A Module On The

"Management of Snake Bite Cases"

For

Medical Officers

Developed By ;

PUBLIC HEALTH BRANCH OF THE DIRECTORATE OF HEALTH SERVICES & INSTITUTE OF HEALTH & FAMILY WELFARE KOLKATA

> DEPARTMENT OF HEALTH & FAMILY WELFARE GOVERNMENT OF WEST BENGAL

Swasthya Bhawan 29 G N Block, Sector - V, Salt Lake City Kolkata 700 091 This Government document is for OFFICIAL USE for Medical Officers of West Bengal Health Services.

Any part of this document may be reproduced and excerpts from it may be quoted without permission provided the material is distributed free of cost and the source is acknowledged

Reprinted in July, 2014

Designing and Printing S. G. Associates Kolkata - 700 154



Government of West Bengal Office of the Chief Medical Officer of Health South 24 Parganas (Public Health Wing) M. R. Bangur Hospital Complex, 241, Deshpran Shasmal Road, Kolkata - 700 033 Phone : (033) 2422-0325 Fax : (033) 2473-0294 E-mail : dycmoh2_s24@wbhealth.gov.in; idsp24s@gmail.com





If one examines the reports generated by different blocks and different level hospitals he/she discovers either no reporting or zero reporting or grossly under reporting on snake bite cases and deaths due to poisonous snake bite. But our field level experience speaks different. In South 24 Parganas, particularly in the Sunderban adjacent areas, we have found that:

- (i) Due to human invasion in plant and animal kingdom for making cultivable land in forest areas, for fishing, wood cutting, honey collection etc. snake bites are increasing.
- (ii) Due to indiscriminate killing of snakes , including helpful snakes like Rat Snakes (Darash), Branded Kraits (Sankhamuti) etc. who eat poisonous snakes, the number of most poisonous snakes, i.e. **Common Krait** (Kalach or Kalachiti or Siorchanda or Ghamchata or Domnachiti) are increasing. Snakes are elusive and reclusive reptiles usually do not bite without provocation or attack. But hoodless night biter severely neurotoxic Common Kraits usually bite while people are sleeping in ground without using mosquito net. Early signs and symptoms (bodyache, pain abdomen, diarrhea etc.) are confusing and usually bite marks are absent. Some experts suspect that the polyvalent AVS does not work on some species of Krait. Further research is needed on this issue.
- (iii) Common people still have strong belief that qualified doctors can treat all ailments except snake bite and they prefer to visit faith healers etc. for treatment of snake bites.

To some extent we are responsible for this. In 2013, Sri Dipankar Majhi, a school teacher and a popular science activist in Mathurapur Block, challenging family verdict brought his three nephews (aged 8, 12 and 14 years) at Raidighi Rural Hospital for treatment of suspected Kalach bites. It was alleged that following a casually treatment with some vials of Inj. AVS the boys were referred to Diamond Harbour District Hospital and from there they were also referred to IPGMER, Kolkata and the three boys died in their journey pathetically. Again in 2014, Sri Joydeb Mondal (38 yrs), a very popular peoples science activist in Canning Subdivision, and organizer of 'Canning Juktibadi Sanskritik Sanstha (CJSS)', while working on nature, fauna and flora conservation and scientific management of snake bite cases, under National Health Mission, The Department of Health & Family Welfare and also with The Department of Forest, Govt. of West Bengal, captured two Monocled Cobras (Keutes) from two Basanti villages after receiving calls in Snake Bite Helpline. When he was releasing the snakes at Sajnekhali Reserve Forest under supervision of forest officials he had an accidental bite. Then and there he was transferred by speed boat and vehicles to Gosaba Rural Hospital and detail history was given to the attending doctors and nursing staff. But reluctance, insufficient treatment and misbehavior were alleged and Sri Mondal expired. These two incidences sparked unrest among common people, science organizations, civil society and intellectuals.

It is well documented that all **six types of poisonous snake bites in West Bengal (King Cobra, Spectacled Cobra, Monocled Cobra, Common Krait, Branded Krait and Russell's Viper)** can be treated upto our Rural Hospital level with adequate use of **Inj. AVS** and other supportive treatment (Inj. Atropine-Neostigmine additionally for neurotoxic snake bites) if the patient is brought early. It is to be mentioned that Flat Tailed Sea Snakes (e.g. Jol Keral), found in coastal areas with rare bite are poisonous, myotoxic and supplied polyvalent Inj. AVS does not work. Our Medical Officers of **Canning Sub Divisional Hospital, Mathurapur Rural Hospital, Sonarpur Rural Hospital** etc. had done commendable works in last few years, saving hundreds of lives from poisonous snake bites. But in other places the experiences are not encouraging. Therefore we thought that all **Medical Officers**, working in **South 24 Parganas District**, should undergo a sensitization / re-sensitization training in batches on snake bite management which will be started on and from 15.07.2014 at **Canning Sub-Divisional Hospital**. We have also procured dry variety of Inj. AVS for PHCs and BPHCs where electricity is not available or irregular.

We are grateful to the District Health & Family Welfare Samiti, South 24 Parganas, particularly Sri Santanu Bose, IAS, The District Magistrate, South 24 Parganas and Executive -Vice Chairperson, DH & FWS; Dr. Ashim Das Malakar, The Chief Medical Officer of Health, South 24 Parganas and Member Secretary, DH & FWS and Dr. Tarun Roy, Karmadhyakswa (Jana Swasthya O Paribesh), South 24 Parganas Zilla Parishad, for their support and funding for the training. We also pay our gratitude to The Director, West Bengal Health Services and Ex-Officio Secretary, GoWB; The Mission Director, NHM, GoWB; The Secretary (PHP), GoWB; The Jt. DHS (PH & CD), GoWB; The ADHS (EC, NC & ES), GoWB and The Director, The Institute of Health & Family Welfare, GoWB, for their kind support and permission to reprint this module. We are also thankful to the Superintendent, Medical Officers and staff, Canning Subdivisional Hospital; CJSS; Dr. Dayal Bandhu Majumder, the state level resource personnel and S.G. Associates for their kind co-operation.

We hope that our Medical Officers will treat snake bite cases in better way and thus save precious lives.

(DR. GAURAB ROY), D.P.H. M.A.E. Dy. Chief Medical Officer of Health II South 24 Parganas





Commissioner, Family Welfare, State Mission Director (NRHM)

& Secretary to the Government of West Bengal

<u>FOREWORD</u>

I am happy to write the forewording note of the publication on "Management of Brake Bite Cases for Medical Officers" from the Department of Health and Family Welfare, Government of West Bengal in collaboration with the Institute of Health and Family Welfare, the training wing of the department. Many of the Medical Officers, particularly those who have been engaged by the department for quite some time, may not be aware of the recent advances in the treatment of snake bite cases. This module will empower them in the management of snake bite cases.

I acknowledge with thanks the sincere efforts made by the Public Health Branch of the Directorate of Health Services, faculties of the Institute of Health and Family Welfare and Directorate of Medical Education who have developed and published the module on the Management of Snake Bite Cases.

I sincerely hope that the programme conceptualized, will be successful and would have visible impact in dealing with cases of snake bite.

Commissioner"(FW) and Mission Director (NRHM)

Swasthya Bhawan, B-Wing (4th Floor), GN-29, Sector - V, Salt Lake, Kolkata-700 091, Phone : 033-2357-3625 Fax : 2357-7909, e-mail : cfw@wbhealth.gov.in, dilipghosh.1952@gmail.com



INSTITUTE OF HEALTH & FAMILY WELFARE

(Department of Health and Family Welfare, Government of West Bengal) 29, GN Block, Sector - V, Bidhan Nagar, Kolkata-700 091 Phone No. : 2357 4531, Tele Fax No. : 2357 8870 e-mail : <u>ihfwkolkata@gmail.com</u> / Website : <u>www.ihwkolkata.org</u>

<u>PREFACE</u>

Snake bite is a medical emergency. It may result in death or chronic disability in active young people. The true scale of morbidity and mortality from snake bite remain uncertain because of inadequate reporting.

There are few reliable data on snake bite, as most snake bite cases report to traditional healers, particularly in South East Asian countries. A recent study carried out by Registrar General of India has stated that expected snake bite death nationally is 45,900 with a rate of 4.1/100000 population annually. This study was based on verbal autopsy and it was found that only 23% death occurred at hospitals.

Records with Public Health Branch of Govt. of West Bengal also indicates the reported number of snake bite cases and death for years 2008, 2009 and 2010 are 19051 and 290, 20089 & 282 and 19306 & 265 respectively. Barring a few districts, the problem of snake bite is state wide.

Local customs and dependency on the traditional healers, delay in seeking care, inappropriate and inadequate treatment are universal problems in management of snake bite cases. Seesides, the medical officers who have joined government service for quite some time are not aware of the recent development in the management of snake bite. With a view to empower the medical officers in the up dated concept of management of snake bite, the Public Health wing of the Directorate of Health Service in collaboration with the Institute of Health and Family Welfare, training wing of the department, has developed this module on the management of snake bite. The management advocated is a syndromic approach and is based on the WHO 2010 protocol.

It is decided to train all the medical officers attached to the primary and secondary level health care facilities with the help of this module on the Management of Snake Bite Gases for medical officers" in a cascade pattern. To begin with Training of the Trainers (TOT) will be organized in the Institute of Health and Family Welfare. Officers of the Public Health Branch, faculties of IHFW/ Medical Golleges and selected district level officers will be taken up. These trainers, at the district level, will take up the training of the medical officers attached to the different primary and secondary level health care facilities.

It is fult that with the training of the medical officers, as envisaged, and supporting them with requisite logistic and adequate IEC will improve the current status of management of snake bite cases.

We wish the efforts great success.

B. Jospani

(Dr.-B. B. Satpathi) Member, Governing -Body, IHFW, K.olkata, Director of Health Services & E.O. Socretary, Deptt. of Health & F.W, GoWB

Birwar

(Prof A. B. Biswas) Director, IHFW, K. olkata

Contents

INT	RODUCTION	 01
1.	DIAGNOSIS OF SNAKEBITE AND ENVENOMATION	 09
1.1	. Signs and symptoms of snake bite	
1.2	. Diagnosis and testing	
2.	MANAGEMENT OF SNAKEBITE	 12
2.1	Level 1: At primary health centre without admission facilities	
	[sub- centre, non bedded PHC], also by paramedics	
2.2	Level 2 : At primary health centre with admission facilities	
	[bedded PHC, BPHC, RH]	
2.3	Level 3 : At secondary care hospitals	
3.	ANTI-SNAKE VENOM SERUM (AVS)	 18
3.1	Adverse reactions to anti-snake venom serum (AVS)	10
3.2	Management of adverse reactions to AVS	
3.3	Flowchart for snakebite management	
4.	CASE STUDIES	 23
АР	PENDIX -I	 33
АР	PENDIX -II	 34
REF	ERENCES	 35
FUI	RTHER READING	 35
LIST	OF CONTRIBUTORS	 36

INTRODUCTION

Snakebite is a medical emergency. It may result in death or chronic disability even in active young people. However the true scale of mortality and acute and chronic morbidity from snakebite remains uncertain because of inadequate reporting.

There are few reliable data on snakebite as most snakebite cases report to 'traditional healers', particularly in South East Asian countries. Papers published by statistical studies section of WHO in 1954 reported half million snakebites and about 40000 snakebite deaths yearly worldwide with 25000-30000 deaths in Asia. Study by Kasturiratne et al in 2008 showed incidence of snakebite deaths as 0.9-2.1/100000/ year in South East Asia.⁽¹⁾

Though records of Government of India of 2006 and 2007 shows 61507 snake bites with 1124 deaths and 76948 snakebites with 1359 deaths respectively;⁽¹⁾ But a recent study carried out by a group attached with "Million Death Study" being carried out by the Registrar General of India, has stated that, expected snake bite deaths nationally are 45900 with a rate of 4.1/100000 population annually.⁽²⁾ This study was based on verbal autopsy and it was found that only 23% deaths occurred at hospitals. Study by Hati et al in 1992 at Burdwan district of West Bengal showed incidence of snakebite deaths as 16.4/100000/year, where as a study in Maharastra during 1974-78 showed snakebite death incidence as 2.43/100000/year.⁽¹⁾

Records of Public Health Branch of Government of West Bengal also indicate under reporting. Snakebite cases and death for the years 2009,2010 and 2011 are 20089 and 282,19306 and 265 and 22776 and 309 respectively.⁽³⁾

Learning objectives

- To identify snake bite as an important public health challenge.
- To identify snakebite cases and manage them following international guidelines of snakebite management.

Epidemiology of Snakebite

Incidence of snakebite depends on frequency of contact between snakes and human. Snakes are usually elusive and reclusive. Snakebites occur when human move to the habitat of snakes like paddy field, tea, rubber and coffee plantations. Bites may be inflicted in home by peri-domestic species which live in roof space or underfloor like Cobras and Kraits.

Seasonal peak of snakebite is associated with increase in agricultural activity or heavy rain leading to flood. During flood there may be epidemic of snakebite. Males are bitten more than females except where work force is predominantly female (tea and coffee picking). Peak age of bite is 15 - 45 years. Most of the snakebites are inflicted on feet and ankles.

Walking bare foot or wearing only sandal either in dark or in undergrowth increases chance of snakebite. Bites occur with Kraits when they come to home for prey (rat, lizard, frog), and someone sleeping on floor rolls over the snake.

Snakebite may be considered as an occupational disease and the following workers are mostly bitten by snakes:

- i. Farmers
- ii. Plantation workers
- iii. Herdsmen and
- iv. Fishermen and fish farmers

Public Heath Challenges of Snakebite

Snakebite and gaps in management are public health problems which need special consideration. The main challenges are:

- 1. Huge magnitude of snakebite incidence: In our country rural population is more and majority live on agricultural works. Tea plantation and fishing are also important occupations in our state.
- 2. Perception and reaction of the community towards a snakebite patient is often guided by social customs and beliefs.
- 3. Reliance of rural population on traditional healers and faith healers leads to loss of precious time before initiation of proper treatment.
- 4. People are not aware about the lifesaving role of Anti Snake Venom Serum (AVS) in venomous snakebite and where to avail of the said treatment. Moreover the procedure of correctly transporting the patient (immobilizing the bitten part) is not followed.
- 5. Medical officers posted at primary health care institutions often feel uncomfortable when a snakebite patient is brought at emergency room and tend to refer the patient unnecessarily to higher center without proper assessment of the patient and without providing specific treatment.
- 6. There is reluctance on the part of the doctors to administer AVS in full doses due to lack of confidence.
- 7. Adequate amount of logistics mainly AVS, Inj. Adrenaline, Neostigmine and Atropine are not stored at BPHC and Rural hospitals throughout the year, particularly during rainy season and harvesting period.
- 8. Inadequate availability or unavailability of transport creates problem for the relatives of the victim to transport to the health facility.
- 9. Provision of dialysis and artificial ventilation, which is lifesaving for treatment of complications of snakebite, is not adequate at medical colleges and district hospitals.
- 10. There is dearth of data at State Headquarter on snakebite, death and use of AVS.

S.NO.	District Name	2011		2010		2009	
		Cases	Deaths	Cases	Deaths	Cases	Deaths
1.	Bankura	2426	55	573	9	898	2
2.	Birbhum	820	22	963	24	1527	18
3.	Burdwan	2448	48	4296	130	3979	122
4.	Dakshin Dinajpur	362	8	295	11	323	6
5.	Darjeeling	124	0	240	4	193	7
6.	Hooghly	2429	12	1943	9	1442	4
7.	Howrah	498	6	192	0	745	2
8.	Jalpaiguri	949	1	1225	1	1118	9
9.	Cooch Behar	711	0	131	0	1029	13
10.	Malda	1156	23	1111	29	990	22
11.	Murshidabad	1258	10	1716	0	1484	14
12.	Nadia	2400	67	1524	10	1547	19
13.	North 24 Parganas	1502	9	1470	7	867	13
14.	Paschim Medinapur	687	3	468	6	701	2
15.	Purba Medinipur	2663	0	1214	0	2281	1
16.	Purulia	46	0	181	0	177	0
17.	South 24 Parganas	2169	38	1725	25	1644	30
18.	Uttar Dinajpur	128	7	39	0	42	0
	TOTAL	22776	309	19306	265	20987	284

REPORTED SNAKE BITE CASES AND DEATHS BY DISTRICTS OF WEST BENGAL IN YR 2009, 2010 & 2011



*Russell's viper (some neurotoxicity with hemotoxic venom)

1. DIAGNOSIS OF SNAKEBITE AND ENVENOMATION

1.1. SIGNS AND SYMPTOMS OF SNAKE BITE

1.1.1. Bite Mark

A bite from a venomous snake may show one or more punctures, a small abrasion and perhaps a linear laceration. *Bite marks to determine whether the biting species was venomous ornon venomous are of no use. The pattern of fang marks is, however, of no help* in ascertaining the amount of venom injected, severity of systemic poisoning and nature of poisoning - Elapidae or Viperidae venom. Very fine bite marks of Common Krait (CK) snakes are almost invisible (particularly in dark complexions). So, searching for bite marks in a case of CK bite is always misleading.

1.1.2. General signs and symptoms of Viper envenomation (Hemotoxic)

- Swelling and local pain.
- Bleeding from the gum and other orifices, and from bite marks and injection site.
- Epistaxis
- Vomiting (may be blood stained or not).
- Acute abdominal pain (which may suggest gastro-intestinal or retro peritoneal bleeding).
- The skin and mucous membranes may show evidence of petechiae, purpura, ecchymoses.
- Hypotension (resulting from hypovolaemia or direct vasodilatation).
- The passing of reddish or dark-brown urine or declining or no urine output.
- Lateralising neurological symptoms and asymmetrical pupils may be indicative of intra-cranial bleeding.
- Muscle pain indicating rhabdomyolysis (common in sea snake bites).
- Tender enlargement of local lymph nodes (as large molecular weight Viper venom enter the system via the lymphatics).
- Parotid swelling, conjunctival oedema, sub-conjunctival haemorrhage.

1.1.3. General signs and symptoms of Neurotoxic envenomation

- Progressive swelling and local pain (Cobra).
- Local necrosis and / or blistering (Cobra).
- Descending paralysis, initially of muscles innervated by the cranial nerves, commencing with ptosis, diplopia, or ophthalmoplegia. The patient complains difficulty in focusing and the eyelids feel heavy.
- Paralysis of jaw and tongue may lead to upper airway obstruction and aspiration of pooled secretions because of the patient's inability to swallow (pharyngeal palsy).
- Numbness around the lips and mouth, progressing to pooling of secretions, bulbar paralysis and respiratory failure.
- Hypoxia due to inadequate ventilation can cause cyanosis, altered sensorium and coma. This is a life threatening situation and needs urgent intervention (*Referred as CRISIS inflow chart for snake bite management*).

- Paradoxical respiration, as result of the intercostals muscles becoming paralysed is a frequent sign.
- Stomach pain which may suggest submucosal haemorrhages in the stomach (Krait bite).
- Krait bites often present in the early morning with paralysis that can be mistaken for a stroke.
- Early morning "Pain Abdomen" is the commonest presentation in Krait bite.

1.2 DIAGNOSIS AND TESTING

• Severe local symptoms are defined as swelling rapidly crossing a joint or involving half the bitten

limb, in the absence of a tourniquet. Once the tourniquet has been removed for more than one hour, if the swelling rapidly continues, this should be viewed as venom generated and not due to the continuing effect of the tourniquet. Purely local swelling is not ground for administering AVS (Anti Snake Venom Serum). **Progressive local swelling is the commonest sign of**



envenomation. There would be local pain along with swelling [Particularly in case of Russell's viper and Cobra bites].

• **Neurological signs** and symptoms are ptosis, hoarseness of voice due to pharyngeal and palatal, palsy, then progressing to respiratory failure (in both Cobra and Krait bites).



 In case of viper bites [hematotoxic like Russell's Viper or 'Chandrabora'] in addition to local pain and swelling there would be signs of coagulopathy. If you suspect coagulopathy, do not wait for red colouration of urine, but do the 20 Minute Whole Blood Clotting Test (20 WBCT) which is adopted as the standard test.

1.2.1. 20 Minute Whole Blood Clotting Test

20 WBCT is simple to carry out but crucially requires a clean and dry test tube or vial (must be glass not plastic). Draw 2-3 ml of venous blood. Keep this fresh blood in a dry test tube left undisturbed for 20 minutes and then gently tilt the tube. If the blood is still liquid [cf. normal clotting time is 8 minutes maximum] this is evidence of coagulopathy and confirms that the biting species is a Viper. Cobras or Kraits do not cause anti-hemostatic symptoms.

20WBCT is to be done if Viper bite is suspected or there is any sign of bleeding. If positive, then it is a case of Viper bite and 10 vials Inj. AVS is to be infused with IV fluid, if not already started based on other signs of envenomation.

If 20WBCT is negative, it has to be repeated after 30 minutes as coagulopathy may occur late.

Perform 20WBCT positively, if bite by Viper or coagulopathy is suspected, it can be easily done at bedside.

In coagulopathy, there may be continuous oozing from bite site, gum or old ulcers. It then leads to hemoptysis and hematuria and ultimately renal failure. (In Chandrabora bite there would be ptosis also).



Always keep in mind that, there would be no local sign in case of Krait bite. The patient may present with pain abdomen or arthralgia or sore throat. History of open floor bed is highly suggestive.

2. Management of Snakebite

PATIENT ASSESSMENT ON ARRIVAL

- Where possible identify the snake responsible. (This is not essential)
- Determine if any traditional medicines have been used, they can sometimes cause confusing symptoms.
- Take history of the exact time of the bite. This can give indications as to the progression of any symptoms.
- Ask questions as to what the victim was doing at the time of the bite. Some activities such as grass cutting or feeding stock animals in the evening can be suggestive of snakebite.

2.1. LEVEL 1: AT PRIMARY HEALTH CENTRE WITHOUT ADMISSION FACILITIES [Sub- centre, Non bedded PHC], also by paramedics

2.1.1 First Aid Treatment

In view of the limitations both tourniquets and 'Pressure Immobilization Method' (PIM) are rejected for use in India. The first aid recommended is based around the mnemonic: "Do it R.I.G.H.T." It consists of:⁽⁴⁾

- R. = **Reassure.** This is vital. Whenever and whatever snake bites a person, he/she becomes panicked. This panic may lead to cardiac attack also. If the patient gets panicked his heart rate would increase which in turn would spread the venom rapidly. Try to reassure the patient. Tell him that 70% of all snakebites are from non venomous species. Only 50% of bites by venomous species actually envenomate the patient.
- I. = Immobilize. Immobilize the bitten limb 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 particularly in case of Russell's Viper bite. If the bite is on the trunk, carry the patient in supine position on a stretcher or country cot. Children can be carried on shoulder.

- G.H. = Go to Hospital immediately. This has got no other alternative. Traditional remedies have NO benefit in treating snakebite. Most of the vital time is lost at the chamber / house of traditional healers. Refer the case to a health centre / hospital where AVS is available. For rapid transport in rural areas "Motor bike Ambulance" is ideal.
- **T.** = **Tell the doctor** of any progress/new symptoms such as ptosis that manifest on the way to hospital.





The following local treatments are contra indicated:

- i. Washing
- ii. Antiseptics
- iii. Incision
- iv. Suction
- v. Electrotherapy or Cryotherapy
- vi. Venom Stone

2.1.2 Management of Pain

- Snakebite can often cause severe pain at the bite site. In scorpion bite there would be much pain but there is almost no swelling. This can be treated with painkillers such as Paracetamol only.
- Aspirin should not be used due to its adverse impact on coagulation. Do not use non steroidal anti-inflammatory drugs (NSAIDs) as they can cause bleeding. This can be particularly dangerous in a patient already having coagulopathy.
- If available, mild opiates such as Tramadol, 50 mg, can be used orally for relief of severe pain. in cases of severe pain at a tertiary centre, Tramadol can be given IV.

2.2. LEVEL 2 : AT PRIMARY HEALTH CENTRE WITH ADMISSION FACILITIES [Bedded PHC, BPHC.RH]

2.2.1. General Management

- If there is evidence of a bite, give Tetanus Toxoid.
- **Routine use of antibiotic is not necessary,** although it should be considered if there is evidence of cellulites or necrosis.
- Volume replacement by IV fluid: normal saline/5% dextrose.
- If there is local pain and spreading edema, elevate the affected limb and allow it to rest on a sand bag.

The following general principles are to be followed:

- Admit all cases with history of bites (snake or unknown). All patients to be kept under observation for a minimum of 24 hours.
- Deal with any life threatening symptoms on presentation, i.e., Airway, Breathing and Circulation (*Referred as CRISIS inflow chart for snake bite management*).
- Closely observe for any sign of local or systemic envenomation. In 50% of known venomous snake bite there may not be any envenomation (called dry bite). If there is no indication for administration of AVS, continue the general treatment (plain drip) for 24 hours.

2.2.2. Handling Tourniquets (if already applied)

- Before removal of the tourniquet, test for the presence of pulse distal to the tourniquet. If pulse is absent *ensure a doctor is present* before removal.
- Care must be taken when removing tight tourniquets. Sudden removal can lead to a massive surge of venom leading to neurological paralysis, hypotension due to vasodilatation etc.
- 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.

2.2.3. Anti-snake Venom Serum (AVS) Treatment:

Criteria for Administration of AVS

AVS should not be used without evidence of systemic envenomation or severe local swelling. Essentially systemic envenomation will be evident from:

- Progressive swelling and pain;
- The 20WBCT or signs of spontaneous bleeding in Viper bite, or
- By visual recognition of neurological impairment such as ptosis (in Krait bite).



Doses and administration

Severity of symptoms is of no help as a means of determining severity of envenomation as it is too dynamic and constantly evolving. The initial dose is 10 vials for both adults and children. First of all keep in hand one ampoule of Inj. Adrenaline to combat any adverse reaction. Add 10 vials of Indian Polyvalent Anti Snake Venom Serum (AVS) to the running bottle (200 ml in children) on earliest sign of envenomation. Open the fluid in jet and try to infuse 10 vials AVS in first hour. Closely observe for any adverse reaction to AVS, if any, treat accordingly. Pregnant women are treated in exactly the same way as other victims.

AVS should be administered over one hour. There is no benefit in administering each dose over longer periods.

Administration of Atropine and NeostigmIne

In the case of neurotoxic bite, once the first dose of AVS has been administered, a Neostigmine test is done and the victim is closely monitored. A Neostigmine test is administered using 1.5mg of Neostigmine IM. *Inj. Atropine 0.6mg IV must be given before Neostigmine*. First sign of improvement is the ability to open the eyes (ptosis improves).

Signs of recovery

If an adequate dose of AVS has been administered, the following responses may be seen:

- Spontaneous systemic bleeding such as gum bleeding usually stops within 15-30 minutes.
- Blood coagulability is usually restored in 6 hours. (Principal test is 20WBCT).
- Post synaptic neurotoxic envenoming such as seen in Cobra bite may begin to improve as early as in 30 minutes after AVS, but may take several hours also.
- Presynaptic neurotoxic envenoming of Krait bite usually takes a considerable time to improve.
- In shocked patients, blood pressure may increase after 30 minutes.

2.2.4. Monitoring

- Pulse rate, respiratory rate, blood pressure every hour.
- Blood urea, creatinine, and WBC count (in Viper bite).
- Urine output, urine for RBCs (in Viper bite).
- Vomiting, diarrhea, abnormal bleeding.
- Extent of local swelling and necrosis.
- 20WBCT at referral hospital (after 6 hours).

Repeat doses of AVS

In Viper bites, once the initial dose has been administered over one hour, no further AVS is given for 6 hours. 20WBCT test done after 6 hours, will determine if additional AVS is required. This reflects the period the liver requires for restoring clotting factors. If clotting defect is there after 6 hours of first dose, second dose of 10 vials of AVS is to be given rapidly.

In neurotoxic snake bite, if after 1 hour the victim has not been improved or has worsened then a second and final dose (of both Atropine and Neostigmine) should be given. If there is no improvement even after second dose of Atropine

and Neostigmine, then the patient will require mechanical ventilation. Repeat second dose of 10 vials of AVS if neurodeficit remains even after second dose of injection Atropine and Neostigmine.

- In Viper bites maximum 30 vials of AVS may be needed.
- 100 vials of AVS may be needed in King Cobra and Sea snake bites.

However, final decision is the prerogative of attending Medical Officer/Physician assessing the condition of the patient

Management of Adverse reactions to AVS

Refer to the section of 'AVS'

2.2.5. Discharge

If no symptoms and signs develop after 24 hours the patient can be discharged. The patient has to be kept in observation for 48 hours if AVS was infused.

2.2.6. Referral Criteria

- Local necrosis and persistent edema necessitating surgical intervention
- Continued bleeding in spite of AVS therapy
- In Viper bite, if 20 WBCT is positive after initial 10 vials of Inj. AVS
- Progressive neuro-paralysis (for mechanical ventilation)
- Progressive septicaemia
- Signs of Renal failure or abnormal Kidney function test (for dialysis)

2.3 LEVEL 3: AT SECONDARY CARE HOSPITALS

2.3.1. Management of Neurotoxicity

If there is sign of Neuroparalysis, give Inj. Neostigmine 3 ml {1.5mg} IM or IV along with one amp. Inj. Atropine (0.6mg) IV which is to be administered before giving injection neostigmine. In Cobra bite there would be dramatic improvement of ptosis and other neurological signs. In Common Krait (CK) and Russell's viper (RV) bite there would be no improvement. Inj. Atropine and Neostigmine may be repeated after one hour.

*Calculate the dose of Adrenaline (0.01mg/kg),Neostigmine (0.04mg/kg) and Atropine (0.05mg/kg) according to body weight of the child.

Atropine must be given IV before Inj. Neostigmine to counteract the muscarinic effect (secretions) of Neostigmine.

In case of persistent neuroparalysis with respiratory failure, artificial ventilation is to be arranged. Ambu bag with endotracheal incubation may be used as a temporary measure particularly during transfer of the patient to higher center for artificial ventilation.

2.3.2. Management of Hemotoxicity

If there is definite history of Viper bites or signs of abnormal bleeding **or abnormal** 20WBCT test indicating coagulopathy, start inj. AVS with IV drip. Refer the case to a hospital having facility of kidney function test. Repeat another 10 vials of AVS in fluid in jet (this should be done at a referral center), if repeat 20WBCT test after 6 hours shows positive coagulopathy.

If haematuria is present or Kidney function test is abnormal refer the patient for Dialysis. Discharge patient when Kidney function test is normal.

3. Anti-snake Venom Serum (AVS)

Basic Knowledge of Indian AVS

Indian Polyvalent Anti Snake Venom Serum (AVS or ASV) is a unique solution to all type of venomous snakebite cases in India. It is called polyvalent as it can be used to treat many types of snakebites. Species specific "Monovalent" AVS is not available in India. Indian AVS is prepared from horse (mule or donkey) serum. Four types of snake venom are used to prepare this AVS. These snakes are 1) Indian Spectacle Cobra, 2) Russell's Viper, 3) Common Krait and 4) Sawscaled Viper.

Sub lethal dose of venom of all these four snakes are injected to a horse (to hyper immunize). Antibody (Ig G) develops against these snake venoms in the blood of that horse. This horse blood (plasma) is then purified in the laboratories to prepare polyvalent AVS. So, AVS is basically a horse protein, and has every chance to be rejected by our human body, as a foreign protein. This rejection is called "reaction". Impurities in the AVS increase the chance of reaction during treatment of a snakebite case.

Prior sensitization to horse serum, as in case of previous use of anti rabies or anti tetanus immunoglobulin (equine) increases the chance of AVS reaction.

Hump nose pit vipers are quite exceptional in India. Their venom is not responsive to common AVS. As these snakes are limited to a small geographic area (Western ghat hill areas), few laboratories prepare specific polyvalent AVS including Pit Viper snake venom along with other four snakes as mentioned earlier.

Indian polyvalent AVS is available in 10 ml vials; both in liquid and lyophilized form. Liquid ones have to be kept in the domestic refrigerators (2-8 °C); Lyophilized AVS can be stored in room temperature (below 25 °C). No AVS should be freezed,

Lyophilized AVS is to be dissolved into 10 ml of water for injection just before mixing in the IV fluid for infusion. Usually Lyophilized AVS lasts for 5 years and liquid ones last for 2 - 3 years. Both must be discarded if any precipitate is noted before mixing in the IV fluid.

One vial of 10ml AVS is meant for neutralizing 6 mg of Russell's Viper venom, 6mg of Cobra venom, 4.5 mg of Common Krait venom and 4.5mg of Saw scalled viper venom.

Indian polyvalent AVS has some cross sensitivity to other species of snakes also; Spectacle cobra venom AVS has good neutralizing effect on Monocled Cobra and King Cobra venom. Common Krait venom AVS can neutralize Banded Krait venom also. AVS for sea snake venom is not available in India. Some authority recommends high dose of Indian polyvalent AVS for sea snake bite cases in India.

Many Indian laboratories prepare AVS for commercial use; all of them have to be standardized from the Central Research Laboratory of Government of India, situated at Kasauli, Himachal Pradesh.



4. Case Studies

I. CASE NO. 1

Bikash Hazra, a 35 yrs male patient, was brought to Habra State General (SG) Hospital in North 24-Paraganas, at about 4 am. On examination the patient was unconscious with flaccid limbs, no respiration notable. Pulse was normal. Relatives gave the history of suspected snake bite about 2 hours back while the patient was sleeping on open floor outside his house. Snake not seen by patient but he told about severe pain in left arm. He could speak till 30 minutes before reaching hospital. No medical specialist was available that time.

Questions

- a) Can you rely upon the history of snakebite?
- b) Can you start treatment without identification of a snake?
- c) Whether to try treating there or to refer to district hospital 20 km away?
- d) What treatment to start with?
- e) How far to wait for improvement?
- f) When to transfer?
- g) If treated at S G Hospital, when to discharge?

CASE NO. 1 : Answers to the questions

- a) Yes you can rely, as the history and findings are suggestive of a Cobra bite.
- b) Yes you can start, identification of the snake is not possible in most of the cases.
- c) Must start treatment here immediately; referring to dist hospital could spend vital time to manage the crisis.
- d) Ideally the patient should be ventilated with Ambu bag. Start IV fluid and give *Inj. Atropine and Neostigminefirst,* as the patient is on the verge of respiratory paralysis. Simultaneously the nursing staff should start adding AVS to the running bottle.
- e) You can wait for one hour for improvement.
- f) Should be transferred with Ambu bag ventilation only if no improvement of neuroparalysis one hour after Inj. A + N.
- g) Should be discharged after 48 hours as the patient got AVS.

ACTUAL MANAGEMENT GIVEN TO THE CASE

B. Hazra was successfully managed at Habra SG Hospital in Oct 2007. He was Immediately admitted and IV fluid started. IV infusion of 15 vials of polyvalent AVS was given within 45 minutes. Inj. Atropine IV and Inj. Neostigmine IM were given simultaneously. The patient opened his eyes within 40 mins and could tell his name after 45 mins, could walk to other bed after 75 mins. Inj. Adrenaline (0.5 ml) was given IM as some urticarial rashes were noted on his throat and chest after completion of AVS drip. Recovered completely and was discharged in the afternoon.

I. CASE NO. 2

Barun Manna, a 29 yrs male patient, brought to a Debra BPHC at **10 am from a** remote village. He had H/0 Russell's Viper bite about an hour back. There were two bite marks near right ankle with progressive swelling. Moderate pain was complained by the patient. There was a tight ligature on right thigh.

Questions

- a) Should you try to manage there or to transfer him to Midnapur Medical College which is 35 km away?
- b) What to do with the ligature?
- c) Start AVS straight way or to do any investigation?
- d) What investigation to do?

CASE NO.2 : Answers to the questions

- a) Should be managed at this bedded Rural Hospital first. Referring the patient without treatment would lead to further delay.
- b) Ligature should be removed after admission and starting an IV fluid.
- c) No investigation is essential; start AVS without delay (already there was a time gap of about 90 minutes from bite). There is definite history of R. Viper bite, pain and progressive swelling.
- d) 20 WBCT is to be done to confirm coagulopathy and also after 6 hours to ascertain whether repeat dose of inj. AVS is needed.

ACTUAL MANAGEMENT GIVEN TO THE CASE

B Manna was managed at Debra BPHC in April 2010. He was admitted in the BPHC, and IV AVS was started. 10 vials of AVS were infused in 1 hr. 20WBCT was normal after infusion of AVS. The patient was not transferred to any higher center as there were no clinical abnormalities; blood test from outside shown normal renal function. Patient was discharged after 2 days.

III. CASE NO. 3

Tapan Bag, a 13 yrs boy brought to one private Nursing Home (NH) at a small town of West Bengal about 50 km from Kolkata, at about 11 am with severe convulsions. Patient went to total respiratory failure within 5 minutes while doctors were examining the patient. Relatives gave history of sore throat at about 8 am, followed by some tablets from a village quack. Complaint of blurring of vision and drooping of eye lids starting at about 8.45 am. Convulsions started about half an hour before they reached the NH. There was no previous history of convulsions, no other H/O any previous illness.

Questions

- a) What should be the diagnosis?
- b) What other history is important?
- c) Could you try artificial respiration? How?
- d) What other medications can be tried?
- e) When and where to transfer?

CASE NO. 3 : Answers to the questions

- a) Though commonly it leads to a diagnosis of Epilepsy, final diagnosis is a Common Krait bite (by typical history and presentation).
- b) History of open bed previous night was highly suggestive.
- c) AMBU bag ventilation could be started immediately.
- d) IV fluid and IV inj. Atropine and Inj. Neostigmine can be tried along with AVS.
- e) The patient should be transferred to any Medical college of Kolkata after infusion of 10 vials of AVS with Ambu bag ventilation.

ACTUAL MANAGEMENT GIVEN TO THE CASE

T Bag attended a private NH at Mecheda in September 2009. Artificial ventilation was started by Ambu bag and a fluid was started. Neurotoxic snake bite was diagnosed by typical history (including floor bed). 10 vials of AVS were infused in the ambulance when the patient was being transferred to Kolkata. Patient survived after artificial ventilation for 5 days in a private hospital of Kolkata. One Common Krait snake was recovered from the room where the boy slept last at home.

IV. CASE NO. 4

Jhantu Roy, a 12 yrs boy, was brought to Habra S G Hospital of West Bengal at about 11 am with H/O snakebite about two hours back. On examination the boy was conscious and cooperative. There were multiple tight ligatures starting from middle of the right leg to upper part of right thigh. There were multiple scratch marks near the right ankle. Part of the leg below the lowest ligature was swollen, there was no complaint of pain.

Questions

a) Should we wait for the snake to be brought?

b) What to do with the ligatures?

c) Any investigation to be done?

- d) What treatment to be started?
- e) How long to wait before referral?
- f) When to discharge?

CASE NO. 4 : Answers to the questions

- a) No possibility to bringing the snake.
- b) Ligature should be removed after admission.
- c) Do 20WBCT as there is history of snake bite to rule out coagulopathy.
- d) Start plain drip slowly and give inj. T. Toxoid
- e) No referral.
- f) Discharge after 24 hrs.

ACTUAL MANAGEMENT GIVEN TO THE CASE

This boy was managed at Habra S. G. Hospital in Nov. 2007. All ligatures were released after IV fluid was started. No progress of local swelling was noted; swelling subsided within one hour. 20 WBCT was normal. No AVS was given as it was a case of non venomous snake bite. Patient discharged after 24 hours.

V. CASE NO. 5

Subhendu Ghosh, 10 yrs boy, was brought to Bishnupur Sub-division (SD) Hospital of Bankura in the evening with history of snakebite 2 hrs back. One medium size R. Viper snake was killed and brought along with. There were two bite marks on right Foot of the boy. There was no pain, no swelling.

Questions

- a) Is the patient manageable at SD Hospital or should he be referred to Bankura Medical College?
- b) What treatment to start with?
- c) What investigation to be done?
- d) How long to wait before referral?
- e) How long to be kept under observation?

CASEN0.5 : Answers to the questions

- a) Manageable at S D Hospital.
- b) Admit the patient and remove any ligature, if present. Start IV fluid and give inj. T. Toxoid.
- c) 20WBCT is to be done, if negative, may be repeated after 30 minutes.
- d) May not require referral as there was no sign of envenomation.
- e) Observe for 24 hours.

ACTUAL MANAGEMENT GIVEN TO THE CASE

This boy was managed at Bishnupur 5 D Hospital in March 2012. Patient was admitted and a plain drip started. 20WBCT test was done on admission, and repeated thrice in one hr. Intervals, No clotting abnormality note. Diagnosed as a dry bite, patient was discharged on the next day.

APPENDIX - 1

Pathophysiology of Snakebite

Venomous snakes have two venom glands inside their mouth, these are modified salivary glands. These two venom glands are connected with the long fangs (venom teeth). These teeth may be hollow like hypodermic needles (as in R Viper) or grooved (in Cobras and Kraits). When a venomous snake bites, some amount of venom is injected into the bitten soft tissue. This venom is gradually absorbed from the deposit site mainly via lymphatics; in a small percentage of cases there may be direct venepuncture or intramuscular injection of the venom. Systemic signs of venom are noted after spread from the deposit site.

Fatal dose of venom varies from species to species. These are 42 mg in R Viper, 15 mg in Cobras (Gokhro and Keute), and only one milligram in Common Krait. Fatal dose of venom may not be injected in 50% of venomous snakebites due to different factors.

More than 90% (w/v) of the venom are different biologically active proteins. These proteins are different enzymes (more than hundred types), non-enzymatic polypeptide toxins, and non-toxic proteins such as nerve growth factor.

Venom enzymes

These include digestive hydrolases, hyaluronidase, and activators or in activators of physiological processes. Zinc metalloproteinase haemorrhagins damage vascular endothelium, causing bleeding.

Procoagulant enzymes: Venoms of Vipers contain serine proteases and other procoagulant enzymes that are thrombin-like or activate factor X, prothrombin and other clotting factors. These enzymes stimulate blood clotting with formation of fibrin in the blood stream. Paradoxically, this process results in incoagulable blood because most of the fibrin clot is broken down immediately by the body's own plasmin fibrinolytic system and, sometimes within 30 minutes of the bite, the levels of clotting factors are so depleted *("consumption coagulopathy")* that the blood will not clot. Some venoms contain multiple anti-haemostatic factors. For example, Russell's viper venom contains toxins that activate factors V, X, IX and XIII, fibrinolysis, protein C, platelet aggregation, anticoagulation and haemorrhage.

Phospholipase A2 (lecithinase): It damages mitochondria, red blood cells, leucocytes, platelets, peripheral *nerve* endings, skeletal muscle, vascular endothelium, and other membranes, produces presynaptic neurotoxic activity, opiate-like sedative effects, leads to the auto pharmacological release of histamine and anti-coagulation.

Hyaluronidase: Promotes the spread of venom through tissues. Proteolytic enzymes and polypetide cytotoxins ("cardiotoxins"): Increase vascular permeability causing oedema, blistering, bruising and necrosis at the site of the bite.

Venom polypeptide toxins ("neurotoxins")

Postsynaptic (a) neurotoxins such as a-bungarotoxin and cobrotoxin (in Cobras) bind to acetylcholine receptors at the motor endplate. Presynaptic (β) neurotoxins such as β -bungarotoxin (in Kraits) release acetylcholine at the nerve endings at neuromuscular junctions and then damage the endings, preventing further release of transmitter. Both presynaptic and postsynaptic blockage cause neuroparalytic signs and symptoms. Postsynaptic blockage only (in cobras) benefit by Inj. Neostigmine.

Nephrotoxicity:

Nephrotoxicity is a feature of Viper venoms, this is particularly noted in R Viper and Humpnose Pit Viper (not found in West Bengal) bites.

Direct enzymatic damage to the renal tubules is the main cause of renal toxicity, Hemoglobinurea, myoglobinurea (in sea snake bites) and deposition of high molecular weight proteins are other causes of oliguria and anuria. Hypovolemic shock is also a causeof oliguria.

APPENDIX-II

How can snake bites be avoided?

Education: Knowledge about local snakes, places they live and hide, seasons and times in day/ night when they are most likely to be active will help to avoid snake bites.

- Special vigilance after rain, during flood, at harvesting season and at night.
- Wear proper shoes and long trousers. Walking outside barefoot or wearing sandal is not advisable. While walking hit the ground as snake can feel vibration and will move away may use gum boat at the time of cultivation.
- Use light (torch/lamp) while moving out during night.
- Avoid sleeping on ground in open bed. If unavoidable, use mosquito net well tucked under the mattress.
- Avoid snakes as far as possible. Attacking, cornering or handling snake can be dangerous. Beware of injured/ dead snake.
- Avoid having rubbish, termite mounds, live stock or unprotected food materials attracting rodents in or near living room. Tree branches should not touch the house and clear long grass and bush around the house.
- Any larger crack and cavity in floor/ walls of the house should be filled.

REFERENCES

- 1. David A Warrell; Guidelines for management of snakebite: WHO, office of South East Asia, New Delhi: 2010.
- Snakebite mortality in India: A national representative mortality; published online in PLoS Neglected Tropical Diseases : April 2011; Volume 5(4).
- 3. Annual Administrative Report 2010-11; Department of Health and Family Welfare, Government of West Bengal.
- 4. Simpson I D; Snakebite management in India, the first few Hours : A guide for primary care Physicians; Journal of the Indian Medical Association; June 2007.
- H. Asita de Silva et al; Low-Dose Adrenaline, Promethazine, and Hydrocortisone in the Prevention of Acute Adverse Reactions to Antivenom following Snakebite: A Randomised, Double-Blind, Placebo-Controlled Trial PLoS Medicine, May 2011 | Volume 8 | Issue 5 | e1000435.

FURTHER READING

- 1. WHOSEARO (New Delhi Office); Guidelinefor management of snakebites 2010
- 2. Indian Paediatrics; March 2007
- 3. JIMA (Journal of Indian Medical Association); June 2007
- 4. WHO endorsed A2 Snakebite Management in Asia & Africa; March 2010

LIST OF CONTRIBUTORS

(In alphabetical order of their names)

Prof. (Dr.) Akhil Bandhu Biswas, Director, Institute of Health and Family Welfare, Kolkata

Dr. Asit Biswas, Technical Officer, SPSRC, DoHFW, GoWB

Dr. Bhusan Chakraborty, ADHS (MPW), DoHFW, GoWB

Dr. Dayal Bandhu Mazumdar, Senior Medical Officer (Grade II), Calcutta National Medical College and Hospital, Kolkata

Dr. Dipankar Maji, DADHS (PH) and Nodal Officer (IDSP), DoHFW, GoWB

Dr. Dipta Kanti Mukhopadhyay, Assistant Professor, Department of Community Medicine, Bankura Sammilani Medical College and Hospital, Bankura

Dr. Jivanananda Pandit, Consultant (Medical), Institute of Health and Family Welfare, Kolkata

Prof. (Dr.) Krishnanshu Roy, Director, School of Tropical Medicine, Kolkata

Dr. Samudra Sengupta, Technical Officer, SPSRC, DoHFW, GoWB

Dr. Sankar Saha, DDHS (Malaria), DoHFW, GoWB

Dr. Santanu Haldar, Additional DHS (PH&CD), DoHFW, GoWB

Dr. Satyajit Chakraborty, ADHS (EC, NC&ES), DoHFW, GoWB

Dr. Sekhares Ghosal, Consultant (Paediatrics), Institute of Health and Family Welfare, Kolkata

Dr. Swapan Kumar Hoory, DDHS (PH&CD), DoHFW, GoWB

Design and layout

Ms. Susmita Nayak, Consultant (Research Officer), Institute of Health and Family Welfare, Kolkata

SNAKE BITE MANAGEMENT IN STANDARD TREATMENT GUIDELINE

About 216 species of snakes are found in India, out of which 52 are poisonous. The poisonous snakes found in India belong to the families Elapidae and Viperidae.

Common Indian Elapids Indian Cobra (Naja Naja) Indian Krait (Bungraus coeruleus)

Common Indian Viperids Russel's Viper (Viper russelle) Saw Scaled Viper (Echis carinatus)

Manifestations are complex.

1. Elapid Evenomization:

Cobra bite is predominantly neurotoxic

Signs:

- A. Local: Pain and numbness, local pain and swelling is absent in krait bite.
- B. **Systemic:** Ptosis, Diplopia, Palsy of limbs, Pharyngeal palsy, Paresthesia and finally respiratory paralysis and arrest with cyanosis, convulsion and coma.
- **2.** In krait bite: Similar to that of cobra with exception that local pain and swelling absent and even suspicion of bite may not be aroused.
- 3. Viperid Evenomization: Predominantly haemotoxic.
 - A. Local: Burning pain with rapidly spreading oedema and painful Lymphangitis. Petechail hemorrhage and bluish purple tinge, Hematoma, etc.
 - B. **Systemic:** Mucosal bleeding, hematemesis, hemoglobinuria and hematuria, hypotension, cardiac arrhythmia and shock.

Test for haemotoxicity: 20 minute whole blood clotting test:- Few ml of venous blood in clean, dry glass test tube left undisturbed for 20 minutes at room temperature and then tiffed; if at the end of 20 minutes blood is liquid, infer as deliberation and consumption coagulopathy.

N.B.: Venomous snakes can bite without injecting venom - These are called "dry bites".

Bite marks: No specificity and is of no help. Rather assess local and systemic signs and symptoms.

Treatment on arrival at the Primary Healthcare setting:

- 1 Observe every case of alleged snakebite for at least 24 hours.
- 2. Reassurance, keep the patient warm and at rest.
- 3. Check for monitoring:

Clinical	Pulse rate, respiratory rate, BP, vomiting, diarrhea, abnormal bleeding, local swelling, necrosis, ptosis, muscle weakness, intake/output abnormalities
Investigations	Subject to availability of facilities:- urine for occult blood/RBC/REME, TLC, DLCHB, BT, CT, ECG, Blood for urea and creatinine etc.

 Ante-venom therapy (AVS): It should be given only when features of evenomation are present. It is most effective in first 4 hours although can be given up to 24 hours with benefit. Dosage regimen of AVS:

Dosage Regimen of AVS :

Clinical spectrum	Dosage of AVS
Dry bite no sign of evenomation	No AVS
Bites with local swelling without any systemic features	20-50 ml
Swelling beyond bitten site & mid systemic features or bleeding	50-100 ml
Marked local and systemic features with hemolysis, clotting abnormalities	100-200ml

Procedure of administration: The appropriate dose to be added to 500 ml of IV normal saline and run as infusic at a rate 15 to 20 drops/min and progressively increasing the rate of infusion so as to complete it by 1 to 2 hcur: If there is no improvement supplemental doses may have to be repeated. In hydrocortisone (200ml) IV or: pheniramine maleate 22.75 mg should be given prior to AVS therapy.

Prior to starting AVS infusion a 1:10 normal saline diluted test dose of AVS (0.02ml) to be given S.C. in, a heaithy site with a saline control on a second site. The result is interpreted at the end of 15 min and is considered positive if there is erythema at test site. In such case keep Adrenaline (0.5 ml of 1:1000 dil) and inj. Hydrocortisor (200 mg) ready to combat anaphylaxis and start the desensitizing dose of AVS as follows:

Time	Antivenom (AVS)	If there is no	If reaction is present	
(mins)	Dose	reaction	Give adrenaline S.C. &	
15	0.1 ml IM	Go to next dose	Hydrocortisone (200 ml) IV	
30	0.5 ml IM	Do	Do	
45	1.0ml IM	Do	Do	
60	0.5 ml IM	Do	Do	
75	1.0ml IM	Do	Do	
90	5.0 ml IM	Do	Do	

STANDARD TREATMENT GUIDELINES

5. Other measures:

- i. Rehydration by IV fluid normal saline/ Ringer solution and oral liquid/ ORS
- ii. Clean the bitten site with povidone-iodine solution
- iii. If there is local pain and spreading edema, elevate the affected limb and allow it to rest on a sand bag
- iv. Tetanus toxoid injection
- v. Antibiotics
- vi. Mild analgesic for pain
- vii. Diazepam 5-10 mg for sedation if necessary
- viii. Nutrition.

Indication

- i. Local necrosis and rapidly spreading edema, necessitating surgical intervention
- ii. Continued anomalous bleeding in spite of AVS therapy bleeding from venepuncture site
- iii. Progressive neuro-paralysis
- iv. Impending shock in spite of IV fluids and rehydration
- v. Progressive septicaemia
- vi. Renal failure haematuria, anuria etc. hiccough, vomiting.