



## Notes on Indian Venomous Snakes and First Aid

**Of the 275 or more species of snakes found in India, we still have no real idea how many are capable of causing human fatalities.**

The commonly used description of the “Big 4” is very outdated. Now we tend to refer to “Snakes of Medical Importance”.

It is beyond the scope of this note to provide an identification key for the venomous snakes.

Species known to have caused human fatalities (listed alphabetically) are:

No	Scientific name	Common name	Currently known distribution	Comments
1	<i>Bungarus caeruleus</i>	Common Krait	Most of mainland India. Probably absent from Assam upwards.	Often confused with <i>Bungarus sindanus sindanus</i> & <i>Bungarus sindanus walli</i> .
2	<i>Bungarus fasciatus</i>	Banded Krait	West Bengal, Bihar, Orissa, Assam onwards to Arunachal Pradesh. Maharashtra (Gadchiroli district), parts of Madhya Pradesh and Uttar Pradesh. Possibly Uttarakhand.	
3	<i>Bungarus sindanus sindanus</i>	Sind Krait	Rajasthan, possibly adjacent Gujarat.	
4	<i>Bungarus sindanus walli</i>	Wall's Sind Krait	Uttar Pradesh (Faizabad), Maharashtra (Pune, Sholapur,	

			Amravati), Bihar (Gaya, Purnia), Bengal (Midnapore)	
5	<i>Daboia russelii</i>	Russell's Viper	Throughout India.	
6	<i>Echis carinatus</i>	Saw-scaled Viper	Throughout India.	Boundaries of the ranges of
7	<i>Echis sochureki/ E. carinatus sochureki</i>	Sochurek's Saw-scaled Viper	Rajasthan, Jammu and probably adjacent Gujarat.	<i>Echis carinatus &amp; Echis sochureki</i> are as yet unknown in India.
8	<i>Hypnale hypnale</i>	Hump-nosed Pit Viper	Western Ghats (northernmost known limit – Belgaum).	Lethality discovered in 2005. See Trans. Roy. Soc. Trop. Med. 101 85-90 Often confused with <i>E. carinatus</i> .
9	<i>Naja kaouthia</i>	Monocled Cobra/ Monocellate Cobra	Haryana (Sonipat), most of the Gangetic Plain, West Bengal, Orissa, Sikkim, Assam to Arunachal Pradesh. Records from Uttar Pradesh and Bihar need confirmation.	
10	<i>Naja naja</i>	Common Cobra	Throughout mainland India except N. E.	Black, patternless forms seen in Rajasthan and Maharashtra (Melghat). These are wrongly identified as <i>Naja oxiana</i> .
11	<i>Naja oxiana</i>	Central Asian Cobra	Jammu & Kashmir	Alternate common name

			(Poonch Valley, NW of Jammu), Himachal Pradesh, probably Punjab (Ferozpur).	“Black Cobra” is misleading. Usually brown. Very few authentic records from India.
12	<i>Naja sagittifera</i>	Andaman Cobra	Andaman Islands.	Some forms resemble <i>Naja kaouthia</i> .
13	<i>Ophiophagus hannah</i>	King Cobra	Western Ghats (Goa, Karnataka, Kerala, Tamil Nadu. Uttar Pradesh (Terai), Uttaranchal, Bihar, Orissa, West Bengal onwards to Arunachal Pradesh. Andaman Islands.	<i>Ophiophagus hannah</i> is probably a species complex. However, this has yet to be scientifically established.

**Sea snakes have not been dealt with. All “true” Sea snakes** (Family Hydrophidae) have flat, oar-like tails and though capable of causing human fatalities, most often do not bite. However human fatalities are on record.

Other snakes found in the sea/ on the sea shore/ in brackish water and without flat, oar-like tails (Subfamily Homalopsinae) may bite, but are not currently known to cause human fatalities. They are thought to be mildly venomous.

**Ashok Captain**

## **Modern Snakebite First Aid for the Wilderness Environment**

### **Introduction**

Today snakebite continues to be a major medical problem in India. The W.H.O. publish statistics that state that the death toll could be as high as 50,000, although many Indian authorities believe the number to be higher.

There are a great many contributory factors as to why the death toll remains so high. Some argue that one of the major factors is the reliance by victims on traditional medicines, which have no proven value in the treatment of snakebite, may be potentially harmful and are based on ideas superseded by modern science.

Traditional medicine is believed to be ineffective by the allopathic tradition because it is perceived to be simply the accumulation of accepted wisdom, not subject to rigorous scientific review. However, snakebite has been such a persistent medical problem in India that there is a danger that similar accumulated concepts have entered the allopathic tradition and remain part of the way we regard snakebite in modern India today. What do we know about snakebites and what is the most effective first-aid in the event of snakebite?

### **Venom Action**

Snake venom works in essentially two ways, either by interrupting the nervous system (Neurotoxic) or by attacking the blood system (anti-haemostatic). In addition, it can cause local damage as a result of elements in the venom designed to help it spread throughout the body.

In simple terms Cobras and Kraits are neurotoxic whereas viperine snakes are anti-haemostatic; however this is complicated by the fact that the Russell's Viper can also cause neurotoxic symptoms. Cobras and Kraits have venom that is designed to stop nerve impulses from the brain reaching muscles and hence paralysing them. Once the diaphragm is affected the victim dies of suffocation as without the diaphragm the victim cannot breathe. In these cases keeping the victim breathing until arrival at hospital will be life saving.

Viper venom is pro-coagulant, it causes the blood to begin clotting in the human body. Other systems in the body are designed to combat any unauthorised clotting and they battle the clotting until eventually one of the factors necessary for the blood to clot is completely used up. The blood is now incoagulable and will not clot even if the body activates the clotting mechanism. In addition, viper venom contains other enzymes whose function is to damage the blood vessels by punching holes in them. The victim will now start bleeding and if not treated will bleed to death.

## Signs and Symptoms of Venomous Bite

### Viperine Envenoming

- Swelling at the bite site (*in many but not all cases*)
- Continual bleeding from the bite site.
- Bleeding from the gums or nose
- Unusual bruising appearing away from the bite site
- Blistering is sometimes seen

### Neurotoxic Envenoming

- Drooping eyelids
- Difficulty speaking, opening the mouth or protruding the tongue
- Difficulty supporting the neck and head
- Difficulty swallowing
- Difficulty breathing

### Equipping Yourself for Snakebite in the Wilderness Environment

Normally you will be entering the wilderness with some basic first aid equipment. For snakebite some simple bandages and a splint for immobilizing the wound will be sufficient. Both these items can also be improvised.

In addition, for organized groups it would be advisable to take 20 vials of polyvalent anti snake venom (ASV) and an ambubag. ***The ASV is to be given to the hospital on arrival, in case they do not have their own stock, it must not be administered outside a hospital or by other than a doctor.*** ASV can cause rapid life threatening reactions which require other drugs to cure.

*In the case of neurotoxic bites the greatest threat is respiratory failure. The patient will appear dead but as long as you keep them breathing, will survive until you reach hospital and the doctor can take over. The ambubag allows the victim to be kept breathing on the way to hospital.*

### First Aid Treatment: What You Should Do!!!!

#### Do it R.I.G.H.T.

The preferred method of first aid currently being recommended is based around the mnemonic "Do it R.I.G.H.T".

It consists of the following:

- R. = Reassure the patient. 70% of snakebites are from non venomous species and only 50% of bites by venomous species actually envenomate the patient.**
- I. = Immobilise as you would for a fracture without compression.**
- G. H. = Get to Hospital fast.**
- T. = Tell the doctor of any symptoms such as drooping eyelids that manifest on the way to hospital.**

There is no need to wash the wound and *this can also lead to increasing venom flow into the body. Keep the victim as immobile as possible and transport quickly to hospital.*

### **First Aid Treatment: What You Should Not Do!**

#### **Tourniquets!**

In modern India the tradition of using a tourniquet remains and in addition a new variant has been introduced, that of the pressure bandage. How useful are these techniques and what is the science behind them?

Tourniquets are tight constriction devices made of cloth, rope, string or rubber which are tied around the upper part of the limb, above the bite, in order to stop the flow of blood into the limb. Tourniquets tied on the lower part of the limb are ineffective because the lower limb consists of two bones and it is therefore difficult to compress the artery sufficiently to stop or reduce flow. Tourniquets also have the following drawbacks.

Firstly they are often justified as being necessary when the victim has considerable distances to travel to the hospital. However tourniquets left in place for greater than 30 minutes, cut the oxygenated arterial blood supply and thus place the limb in danger of ischaemia often resulting in amputation. Secondly, the vast majority of Indian snakes have venom which causes significant local tissue damage or necrosis. Using tourniquets simply confines the toxin to a smaller area and by raising the intracompartmental pressure within the limb, makes this toxin more effective and therefore creates greater local tissue damage and necrosis.

The third area of concern is the consequences of what happens when the tourniquet is released. In the case of viper bites the first action of the toxin is pro-coagulant which causes the blood to begin clotting. The blood below the tourniquet will be under tremendous pressure to clot and small clots will form in the bloodstream. Once the tourniquet is released there is a great danger that these clots will then enter the main part of the body and cause embolism and death.

The final issue with tourniquets is whether or not they are effective at all. Research carried out in Burma in the 1980s showed that venom levels on both sides of the tourniquet were similar. Further research showed that in 33% of cases where tourniquets had been applied the victim underwent systemic envenomation even whilst the tourniquet was still in place, demonstrating quite clearly that the tourniquet doesn't do what we believe it does, which is to stop the flow venom into the body. It is also interesting to note that in the early 1900's when Wall wrote his great work 'The Poisonous Terrestrial Snakes' he dismissed the use of tourniquets on the grounds of effectiveness. Clearly some myths certainly have the tenacity to endure despite all evidence to the contrary.

#### **Pressure Immobilisation Technique!**

The modern variation of the tourniquet is the pressure bandage, Pressure Immobilisation Method or Sutherland Wrap as it has been called. A great many books, particularly those

published by herpetologists, recommend this method in the event of a bite. The instructions are to tie a crepe bandage in the same way that you would for a sprain, tightly enough such that you can place two fingers under the bandage.

Again let us look at the background to this technique. This procedure was derived from work carried out by Sutherland in 1979 in Australia. Sutherland's work appeared to demonstrate that the rate of flow of venom into the body could be reduced by the application of this technique. However Sutherland's research work was carried out on monkeys tied to wooden boards and thus did not represent a practical setting. Sutherland also recommended that for the technique to be successful an integral splint had to be included with the bandage. Sutherland himself did not recommend the version currently carried out in India of simply applying the bandage without a splint.

Finally, Sutherland concluded, to be effective the level of pressure that the bandage had to apply was the equivalent of 55 mm of mercury. Further research carried out in Australia demonstrated that to be effective, the range of pressure in the upper limb had to be between 40 and 70 mm of mercury and in the lower limb 55 to 70 mm of mercury.

In addition, this research demonstrated that even if the technique had been accurately applied, the simple act of walking for 10 minutes rendered the technique ineffective. Also pressure bandages above the recommended level of pressure may in fact increase the flow rate of venom into the system.

Later work carried out in the United States demonstrated that doctors carrying out the technique were only able to achieve the correct level of pressure 13% of the time and lay people 5% per cent of the time.

The lack of practicality in the application of this technique in India is compelling.

### **Other Methods**

Other methods have been proposed such as cutting the wound to release the venom. Unfortunately evidence has shown you cannot bleed venom from a wound. In cases of viper bite, when the blood becomes incoagulable, cutting the victim will cause uncontrollable bleeding and is life threatening.

Evidence has shown *you cannot suck venom from a wound*, wither by mouth or by using a mechanical suction device. ***Mechanical suction devices, advertised in the U.S. do not remove venom and may make matters worse by causing greater local tissue damage.***

The use of electrical shocks to denature the venom was also popular at one time in the U.S. ***Research has shown that electric shocks DO NOT denature venom and simply electrocute the victim!***

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