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Compartmental syndrome following a green pit viper (*Trimeresurus erythrurus*) bite

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Green snake bite is common in Myanmar and majority of the victims do not seek hospital treatment because of lack of mortality and morbidity. However, in the present case, a 17 yr old girl bitten by a big green snake with a dry tail who applied tight tourniquets developed massive local swelling (diagnosed as a compartmental syndrome) and bleeding from the wound. Fasciotomy performed on the patient with incoagulable blood leads to uncontrolled local bleeding, shock and wound sepsis almost killing the patient was rescued by replacement of 26 units of blood, intensive care treatment to combat shock and sepsis and ventilatory support for 6 days. The patient landed up with wrist drop and sensory loss of the limb and has spent 6 months in hospital for reconstructive surgery. The massive swelling and wrist drop could be secondary to the use of tight tourniquets and compartmental syndrome. The study highlights that surgical intervention in snake bite patient with incoagulable blood should be delayed until specific antivenom or clotting factor substitutes are given to correct the coagulation defect.

INTRODUCTION

Green snake bite occurs through out Myanmar. Green snake known as Mwe-sein is well known in Myanmar. Very few victims brought the snake for identification. It is believed that its bite leads to massive local swelling with no casualty. Not all green snake bite cases seek medical treatment at hospital and prevalence rate of 4% based on hospital data is underestimated [1]. However, green snake bite accounts for 16% of the snake bite cases admitted to Yangon General Hospital between January 1999 to April 2001 and 64% of them were bitten in Bahan Township [2]. Community based study of epidemiology of snakebite carried out in Taungdwingyi and Kyaukpadaung shows that prevalence rate of green pit viper bites varies from 5.4-5.8% [3]. Of 7 species known to inhabit in Myanmar [4], *Trimeresurus erythrurus* is the most frequently encountered species and is responsible for most bites [4-5]. Clinical features and development of antibody following green pit viper (*Tr. erythrurus*) bite has been reported earlier [4]. In this communication, development of compartmental syndrome in a green pitviper (*Tr. erythrurus*) bite victim is described.

MATERIALS AND METHODS

Case report

A 17 year-old girl from Golden Valley, Yangon, was bitten by a 29 x 2 inches long green snake with a dry tail, at lower 1/3 of radial border of right forearm while moving roofing sheets in house compound at 10 am on 6 June 2002. The snake hanged on to the site of bite had to be removed. A tight cotton tourniquet was applied at mid right upper arm following the bite. She was transported to emergency unit, Yangon General Hospital 2.5h following the bite. On arrival, she had massive local swelling of the whole limb below the tourniquet with dark brown discolouration of the skin below

elbow joint, heaviness and numbness of the whole limb. Another cotton bandage of moderate tightness was applied below the first at emergency unit. Both were removed on arrival at the medical ward, Yangon General Hospital 1.5h later (4hr after the bite). Local swelling spread to right anterior chest wall following release of the tourniquets.

At admission, the whole limb was swollen up to right half of the anterior chest wall. Her blood pressure measured was 130/80 mmHg and she had a pulse rate of 100 per minute. Blood was coagulable on admission and found to be prolonged on retesting at 3hr after the bite.

Eight hours after the bite, there was marked swelling of the whole limb and discolouration of the skin overlying mid 1/3 of the arm. The limb was cold, tender with loss of sensory function. Radial, ulner and axillary pulses were not palpable. Blisters and necrosis developed at the site of bite. Bleeding from the wound resulting in soaking of 3 blankets and was covered with oozing blood.

Sixteen hours later, the patient was pale, restless and bleeding from the local wound continued. Her blood pressure fell to 60/ 0 by palpation and pressure agents, steroid and blood were given to combat shock. Fasciotomy was carried out on right forearm in flexor and extensor compartments, carpel tunnel, dorsum of hand and right arm. Necrosis of muscles was noted in extensor (severely), flexor (moderate) and in triceps, biceps and post deltoid. Radial pulse was not palpable.

Twenty one hours after the bite, she was pale and had a temperature of 99º F, blood pressure 80/50mmHg and heart rate of 120/min. Another unit of blood was given.

Twenty four hours after the bite, her blood pressure fell again (BP 60mmHg by palpation); local bleeding continued and became restless. Resuscitation measures were given along with transfusion of another unit of blood. Her blood pressure remained labile and pressure agents were given in order to combat shock. Another unit of fresh blood was given at 38hr after the bite.

Sixty one hours after the bite, the patient was referred to intensive care unit with shock and gasping. She was put on respirator/ventilator and measures to combat shock including replacement of fresh blood were given. Spontaneous ventilation returned 140hr (day 6) after the bite. Wound debridgement was carried out on day 12 which disclosed black discoloration of skin extending from dorsum of hand to forearm, black bullae on dorsum of 2^{nd} and 4^{th} finger and discoloration of muscle in the wound. Her condition became stable (18 days after the bite) following transfusion of a total 26 units of fresh blood. Skin grafting of the wound was attempted 10 times during 6 months following the bite. Wrist drop with loss of sensory function was noted. The patient was still in hospital waiting to undergo further skin grafting. Investigations showed prothrombin time and activated partial thrombin time returned to normal values on 8 days after the bite.

DISCUSSION

Green snake bite is common in Myanmar and its bite rarely leads to severe morbidity and mortality. (One green snake bite patient developed internal bleeding following massive massage of abdomen in Mandalay hospital, Personal communication, Dr. Sann Mya). In Yangon, most green snake bite cases come from Golden Valley and Shwe-gondine localities, Bahan Township [2, 4].

Green pit viper bite results in massive local swelling with defibrination leading to incoagulable blood [4, 5]. In this case, the patient has massive local swelling, skin discolouration below the tourniquets and loss of sensation and radial pulse suggesting development of ill effects of tourniquets and excessive extravasations of plasma and fluid

into limb and necrosis of extensor muscles of the right hand.

Development of coagulopathy leads to profuse bleeding from the wound and haemorrhagic hypovolumic shock. No specific antivenom is available in Myanmar. Time taken for restoration of clotting defect depends on the amount of circulating venom procoagulant (fibrinogen activator) and fibrinogen turns over of the liver. Specific antivenom has been shown to play a vital role in correcting clotting defect [6]. In this case clot restoration occured about 8 days after the bite following replacement of several units of fresh blood. In our earlier studies, clot restoration occured around 8 days without replacement of clotting factors and it could take in the absence of anti-venom as long as 28 days after the bite [4].

Massive local swelling is due to spreading factor(s) of the venom. However, in the present case, massive swelling leading to compartmental syndrome is a compound effect of venom and tight tourniquet(s). Wrist drop in this case is secondary to prolong application of tight tourniquets and compartmental syndrome. Ill effects following application of tight tourniquets have been documented [7]. This case demonstrates that the surgical intervention should be delayed until normal clot restoration has occurred either by giving specific antivenom to neutralise circulating venom procoagulant or replacement of the clotting factors to correct the clotting defect. A similar distarous persistent bleeding leading to development of haemorrhagic shock despite transfusion of 20 units of blood occurred in a Malayan pit viper bite victim following fasciotomy before correction of coagulation defect has been reported [8]. A profuse bleeding following fasciotomy in a green pit viper (*Trimeresurus albolabris*) bite case had also been reported [8]. It is fortunate that the life of the patient was saved by energetic efforts of the medical personnel and infusion of 26units of blood to combat shock and septicemia.

The study highlights that green pit viper bite cases presented with coagulopathy should be corrected with specific antivenom or replacement of the clotting factors first before performing any surgical intervention. A limited stock of specific antivenom for green pit viper should be made available for these cases in the hospitals.

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