

Snake Bite Treatment & Management

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Abstract :

Venomous animals account for a large number of deaths and serious injuries in all over the world. Snakes alone are estimated to inflict 2.5 million venomous bites in each year, which resulting in about 125,000 deaths. However, the actual number may be larger. Most of the fatalities are due to the victim not reaching the hospital in time where definite treatment can be administered. In addition community is also not well informed about the occupational risks and simple measures which can prevent the bite. It continues to adopt harmful first aid practices such as tourniquets, cutting and suction, etc. Studies reveal that primary care doctors do not treat snakebite patients mainly due to lack of confidenceⁱ.

Introduction:

There are 236 species of snakes in India out of which about 13 are highly venomous. The big four dangerous snakes of India includes Indian cobra, krait, Russell's viper and Saw-scaled viperⁱ. Almost 20000 people die due to venomous snake bites every year in India. India is estimated to have the highest snakebite mortality in the world. World Health Organization (WHO) estimates place the number of bites to be 83,000 per annum with 11,000 deathⁱⁱ

Commonest poisonous types of snakes in India:

- 1. Indian Cobra:** Indian cobra also known as "Nag". It is one of the highly venomous snake found throughout India. Indian cobras are found in many habitats but generally in open forest edges, fields, and the areas around villages.
- 2. Indian Krait:** kraits is most dangerous venomous snake of India and one of the deadliest snakes of the world. Krait venom is extremely neurotoxic and induces muscle paralysis, its bite is lethal to man. There are 12 Species and 5 sub-species of Krait Snakes.
- 3. Russell's Viper:** It is also called as koriwala. It is also one of the most venomous snake all over the India. One of the most dangerous snakes of India, with an average length of 20 cm (4 ft). The dark brown or brownish-gray deadly snake feeds on Rodents, lizards & small birds.

- 4. The King Cobra:** King Cobra is the biggest snake in India, with an average length of 13-15 ft. The King cobras can reach upto 18 feet in length, which making them the world's longest venomous snake. The physical feature of King Cobra is olive-green, tan, or black with faint, it has pale yellow cross bands down the length of the body.
- 5. Indian Pit Viper:** The Indian Pit Viper is generally green in colour and also known as bamboo snake. It mainly live on arboreal, living in vines, bushes and bamboos. They also have a very 'cool' heat sensing system.
- 6. Saw-Scaled Viper:** The Indian saw-scaled viper is a small viper from one of the eight species of small viper venomous snakes family. It is a rough scaled snake with large eyes, wider head than neck and stocky body, habitat in sand, rock, soft soil and in scrub landsⁱⁱⁱ

The best solution to save people in this situation of snake bite emergency is to educate people - disseminate information about snakes and snakebite - what are snakes, when and why do they bite, how to avoid getting bitten, what to do when bitten, etc. It helps to understand that:

- All snakes are not venomous –Every snakebite is not going to result in death.
- Even a venomous bite is not always fatal – because the severity of snakebite depends on many factors like the size of the snake, whether the bite could be completed, whether it was a dry bite or not.
- First Aid would enable a person to buy more time to reach medical aid on time.

d) The only cure which is available is anti-venom serum injection.

Clinical Presentation

General: Fear and anxiety are very common and can lead to panic and trauma related to falls due to severe anxiety.

Local envenoming:

Local pain at the site of the bite (krait bites are usually painless),

- Local swelling spreading proximally,
- Tenderness,
- Painful swelling of regional lymph nodes draining bite site,

Other signs:

Fang marks, persistent local bleeding, bruising, lymphangitis, inflammation (swelling, redness, heat), blistering (blebs, bullae, vesicles), infection, abscess formation, necrosis

Systemic envenoming:

Nausea, vomiting, malaise, abdominal pain, weakness, drowsiness, prostration.

Cardiovascular (Viperidae):

- Hypotension, syncope, collapse, shock,
- Cardiac arrhythmias,
- Myocardial damage.

Generalized increase in capillary permeability:

- Facial, periorbital, conjunctival edema (chemosis),
- Pleural and pericardial effusions, pulmonary edema, Massive albuminuria,
- Hemoconcentration.

Bleeding and clotting disorders (Viperidae):

- Local traumatic bleeding from recent and partly healed wounds and venepuncture sites;
- Spontaneous systemic bleeding (gums, epistaxis, hemoptysis, meningism from subarachnoid hemorrhage, lateralizing signs, and/or coma from cerebral hemorrhage/thrombosis), hematemesis, rectal bleeding or melena, hematuria, vaginal bleeding, subconjunctival hemorrhages, skin petechiae, purpura, discoid hemorrhages, ecchymoses Bilateral ptosis,
- External ophthalmoplegia,
- Descending paralysis progressing to generalized flaccid paralysis.

Generalized rhabdomyolysis:

- Muscular stiffness, tenderness,
- Painful on passive stretching, trismus,
- Dark brown urine

Acute kidney injury:

- Loin (lower back) pain,
- Hematuria, hemoglobinuria, myoglobinuria,

- Oliguria/anuria,
 - Uremia (acidotic breathing, hiccups, nausea, pleuritic chest pain, encephalopathy).
- Pituitary insufficiency (Russell’s viper) (Fig. 2):
- Acute—shock, hypoglycemia;
 - Chronic—weakness, loss of secondary sexual characters, loss of libido, amenorrhea, testicular atrophy, hypothyroidism, etc.

If the “spat” venom enters the eyes, there is immediate and persistent intense burning, stinging pain, followed by profuse watering of the eyes with the production of whitish discharge, congested conjunctivae, spasm and swelling of the eyelids, photophobia, clouding of vision or temporary blindness, corneal ulceration, permanent corneal scarring, and secondary endophthalmitis.

Investigations / Laboratory Tests

20-minute whole blood clotting test (20WBCT) is a simple, informative bedside test requiring only a new, clean, dry, ordinary glass tube, bottle, vial, or syringe. The positive (nonclotting) result indicates severe consumption coagulopathy and the need for immediate antivenom treatment.

Other more sensitive laboratory tests of blood

Coagulation:

- International normalized ratio (INR) based on prothrombin time (PT) (> or =1.2 is abnormal).
- Activated partial thromboplastin time (aPTT), fibrin(ogen)-related antigens (fibrin degradation Products—FDP), or d-dimer.

Management Protocol (As Per Recent WHO Guidelines 2016)

First Aid ^{iv}

The first aid being currently recommended is based on the mnemonic.

“CARRY NO R.I.G.H.T.”

It consists of the following:

CARRY = Do not allow victim to walk even for a short distance; just carry him in any form, especially when bite is at leg.

No = Tourniquet ; No-electrotherapy ; No-cutting; No-pressure immobilization; No-sucking of venom

R = Reassure the patient. About 70% of all snakebites are from nonvenomous species. Only 50% of bites by venomous species actually envenomate the patient.

I = Immobilize in the same way as a fractured limb. Use bandages or cloth to hold the splints, not to block the blood supply or apply pressure. Do not apply any compression in the form of tight ligatures, they do not work and can be dangerous!

GH = Get to hospital immediately. Traditional remedies have NO PROVEN benefit in treating snakebite.

T = Tell the doctor of any systemic symptoms that manifest on the way to hospital.

Traditional methods should be discarded.

Pain

Snakebite can often cause severe pain at the bite site. This can normally be treated with painkillers, such as paracetamol. Aspirin and nonsteroidal anti-inflammatory drugs (NSAIDs) should not be used, as they can exacerbate bleeding. This can be particularly dangerous in a patient already having coagulopathy. Mild opiates, such as tramadol 50 mg, can be used for good pain relief.

Don't Do After Snake Bite:

- a) Do not apply a tourniquet^v
- b) Do not wash the bite site with soap or any other solution to remove the venom.
- c) Do not make cuts or incisions on or near the bitten area.^{vi}
- d) Do not use electrical shock.^{vii}
- e) Do not freeze or apply extreme cold to the area of bite.
- f) Do not apply any kind of potentially harmful herbal or folk remedy.
- g) Do not attempt to suck out venom with your mouth.^{viii}
- h) Do not give the victim drink, alcohol or other drugs.
- i) Do not attempt to capture, handle or kill the snake and patients should not be taken to quacks.
- j) Some research which suggests that a "Pressure Pad" at the site of bite may be of benefit.^{ix}

Snake Antivenom

Snake antivenom is a kind of therapeutic serum which at present constitutes the only effective product to treat the consequences of snakebite, a serious public health problem in many tropical and subtropical countries. Antivenom production is a biotechnological process that involves the use of animal blood as raw material, which is processed and purified before obtaining the final product.

A purified fraction of immunoglobulin or immunoglobulin fragments fractionated from the

plasma of animals that have been immunized against a snake venom or a snake venom mixture.^x

Snake antivenom immunoglobulin (antivenoms) are the only specific treatment for envenoming by snakebites. They are produced by the fractionation of plasma usually obtained from large domestic animals hyper-immunized against relevant venoms. Important but infrequently used antivenoms may be prepared in small animals. When injected into an envenomed human patient, antivenom will neutralize any of the venoms used in its production, and in some instances will also neutralize venoms from closely related species. Anti-snake venom (ASV) is the main treatment. In India, polyvalent ASV, i.e. effective against all the four common species; Russell's viper, common cobra, common Krait and saw-scaled viper and no monovalent ASVs are available. ASV is produced both in liquid and lyophilized forms. Antivenom acts to neutralize the poisonous venom and causes the venom to be released from the receptor site. Thus, the receptor sites that were previously blocked by venom are now free to interact with the acetylcholine molecule, and normal respiration resumes. The spent antivenom and the neutralized venom are then excreted from the body.

| Dose of Antivenom ^{iv} | | |
|---|---|--------------------------------------|
| Mild envenomation, neurotoxic/haemotoxic | Systemic symptoms, manifestation > 3 hrs after bite | 8-10 vials (Each vial contains 10ml) |
| Severe envenomation, neurotoxic/haemotoxic | Systemic symptoms, manifestation <3 hrs after bite | 8 vials (Each vial contains 10ml) |

- a) ASV should introduce 2ml/min rate as slow intravenous (IV) injection.
- b) ASV should introduce continuous 1 hour in same rate
- c) Patient should be keep in monitoring for 2 hours after ASV injection. d) ASV should not be administered locally at the biting site.

Snakebite Prevention Preventive Measures

- Walk at night with closed-type footwear (e.g., shoes or boots), and a flashlight that is switched on

- Carry a stick when grass cutting or picking fruit or vegetables, or clearing the base of trees. Use the stick to move the grass or leaves first.
- If you encounter a snake, give the snake a chance to move away
- Pay close attention to the leaves and sticks on the ground when collecting woods.
- Keep animal feed and rubbish away from your house. They attract rats, and snakes will eventually follow.
- Try to avoid sleeping on the ground. Keep plants away from your doors and windows. Snakes like cover, and plants help them climb up.

Comparison of three first-aid treatments. *Med J Australia*. 1982; 1: 212-4.

ix . Tun-Pe, Aye-Aye-Myint, Khin-Ei-Han, et al. Local compression pads as a first-aid measure for victims of bites by Russell’s viper (*Daboia russelii siamensis*) in Myanmar. *Trans R Soc Trop Med Hyg*. 1995; 89: 293-5

x WHO Guidelines for the Production, Control and Regulation of Snake Antivenom Immunoglobulins, who.int/blood_products/snakeantivenoms

Conclusion

As a common man, one should know how to administer proper first-aid to a snakebite victim, without losing precious time. It is not important to assess whether it was venomous snakebite or not at the time of emergency. Then victim should be treated as venomous snakebite, as some snake venom (like that of common krait) does not show any immediate symptoms even in the case of a serious bite. It should be kept in mind that no attempt should be made to kill the snake to carry it along to the hospital. Anti-snake venom is the only treatment in such cases

References

i Wareell DA. WHO/SEARO guidelines for the clinical management of snakebite in the southeast Asian region. *SE Asian JTrop Med Pub Health* 1999;30: 1-85

ii Kasturiratne A, Wickramasinghe AR, DeSilva N, et al. The global burden of snakebite: A literature analysis and modelling based on regional estimates of envenoming and deaths. *PLOS Med*. 2008;5:e218

iii walkthroughindia.com/The_6_Most_Venomous_Snakes_in_India.htm

iv Anker RL, Staffon WG, Loiselle DS, et al. Retarding the uptake of “mock venom” in humans. Comparison of three first-aid treatments. *Med J Australia* 1982;1:212-214.

v Amaral CF, Campolina D, Dias MB, et al. Tourniquet ineffective-ness to reduce the severity of envenoming after *Crotalus durissus* snake bite in Belo Horizonte, Minas Gerais, Brazil. *Toxicon*. 1998; 36: 805-8.

vi . Bush SP, Hegewald KG, Green SM, et al. Effects of a negative-pressure venom extraction device (Extractor) on local tissue injury after artificial rattlesnake envenomation in a porcine model. *Wilderness Environ Med*. 2000; 11: 180-8.

vii Davis D, Branch K, Egen NB, et al. The effect of an electrical current on snake venom toxicity. *J Wilderness Med*. 1992;3: 48-53

viii Anker RL, Staffon WG, Loiselle DS, et al. Retarding the uptake of “mock venom” in humans.