Management of Snake Bite in India

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Introduction

India is a country known to the western population as a country of snake charmers and snake over centuries. Despite generation after generations some families in our country who play with snakes (snake charmers), we fail to protect the community from snake bite which requires at least education of the common people, how to protect themselves from snake bite as well as what to do after the bite has occurred. The estimated death in India is 50,000/yr, an underestimate because of lack of proper registration of snakebite. The persons or population at risk of snakebite in our country is around 50 million people which may occur any time in the life. There are large number of conflicting protocols for dealing with first aid and treatment. In 2004, WHO established a snakebite Treatment Group, whose role was to develop recommendations to reduce mortality according to international norms. A primary recommendation was to establish a single protocol for both first-aid and treatment which contained evidence-based procedures and was relevant to the Indian context. In July 2006, A National Snakebite Conference was convened, including Indian and International experts. Moreover, publications issued by the WHO Regional Office for South-East Asia, written and edited by David A. Warrell in the year 2015 and endurin g efforts of the scientist and doctors working indifferent regions of India is the back bone of this Editorial. We have treated about 10000 cases of snake bite patients in Medical College Hospitals, Kolkata, Tarakeswar Rural Hospitals and Seba Nursing Home, SRI Hospitals, Betai, Nadia, West Bengal since 1987.

First Aid Treatment Protocol

Much of the first aid currently carried out is ineffective and dangerous (Simpson, 2006).

Recommended Method for India

Modified by our team in West Bengal

The first aid being currently recommended is based around 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, specially when bite is at leg.

No- Tourniquate
No- Electrotherapy
No- Cutting
No- Pressure immobilization
Nitric oxide donor (Nitrogesic ointment/ Nitrate Spray)

R.= Reassure the patient. 70% of all snakebites are from non-venomous 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 don’t 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 of hospital.

Do not waste time for doing the first aid management.

This method will get the victim to the hospital quickly, without recourse to traditional medical approaches which can dangerously delay effective treatment (Sharma et al, 2004), and will supply the doctor with the best possible information on arrival.

Traditional Methods to Be Discarded

Diagnosis Phase

General assessment -> Depending upon type of symptoms (Table 1).

In addition some of the krait bite (Shochoureki) does not respond to ASV of Indian origin. In our study none of the Russell’s Viper presented with neurotoxicity.

Diagnosis Phase: investigations

20 Minute Whole Blood Clotting Test (20WBCT)

Considered the most reliable test of coagulation and should be carried out at the bedside by treating physician. It can also be carried out in the most basic settings.

A few milliliter of fresh venous blood is placed in a new, clean and dry glass vessel and left at ambient temperature for 20 minutes. The vessel ideally should be a small glass test tube. The use of plastic bottles, tubes or syringes will give false, readings and should not be used.

The glass vessel should be left
undisturbed for 20 minutes and then gently tilted, not shaken. If the blood is still liquid then the patient has incoagulable blood. The must not be washed with detergent as this will inhibit the contact element of the clotting mechanism. The test should be carried out every 30 minutes from admission for three hours and then hourly after that. If incoagulable blood is discovered, the 6 hourly cycle is then adopted to test for the requirement for repeat doses of ASV.

Management of Snake bite in general

Pain
Snakebite can often cause severe pain at the bite site; this can be treated with painkillers such as paracetamol.

Handling Tourniquets
Care must be taken when removing tight tourniquets which most of the time used. Sudden removal can lead to a massive surge of venom leading to neurological paralysis, hypotension due to vasodilatation etc.

• Before removal of the tourniquet, test for the presence of a pulse distal to the tourniquet. If the pulse is absent ensure a doctor is present before removal.

• Be prepared to handle the complications such as sudden respiratory distress or hypotension. If the tourniquet has occluded the distal pulse, then a blood pressure cuff can be applied to reduce the pressure slowly.

Anti Snake Venom (ASV)

After assessing patient whenever decision is taken for giving ASV, start ASV whatever dose is available in hand, do not wait for full dose to be available.

In India polyvalent ASV is only available. It is effective against all the four common species; Russells viper (Daboia russelii), Common Cobra (raja naja), Common Krait (Bungarus caeruleus) and Saw Scaled viper (Echis carinatus).

There are known species such as the Hump-nosed pit viper (Hypnaele hypnale) where polyvalent ASV is known to be ineffective. In addition, there are regionally specific species such as Sochurek’s Saw Scaled Viper (Echiscarinatus sochureki) in Rajasthan, and Kalach in West Bengal where the effectiveness of polyvalent ASV may be questionable. These species should be detected first and special measures to be taken for these bites.

ASV Administration Criteria

ASV is a scarce, costly commodity and should only be administered when there are definite signs of envenomation. Unbound, free flowing venom, can only be neutralised when it is in the bloodstream or tissue fluid. In addition, Anti-Snake Venom carries risks of anaphylactic reactions and should not therefore be used unnecessarily.

Systemic Envenoming

• Evidence of coagulopathy: Primarily detected by 20WBCT or visible spontaneous systemic bleeding.

• Evidence of neurotoxicity: ptosis, external ophthalmoplegia, muscle paralysis, inability to lift the head etc.

• Cardiovascular abnormalities: hypotension, shock, cardiac arrhythmia, abnormal ECG.

• Persistent and severe vomiting or abdominal pain.

<table>
<thead>
<tr>
<th>Table 1: Clinical features</th>
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<tr>
<td><strong>Feature</strong></td>
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<tr>
<td>Local pain/tissue damage</td>
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<tr>
<td>Ptoisis, neurological sign</td>
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<tr>
<td>Hemostatic abnormality</td>
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<tr>
<td>Renal complication</td>
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<tr>
<td>Response to neostigmine</td>
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<tr>
<td>Response to ASV</td>
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Severe Current Local envenoming

• Severe current, local swelling involving more than half of the bitten limb (in the absence of a tourniquet). In the case of severe swelling after bites on the digits (toes and especially fingers) after a bite from a known necrotic species.

• Rapid extension of swelling (for example beyond the waist or ankle within a few hours of bites on the hands or feet). Swelling a number of hours old is not grounds for giving ASV.

• Purely local swelling, even if accompanied by bite mark from an apparently venomous snake, is not grounds for administering ASV.

ASV Administration

Total required dose will be between 10 vials to 30 vials usually, as each vial neutralizes 6mg of Russells Viper venom. Not all victims will require 10 vials as some may be injected with less than 63mg. However, starting with 10 vials ensures that there is sufficient neutralizing power to neutralize the average amount of venom injected and during the next 12 hours to neutralize any remaining free flowing venom, even in the large study from south India, the amount of ASV exceeded 50 vials in some patients. So decision of the treating physician is of utmost importance, because the guidelines may not be useful for all patients.

No ASV test dose must be administered

Test doses have been shown to have no predictive value in detecting anaphylactic or late serum reactions and should not be used (Warren et al 1999). These reactions are not IgE mediated but Complement activated, They may also pre-sensitize the patient and thereby create greater risk.

ASV is Recommended to be Administered in the Following Initial Dose

Neurotoxic/ Anti Haemostatic 10 Vials

N.B. Children and pregnant women receive the same ASV dosage.
as adults. The ASV is targeted at neutralizing the venom. Snakes inject the same amount of venom into adults and children.

**ASV can be Administered in Two Ways**

- Infusion: liquid or reconstituted ASV in isotonic saline or glucose, may be started without any diluent fluid in volume overload patients.

All ASV to be administered over 1 hour at constant speed. Local administration of ASV, near the bite site, has been proven to be ineffective, painful and raises the intracompartmental pressure, particularly in the digits, it should not be used.

**Snakebite in Pregnancy**

*Pregnant women are treated in exactly the same way as other victims.* The same dosage of ASV is given. The victim should be referred to a gynaecologist for assessment of any impact on the foetus.

**ASV Reactions**

Anaphylaxis can be rapid onset and can deteriorate into a life-threatening emergency very rapidly. Adrenaline should always be immediately available.

The patient should be monitored closely (Peshin et al, 1997) and at the first sign of any of the following:

- Urticaria, itching, fever, chills, nausea, vomiting, diarrhea, abdominal cramps, tachycardia, hypotension, bronchospasm and angio-oedema
- ASV to be discontinued
- Children are given 0.01mg/kg body weight of adrenaline iv.
- In elderly noradrenaline and nitroglycerin infusion when hypotension is corrected can be given to avoid adrenaline induced arrhythmia which is common in elderly.

If after 10 to 15 minutes the patient’s condition has not improved or is worsening,

- A second dose of 0.5 mg of adrenaline 1:1000 iv is given. This can be repeated for a third and final occasion but in the vast majority of reactions, 2 doses of adrenaline will be sufficient in children.
- If there is hypotension or hemodynamic instability, IV fluids should be given.

Once the patient has recovered, the ASV can be restarted slowly for 10-15 minutes, keeping the patient under close observation. Then the normal drip rate should be resumed.

Late Serum sickness reactions can be anticipated with an oral steroid such as prednisolone, adults 5mg 6 hourly, paediatric dose 0.7mg/kg/day.

**Neurotxic Envenomation**

- *Neostigmine* is an anticholinesterase that prolongs the life of acetylcholine and can therefore reverse respiratory failure and neurotoxic symptoms. It is particularly effective for post synaptic neurotoxins such as those of the Cobra (Watt et al, 1986).

In the case of neurotoxic envenomation where edrophonium is not available Neostigmine Test can be done. The neostigmine dose is 0.04 mg/kg IV and atropine/glycopyrolate may be given by continuous infusion.

The patient should be closely observed for 1 hour to determine if the neostigmine is effective.

**Repeat Doses: Anti Haemostatic**

In case of anti haemostatic envenomation, the ASV strategy will be based around a six hour time period. When the initial blood test reveals a coagulation abnormality, the initial ASV amount will be given over 1 hour.

No additional ASV will be given until the next Clotting Test is carried out. This is due to the inability of the liver to replace clotting factors in under 6 hrs.

After 6 hours a further coagulation test should be performed and a further dose should be administered in the event of continued coagulation defect and in that case ASV to be given over 1 hr. CT tests and repeat doses of ASV should continue on a 6 hourly pattern until coagulation is restored or unless a species is identified as one against which polyvalent ASV is not effective.

The repeat dose should be 10 vials of ASV i.e. one full dose of the original amount. The most logical approach is to administer the same dose again, as was administered initially. Some Indian doctors however, argue that since the amount of unbound venom is declining, due to its continued binding to tissue, and due to the wish to conserve scarce supplies of ASV, there may be a case for administering a smaller second dose. In the absence of good trial evidence to determine the objective position, a range of vials in the second dose has been adopted.

**Repeat Dose: Haematotoxic**

The normal guidelines are to administer ASV every 6 hours until coagulation has been restored. However, what should the clinician do after say, 30 vials have been administered and the coagulation abnormality persists. A large study recently done from south India (Kerala) showed that upto 50 vials (500 ml) has been given for Haemotoxic poisoning.

- It has been established that envenomation by the Hump-nosed Pitviper (*Hypnalehypnale*) does not respond to normal ASV. This may be a cause as, in the case of *Hypnale*, coagulopathy can continue for up to 3 weeks.

**Surgical Intervention**

Whilst there is undoubtedly a place for a surgical debridement of necrotic tissue, the use of fasciectomy is highly questionable. The appearance of (Joseph, 2003):

Fasciectomy is required if the intracompartmental pressure is sufficiently high to cause blood vessels to collapse and lead to ischemia. Now a days we are using multiple puncture technique using large bore needle.

What is important is that the intracompartmental pressure should be measured objectively using saline manometers or newer
snake bite pose an important problem for transportation from the site of bite to the hospital. A well designed study from PGI Chandigarh shows that just putting an airway tube and an AMBU bag decrease the morbidity to a great extent. Mechanical ventilation to be avoided as far as possible, as because most of the death in ventilated snake bite patient is Ventilator associated pneumonia. Early initiation and early weaning from ventilator is the strategy, noninvasive ventilator with a patent upper air way is better option.

Heparin and Botropase: No role

Referral Criteria

The primary consideration, in the case of neurotoxic bites, is respiratory failure.Capacity of neck lifting is good predictor of requirement of ventilator support. Refer such patient to the center equipped with invasive ventilation.

In this issue of JAPI a study from south India involving more than 1000 patients has thrown light in the controversies in the management of snake bite victims. The study shows that early diagnosis of envenomation by way of clinical (history, bleeding and regional lymphadenopathy) along with PT, APTT and obviously WBCT and early institution of anti-snake venom in adequate dose, can reduce the development of SAKI (snake bite induced acute kidney injury). The study also used ASV more than 50 vials or 500 ml (maximum) for haematological and 30 vials for neurotic poisoning (maximum) and which I fully endorse from my personal experience.

Another study from North India in this issue of JAPI has shown that usual or low dose ASV (100 ml of two doses) is sufficient along with early ventilatory support. However, I personally think that if invasive ventilation can be avoided, incidence of ventilator-associated pneumonia can be avoided. Most of the patients are conscious though they’re speechless and if there’s no upper airways paralysis, nasopharyngeal (may be modified one) along with non-invasive ventilation is a better choice. However, if early intubation and early weaning principle is maintained, then VAP can be minimised, which may be the major cause of mortality and morbidity for altered mentation with or without bulbar paralysis. There’s some physicians who think that ventilatory support should be the primary with very little or no ASV particularly who came late (6 hours or more), though this is not recommended still today.

References

8. Guideline for management of snake bite in south east Asia countries by David Warrel