial infection may combine with tissue necrosis to make major amputation inevitable. All these factors were in operation in our patient and those of others^{4,8}. Disability from amputation in a farming environment, poverty and inaccessibility to prostheses have the consequences. Prevention is imperative. Farmers should wear protective shoes, long trousers and protective gloves while working on the farm. Health education should focus on enjoining victims to report to hospital immediately. Efforts should be made to provide facilities in rural areas and train rural workers in first aid.¹³

Conclusion

Development of gangrene following tourniquet application is an unusual finding in modern healthcare system and it depicts a lack of awareness and effectiveness at community level. This case report shows the complications related to tourniquet application and role of measures to prevent such incidents in future.

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