



## ANALYSIS OF RECONSTRUCTIVE PROCEDURES IN SNAKE BITE

Dr.K.Boopathi

MS,M.Ch. Associate Professor of Plastic Surgery Chengalpattu Medical College and Hospital Chengalpattu Tamilnadu

Dr.V.Govindaraj\*

MS, Resident in MCh Plastic Surgery Chengalpattu Medical College and Hospital  
\*Corresponding Author**ABSTRACT**

The aim is to analyse the reconstructive procedure among snake envenomation patients to preserve and restore the soft tissue integrity, anatomy and function of foot and hand

**Materials and Methods:** This is a prospective observational study from a tertiary care institute. Clinical presentation, type of envenomation, reconstructive procedures required, duration of hospital stay, surgical intervention and final outcome were studied. This study was undertaken after ethical committee approval and informed consent. In this study 24 males & females were included, 15 were children and 9 were adult, 71% were neurotoxic and 69% had local envenomation. Compartment syndrome was encountered in 7 patients (37.14%). Shortening and closure of the middle finger at DIP joint was done in one patient. Initial fasciotomy with subsequent wound debridement was done in 8 patients. Split thickness skin grafting was done in 14 patients. Flap cover done for 9 patients. Split thickness skin grafting and Flap cover done for 2 patients. 36% of patients with neurotoxic envenomation and 54% with local envenomation and 16% with hemotoxic envenomation required surgical intervention

**Conclusion:** Patient with snake envenomation needs stable and durable cover. Reconstructive option should be tailored according to the patients' requirement.

**KEYWORDS :** Fasciotomy, Snake Envenomation, Split Skin Grafting, groin flap**Introduction :**

Even with much of globalization, industrialisation & mechanization in the world, snake bite is increasing in frequency especially in the hand and foot of agricultural workers and children's at rural area.

Snake envenomation is still a major preventable disease in rural and semi urban areas. It is a disease of poverty and is a neglected tropical condition. The standard initial management involves anti snake venom administration and supportive therapy. Role of surgical procedures are not well documented in literature. Surgical intervention and plastic surgical procedures are a required in small number of patients with snake envenomation and tissue necrosis. Envenomation following neurotoxic cobra bites and Russell viper bites leads to tissue necrosis which needs surgical intervention depending on the degree of tissue destruction. Commonest site is dorsum of the foot, lateral, medial malleolar, heel pad region of the foot and dorsum of the hand. Next comes the digits, sometimes this needs disarticulation of the digits.

Multiple sittings debridement may be warranted in some patients with extensive tissue necrosis

**Inclusion criteria**

All patients referred from medicine and paediatric department with snake bite Age from 2 to 60 years

**Exclusion criteria**

Cases with trauma , diabetic cellulitis ,

**Aim in reconstruction are**

Reconstruct a useful foot & hand with the available tissue.

Preserve movements in the key joints.

Maintain the relative length of the medial and lateral columns of the foot. Restore the coronal plane position of the foot.

Rehabilitate the patient so that he/she can make the best use of the reconstructed foot.

A good skin is essential to protect all these structures, if a good skin is not provided, then all the efforts will be in vain.

In our study as soon as the medical management is complete and patients' general condition is stable with normal renal, haematological function, plastic surgical procedures were planned and executed

**Materials & Methods**

Our study presents a simple algorithm for management, of post snake bite soft tissue defects involving the dorsum of foot, heel pad and

lateral, medial malleolar region of the foot and dorsum of hand. 24 cases included in this study with 15 children and 9 adults from March 2015 to February 2017. Patient's data including age, sex, side of injury, extent of injury (isolated or combined), type of wound, management of wound, wound healing time and complications were noted. Most of the patients were operated under spinal anesthesia & regional anesthesia except free flaps and few other patients. Thorough wound toilet and debridement, saline and Paraffin gauze dressing was done, and limb elevation was given, daily dressings were carried out and coverage was given with Split thickness skin graft or flap.

**Results**

Isolated soft tissue defect involving the dorsum of foot, lateral and medial malleolus was presented in 5 patients and at dorsum of hand in 9 patients which were covered with Split thickness skin graft. Lateral calcaneal artery flap was done in 1 patient involving the TA region of the heel. Reconstruction was done with Distally based superficial sural artery flap in 2 patients

In 2 patients with dorsum of hand reconstruction done with groin flap, in 3 patients abdominal flap was used, in 1 patient Free flap was done.

Six of the soft tissue defects involving the posterior heel and non-weight bearing part of the heel were covered with Split thickness skin grafting.

Pressure dressings (Elastocrepe bandage) was started on the 10th day. Active and passive physiotherapy of joints around ankle was also started on the 10th day. After 21 days gradual mobilization was started with intermittent weight bearing, making the patient to do all his activities at around one and half months. In between the weight bearing, patients were advised to elevate the limbs. Daily massage and use of special footwear (silicone) were also explained to the patient.

Follow-up was carried out for the presence of pain over the donor or recipient site, aesthetic appearance of donor and recipient site, loss and restriction of movements, loss of sensations by division of sural nerve or superficial peroneal nerve and scar complications. Offloading footwear were advised for patients having injury over the weight bearing areas. Average follow-up of the patients was 11.3 months and longest follow-up was 11/2 years.

**SSG****GROIN FLAP**

## Discussion

Globally, about 1.2 million to 5.5 million snakebites occur annually leading to as high as 1,84,1000 envenomings and 94,000 deaths. In India, out of the 216 species of snakes, 60 are considered poisonous. The most poisonous, medically important species of India include Cobra, Common Krait, Russell's viper and Saw-scaled viper.

Snake envenomation is a neglected tropical condition. In comparison to adults where the bite is predominantly during outdoor activities, in children the bite is predominantly indoors while playing in the garden.

Snake bite produces widespread damage to mitochondria, red blood cells, leucocytes, platelets, peripheral nerve endings, skeletal muscle, vascular endothelium, and other membranes. Tissue necrosis in krait bite is less. However, Russell's viper and cobra are commonly associated with tissue necrosis and this may rapidly progress to vascular compromise and loss of the limb. Except for one child with features of Russell's viper bite others were due to cobra bite in this study group.

In our series, majority of the bites were neurotoxic (71%) compared to the published data from elsewhere, documenting hemotoxic bites to be common in children.

Surgical intervention varies from incision or excision of the bite site, fasciotomy and digital fasciotomy.

Comparison of factors like age, gender, bite to ASV receipt time, number of ASV vials used, initial blood glucose, white blood counts, native treatment did not show any statistically significant difference as risk factors for plastic surgical intervention.

Patients who underwent surgical procedures required longer hospital stay compared to those who did not need surgical procedure. Cobra bites were associated with soft tissue necrosis in comparison to viper bites, 47.6% versus 3.6% respectively.

Higher occurrence of local reactions (68%) in this study population with envenomation could be the reason for higher requirement of surgical intervention.

*Morganella morganii* was identified as the most common organism in our cases. However, in south east Asian regions *Staph aureus* and *Escherichia coli*, were the common organisms which also presented monomicrobial to be more common than polymicrobial. The same was present in our study.

In the study by Rha et al, among the 58 children, 13 children (22%) required surgical intervention in the form of serial wound debridement, followed by skin grafting. Our study has shown that a higher percentage, 55% of children required surgical intervention.

Study from Korea states that conservative approach would be the best in children with viper bites. Earlier surgical intervention in children with tissue necrosis did not yield good results and had a poor surgical outcome. In our study no surgical intervention was undertaken until hemostatic abnormalities are corrected. Otherwise the patient may bleed to death.

Tissue necrosis is due to destruction by venom enzymes phospholipase A2, the most widespread enzyme in the venom. Hyaluronidase aids in venom dissemination from the bite site through tissues or distal ischemia-related compartmental syndrome especially in viper bites. However, early fasciotomy reduces the tissue destruction.

The bites in the hands, depth of the fang marks, severity of envenomation are risk factors. Based on our studies, fasciotomy should be considered when clinically significant compartment pressures (>30 mm Hg) are present despite all supportive measures and adequate anti-snake venom therapy. This surgical intervention is still decided by clinical findings on a case to case basis. As soon as wound bed is free from slough, infections and necrotic tissue reconstruction done according to the anatomical zone.

### Anatomical zones are:

1. Weight bearing heel and plantar.
2. Non-weight bearing heel, medial and lateral malleolus and Achilles tendon area
3. Extensive dorsum foot defects.

4. Dorsum of hand And reconstruction in the form of,
  1. Primary Skin Closure. 2.Skin Grafting.
3. Flap Cover – Local, loco regional, distal, cross leg, and micro vascular free flap.

Obviously, primary repair is the best, but when that is not feasible as in our patients because of contaminated wound, tissue necrosis and fulminant infections appropriate antibiotics are given to the patient until the wound bed becomes healthy to protect from the secondary infections and then proceed with reconstruction.

### Primary skin suturing:

There is no doubt that original is always the best. If the skin at the wound edges is healthy and the skin could be sutured without any tension, nothing will be better than that. In one patient with old age involving the cheek region, dead skin was excised, wound edges freshened and primary skin suture done. This was possible because of skin elasticity.

### SKIN GRAFTING:

This is especially for non - weight bearing areas of the foot, dorsum of foot, medial, lateral malleolus region and dorsum of hand without exposing the vital structures. But one important pre-requisite for skin grafting is a good vascular soft tissue bed. Large areas of skin can be obtained from the thighs after anaesthetising the lateral cutaneous nerve of thigh or under field block.

### FLAPCOVER:

When primary skin closure is not feasible or when the skin graft is not appropriate or when a future reconstructive procedure is pending, flap cover is the ultimate choice. For defect involving the heel (non-weight bearing region) around the tendoachilles region reconstruction done with Lateral calcaneal artery flap. Whereas Soft tissue defect involving weight-bearing areas reconstruction done with reverse sural artery, Lateral calcaneal artery flap and Microvascular free flap. Defect involving the dorsum of hand Groin flap was used for reconstruction in 2 patients and Inferiorly based abdominal flap in other 2 patients

### CONCLUSION:

Snake bite is a common medical emergency, where timely treatment can prevent mortality also appropriate reconstructive procedures can reduce morbidity and save precious human lives. Though split Thickness skin graft is useful for most of the cases, decision making on reconstructive option should be based on individual patient's requirement.

### REFERENCES

- [1] Das RR, Sankar J, Dev N. High-dose versus low-dose antivenom in the treatment of poisonous Snakebites: a systematic review. *Indian J Crit Care Med* 2015;19(6):340-9.
- [2] Kumaravel KS, Ganesh J. A study on the clinical profile of children with Snake envenomation in a tertiary referral centre at Dharmapuri, Tamilnadu, India. *Int J Res MedSci* 2016;4(6):2142-5.
- [3] Hall EL. Role of surgical intervention in the management of crotaline Snake envenomation. *Ann Emerg Med* 2001;37(2):175-80.
- [4] Laohawiriyakamol S, Sangkhathat S, Chiengkriwate P, et al. Surgery in management of Snake envenomation in children. *World J Pediatr* 2011;7(4):361-4.
- [5] Garg A, Sujatha S, Garg J, et al. Wound infections secondary to Snakebite. *J Infect Dev Ctries* 2009;3(3):221-3.
- [6] Gras S, Plantefève G, Baud F, et al. Snakebite on the hand: lessons from two clinical cases illustrating difficulties of surgical indication. *J Venom Anim Toxins including Trop Dis* 2012;18(4):467-7.
- [7] Lee BJ, Hong SI, Kim HS, et al. Hematological features of coagulopathy and the efficacy of antivenin therapy for a Korean Snakebite. *J Korean Surg Soc* 2007;72(1):18-26.
- [8] Chippaux JP. Surgery should not be used as first line treatment. *J Venom Anim Toxins incl Trop Dis* 2010;16(1):3-4.
- [9] Ahmed SM, Ahmed M, Nadeem A, et al. Emergency treatment of a Snakebite: Pearls from literature. *J Emerg Trauma Shock* 2008;1(2):97-105.
- [10] Tanen DA, Danish DC, Grice GA, et al. Fasciotomy worsens the amount of myonecrosis in a porcine model of crotaline envenomation. *Ann Emerg Med* 2004;44(2):99-104.
- [11] Chattopadhyay A, Patra RD, Shenoy V, et al. Surgical implications of Snakebites. *Indian J Pediatr* 2004;71(5):397-9.
- [12] Palappalli DS. Pattern of use of antibiotics following Snakebite in a tertiary care hospital. *Journal of Clinical and Diagnostic Research* 2015;9(8):OC05-OC09.
- [13] Chew KS, Khor HW, Ahmad R, et al. A five-year retrospective review of Snakebite patients admitted to a tertiary university hospital in Malaysia. *Int J Emerg Med* 2011;4:41.
- [14] Ahmed SM, Nadeem A, Islam MS, et al. Retrospective analysis of Snake victims in Northern India admitted in a tertiary level institute. *J Anaesthesiol Clin Pharmacol* 2012;28(1):45-50.
- [15] Aktar F, Aktar S, Yolbas I, et al. Evaluation of risk factors and follow-up criteria for severity of Snakebite in children. *Iran J Pediatr* 2016;26(4):e5212.
- [16] Ribeiro LA, Jorge MT, Lebrão ML. Prognostic factors for local necrosis in Bothrops jararaca (Brazilian pit viper) bites. *Trans R Soc Trop Med Hyg* 2001;95(6):630-4.
- [17] Plastic Surgery III Edition; Peter Neligan & Grabb & Smith plastic surgery 5th edition