Meet the Expert
Management of Snake Bite

11th January, 2008
Hall H
17.00 to 18.30 hrs.

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Meet the Expert

Management of Snake Bite

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Snake Bite

• Snake bite is a acute life threatening time limiting medical emergency a occupational hazard often faced by farm labourers and farmers. It is in endemic form all over tropical countries like India.
• Snake bite is a forgotten topic in India.

Gravity
• 2.5 lakhs snake bites per year in India.
• 35,000 to 50,000 deaths per year due to snake bite in India.
• High mortality in Maharashtra, upto 2000 deaths per year
• High mortality in rural population.
• Death figure may be high.
• 3000 species of snakes are distributed worldwide. 500 are venomous species 52 venomous species are found in Indian subcontinent.

Poisonous Snakes
Elapids Neurotoxic:
  Cobra, King Cobra, common krait, banded krait, coral, Spitting cobra & Mamba.
Vipers Vasculotoxic:
  Pitless - Russell’s Viper & Saw-scaled
  Pit - Bamboo pit viper, Hump-nosed pit viper, Malbar pit viper

Sea snakes Myotoxic
  Big four
  Cobra Predominantly neurotoxic
  Krait Predominantly neurotoxic
  Russell’s Viper Predominantly vasculotoxic
  Saw-scaled viper Predominantly vasculotoxic

Cobra : (Naja naja naja or Nag):-found all over India, upto 6 feet in length , Wheaty or blackish colored ,forms a hood bearing a spectacle mark (Bicyclelet, Monocyclelet or Acyclelet), bites common in morning & evening & predominantly neurotoxic.

Common Krait (Bungaraus caeruleus or common krait or Manyar):- Found all over India, upto 3 feet in length . glistening black, having white bands darker towards tail, central hexagonal scales, nocturnal , predominantly neurotoxic, Suryakandar.

Russell’s Viper (Daboia russellii, Ghonus, Parad):- Found all over India, upto 5.5 feet in length , Stout, Brown or buff coloured & has three rows of black diamond shaped spots on back, triangular head with v mark ,it makes a terrific hissing sound when about to bite& bite may be in day or night hours, predominantly vasculotoxic
Saw-scaled viper (Echis carinatus or phoorsa or Jilebi Snake):- Found all over India, upto 1.5 feet, Brownish coloured, triangular head with white arrow mark, bite may be in day or night hours, predominantly vasculotoxic.

Non-poisonous Snakes

01. Rat Snake (Coluber mucosus)  
02. Trinket (Elaphe helena)  
03. Common Wolf Snake (Lycodon aulicus)  
04. Water Snake (Checkered Keel Back)  
05. Python (Python molurus molurus)  
06. Earth Boa (Eryx johnii)  
07. Common Sand Boa (Eryx conicus)  
08. Grass Snake (Macropisthodon plumbicolor)  
09. Bronze back tree snake (Dendrelaphis tristis)  
10. Banded Racer (Argyrogena fasciolatus)  
11. Common cat snake (Boiga trigonata)  
12. Common kukri snake (Oligodon amensis)  
13. Stripped keelback (Amphiesma stolata)  
14. Vine or Whip snake (Ahaetulla)

Anatomy of the snake

Snake is a vertebrate, cold blooded reptile, has two eyes without eye lids, two nostrils, no ears, bipronged tongue, 70–80 teeth & two fangs in venomous snakes, 100-200 vertebrae & 200-400 ribs, lungs, kidneys, testis, etc., No diaphragm, heart 3 chambered, no sweat glands.

Fangs of Snakes

Cobra & Krait     Short, 2-4 mm & grooved, erected
Viper            Long, 12-15 mm & canalised like hypodermic needle, folded

Snake Venom

Contains number of toxins and enzymes. It is a clear transparent, amber tinted fluid and contains.

1. Neurotoxin     (Predominant in Elapids)  
2. Cholinesterase (Predominant in Elapids)  
3. Haemolysins   (Predominant in Viper)  
4. Thromboplastin (Predominant in Viper)  
5. Fibrinolysins
6. Proteolysins
7. Cardiotoxin
8. Agglutinins
9. Coagulase, Hyaluronidase etc.

• 10 out of 26 in each venom with seasonal (Venom is more lethal in winter than summer) & Regional variations in potency.

Factors Affecting Snake Bite

1. Site :- Bites are more common in lower & upper limbs, bites closer to brain are more dangerous.

Factors Affecting Snake Bite

2. Occupation : Bites are more common in Farmers & Labourers  
3. Time of bite :- Nocturnal bites are serious. Cobra:– Morning and evening, Krait:– Night, Vipers:– day & night hours.  
4. Size of the snake :- New borns of snakes are equally dangerous like adults.
Pathophysiologic basis of clinical spectrum in ophitoxemia

Snake bite
Venom
Systemic absorption via lymphatics
Spread facilitated by hyaluronidase
Venom in blood stream (Ophitoxemia)

- Pooling of blood in microcirculation
- Activation of kinin & bradykinin system
- Directo cytolytic action
- Alteration of coagulation activity

- Ischaemia
- \(\uparrow\) fibrinolysis
- Haemolysis
- Local necrosis
- 2\(^{\circ}\)Infection
- Bleeding

Venom in blood stream (Ophitoxemia)

- Neurotoxin
- Cardiotoxin
- Myotoxin
- Nephrotoxin

- Selective Neuromuscular block
- Cardiac arrest
- K\(^{+}\) release
- Myoglobinuria
- ARF

- Paralysis
- Respiratory Arrest

DEATH
### Distribution of Total Bite Cases as per Site of Bite

<table>
<thead>
<tr>
<th>Site</th>
<th>Neurotoxic</th>
<th>Vasculotoxic</th>
<th>Non Poisonous</th>
<th>Unknown</th>
<th>Total</th>
<th>% Fatal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper limbs</td>
<td>48</td>
<td>126</td>
<td>83</td>
<td>127</td>
<td>384</td>
<td>43.24</td>
</tr>
<tr>
<td>Lower limbs</td>
<td>51</td>
<td>182</td>
<td>123</td>
<td>126</td>
<td>482</td>
<td>54.28</td>
</tr>
<tr>
<td>Trunk</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>Nil</td>
<td>3</td>
<td>0.34</td>
</tr>
<tr>
<td>Head &amp; Neck</td>
<td>2</td>
<td>3</td>
<td>Nil</td>
<td>1</td>
<td>6</td>
<td>0.67</td>
</tr>
<tr>
<td>Penis</td>
<td>2</td>
<td>Nil</td>
<td>Nil</td>
<td>2</td>
<td>4</td>
<td>0.23</td>
</tr>
<tr>
<td>Glutel area</td>
<td>Nil</td>
<td>1</td>
<td>Nil</td>
<td>1</td>
<td>2</td>
<td>0.23</td>
</tr>
<tr>
<td>Site Not Detected</td>
<td>9</td>
<td>Nil</td>
<td>Nil</td>
<td>9</td>
<td>18</td>
<td>0.10</td>
</tr>
<tr>
<td>Total</td>
<td>113</td>
<td>314</td>
<td>206</td>
<td>255</td>
<td>888</td>
<td>100.00</td>
</tr>
</tbody>
</table>

*Management of Snake bite in rural Maharashtra: A 10 year experience, D. P. Punde, NMJI, VOL 18, No.2, 2005, 71 - 75*

### Occupationwise Distribution of Bite Cases

<table>
<thead>
<tr>
<th>Sr</th>
<th>Occupation</th>
<th>Poisonous</th>
<th>Non Poisonous</th>
<th>Unknown</th>
<th>Total</th>
<th>% of Total Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Child</td>
<td>12</td>
<td>4</td>
<td>6</td>
<td>22</td>
<td>2.48</td>
</tr>
<tr>
<td>2</td>
<td>Labourer</td>
<td>119</td>
<td>72</td>
<td>68</td>
<td>259</td>
<td>29.17</td>
</tr>
<tr>
<td>3</td>
<td>House Wife</td>
<td>117</td>
<td>58</td>
<td>99</td>
<td>274</td>
<td>30.86</td>
</tr>
<tr>
<td>4</td>
<td>Farmer</td>
<td>159</td>
<td>69</td>
<td>80</td>
<td>308</td>
<td>34.68</td>
</tr>
<tr>
<td>5</td>
<td>Student</td>
<td>16</td>
<td>3</td>
<td>1</td>
<td>20</td>
<td>2.25</td>
</tr>
<tr>
<td>6</td>
<td>Service</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0.23</td>
</tr>
<tr>
<td>7</td>
<td>Business</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>0.34</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>427</td>
<td>206</td>
<td>255</td>
<td>888</td>
<td>100.00</td>
</tr>
</tbody>
</table>

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5. **Condition of the snake:**- If recently casted severe envenoming.

6. **Type of fangs:**- More venom is injected in vipers.

7. **Size of the pt.**:- Severe envenoming in children due to less body surface area.

8. **Clothes, shoes:**- Less envenoming.

9. **Sleep** :- Slow envenoming.

10. **Primary aids** :- If received less mortality & if not high mortality.

11. **Bite Time since**: - If delayed admission high mortality.

### Diagnosis of Snake Bite

- H/o snake bite - see for A,B,C of the pt. Ask 3 questions to pt. –
- Which is the site of bite ?, What is time since bite?, whether snake is seen or not?
- Unknown bite to S/o snake bite
- Exam of killed snake, showing specimen.

### Observed Bite Marks Variations

**Poisonous** :

1. Two fang marks only with or without oedema
2. Two Fang marks + other multiple teeth marks + oedema
3. Single mark only with or without oedema
4. Only abrasion
5. Two abrasions with or without oedema
6. Only ecchymotic patch
7. Local blood oozing
8. No marks seen

**Observed Bite Marks Variations**

*Non-poisonous:*
1. Multiple teeth marks
2. Single mark
3. Only abrasion
4. Multiple abrasions

**Clues for Diagnosis**

*Non-poisonous: (Snake not brought)*

H/o snake bite, No S/o envenoming, Poisonous: (H/o snake bite but Snake not brought & S/o envenoming)

- **Saw scaled** Local oedema+bleeding rare.
- **R. viper** Local + bleeding diathesis
- **Krait** Minimal or no local signs + slow neuroparesis
- **Cobra** Local + fast neuroparesis

**Clues for Diagnosis**

Unknown Bite: H/o unknown bite, Observe (24 to 48 hrs.)

* If S/o snake envenoming - snake bite
* No S/o snake envenoming - unknown bite.

**Dry Bite: ** H/o snake bite, No S/o envenoming, bitten snake is poisonous

**Clinical Syndromes**

**Syndrome 1**- Local envenoming (swelling etc) with bleeding/Clotting disturbances – Viperidae (all species)

**Syndrome 2**

- Local envenoming (swelling etc) with bleeding/clotting disturbances, Shock or renal failure – Russell’s viper (and possibly saw-scaled viper – echi species – in some areas.
- With conjunctival oedema (chemosis) and acute pituitary insufficiency – Russell’s viper, Myanmar, NE India
- With ptosis, external ophthalmoplegia, facial paralysis etc and dark brown urine – Russell’s viper, Sri Lanka and South India

**Syndrome 3** – Local envenoming (swelling etc) with paralysis – Cobra or King cobra

**Syndrome 4** – Paralysis with minimal or no local envenoming bite on land while sleeping outside – Krait. Bite in the sea – sea Snake

**Syndrome 5** – Paralysis with dark brown urine and renal failure:

- Bite on land (with bleeding and clotting disturbance ) – Russell’s viper, Sri Lanka/South India
- Bite in the sea (no bleeding/clotting disturbances) – Sea Snake

**Cobra bite - Symptoms & Signs**

Majority of pts. Present within one hr.

Giddiness, Local oedema, Ptosis, Ophthalmoplegia, Heaviness in limbs, Dysarthria, Dysphagia, Abd. Pain, Convulsions, Quadriplegia, Respiratory paralysis, Death.

**Note** : fast development of signs (10 min to 2 hours) and fast recovery

**Krait bite - Symptoms & Signs**

Minimal or no local signs, Abd. Pain (High index of suspicion should be there), Ptosis, Dysarthria, Dysphagia, Chest pain, Quadriplegia, Respiratory paralysis, death.

**Note** :

1. Slow development of signs generally within 3 to 4 hrs. but delayed signs observed upto 56 hrs.
2. Slow recovery
3. Worst type of snake bite, more dangerous than cobra.

**Russell’s Viper bite - Symptoms & Signs**

- Sev. Local pain, local bleeding starts soon after bite.
- Rapidly progressive oedema, regional tender lymphadenopathy
- Nausea, vomiting
- Collapse, shock
- Bleeding - gum, tongue, Haematemesis, Hemoptysis, P/R, P/V, intracranial, petichae, purpura, echymoses, conjunctival, old wounds, venepuncture sites bleeding.
- S/o neuroparesis in few cases
- Convulsions, coma
- DVT
- Renal failure
- Death

**Saw-Scaled Viper bite Symptoms & Signs**

- Local slow progressive oedema
- Systemic signs rare
- Bleeding rare
- Mortality less

**Sea Snake**

- Usually painless bite and teeth are frequently present in the wound
- No local swelling or involvement of local lymph nodes.
- Headache, thirst generalized aching, stiffness, tenderness of muscles and trismus.
- Generalized flaccid paralysis like elapid neurotoxicity
- Generalized rhabdomyolysis.
- Myoglobinemia and myoglobinuria after 3 to 8 hours.
- Serum/Plasma appears brownish and Urine dark reddish brown (Coca-cola) colored.
• ARF, Hyperkalemia and cardiac arrest.

**Complications of Snake Bite**

Respiratory paralysis: Cobra & Krait Fast in Cobra

Shock & Bradycardia: Mainly in vipers

Bleeding diathesis & ARF: Russell’s viper, rare in saw-scaled viper (in Marathwada, M.S.)

Non-healing ulcers: Cobra & viper

Delayed: Pituitary dysfunction, persistence of swelling in vipers.

**Analysis of Poisonous Snake Bite Cases at Punde Hospital, Mukhed, Nanded (M.S.), Total Cases = 427**

**Period 1992 to 2001 (Retrospective Study)**

<table>
<thead>
<tr>
<th>Type of Snake</th>
<th>No. of Cases</th>
<th>Respiratory Paralysis</th>
<th>ARF</th>
<th>ASV Anaphylactic</th>
<th>ASV Dose</th>
<th>Referred Cases</th>
<th>Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobra</td>
<td>71</td>
<td>36 (50.71%)</td>
<td>Nil</td>
<td>12</td>
<td>40 to 320 (156)</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>Krait</td>
<td>42</td>
<td>13 (30.95%)</td>
<td>Nil</td>
<td>08</td>
<td>40 to 250 (154)</td>
<td>08</td>
<td>03</td>
</tr>
<tr>
<td>Russell’s Viper</td>
<td>40</td>
<td>Nil</td>
<td>12</td>
<td>(30%)</td>
<td>08</td>
<td>20</td>
<td>04</td>
</tr>
<tr>
<td>Echis</td>
<td>274</td>
<td>Nil</td>
<td>Nil</td>
<td>22</td>
<td>20 to 240 (040)</td>
<td>08</td>
<td>Nil</td>
</tr>
<tr>
<td>Total</td>
<td>427</td>
<td>49</td>
<td>12</td>
<td>50 (11.71%)</td>
<td></td>
<td>46</td>
<td>20 (4.7%)</td>
</tr>
</tbody>
</table>

**Complications of Snake Bite**

<table>
<thead>
<tr>
<th>Complication</th>
<th>Type of snake-bite</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Neurotoxic (n=113)</td>
<td>Vasculotoxic (n=314)</td>
</tr>
<tr>
<td>Acute Respiratory paralysis</td>
<td>49</td>
<td>0</td>
</tr>
<tr>
<td>Cardiac complications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shock</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>Bradycardia</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Pulmonary oedema</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Bleeding diathesis</td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td>Acute renal failure</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Gangrene</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Subcutaneous emphysema</td>
<td>1</td>
<td>0</td>
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<tr>
<td><em>Therapy-related</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antisnake venom anaphylaxis</td>
<td>11</td>
<td>39</td>
</tr>
<tr>
<td>Severe</td>
<td>8</td>
<td>28</td>
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<tr>
<td>Delayed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-healing ulcer</td>
<td>25</td>
<td>6</td>
</tr>
<tr>
<td>Contracture</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Vocal cord adhesions</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

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**Investigations**

CBC, BT, CT - 20 min WBCT, Urine, ECG, Bl. Grouping, LFT, Bl. Urea, Sr. creatinine, Sr. Na+, Sr. K+, X-ray chest, Coagulation profile (at higher center), Blood gas analysis (at higher center).
WBCT (Cont..) 20 Min WBCT (Whole blood clotting time) WHO/SEARO Guidelines

• Simple, bedside gold standard test having diagnostic value.
• Draw 2 cc venous blood of pt. & place in a new test tube.
• Leave undisturbed for 20 mins. at ambient temp.
• Tip the tube ones after 20 mins.
• If the blood is still liquid (uncotted) and runs out, the patient has hypofibrinogenenaemia (“incoagulable blood”) as a result of venom-induced consumption coagulopathy.
• In the Southeast Asian region. Incoagulable blood is diagnostic of a viper bite and rules out an elapid bite.

WBCT 20 Min WBCT (Whole blood clotting time) WHO/SEARO Guidelines

• Warning ! If the vessel used for the test is not made of ordinary glass, or if it has been used before and cleaned with detergent, its wall may not stimulate clotting of the blood sample in the usual way and test will be invalid.
• If there is any doubt repeat the test in duplicate including a “control” (blood from a healthy person).
• Perform test on admission & 6 hrly.
• Change in WBCT is observed within 30 min or upto 6 hrs due to initial hepatic compromise.
• ASV monitoring is done with the help of WBCT.

Management

Difficult in rural set-up

Due to :
• Lack of facilities, equipments & trained staff
• Illiteracy, misbeliefs, quacks & poverty
• Improper primary aid
• Delay in admissions
• High cost therapy (400 to 500 Rs/ Vial )

Management - Primary AIDS

• Immobilisation of pt. - Avoid fright & flight
• Keep bitten part below heart level
• Allay of anxiety (Less in paediatric group)
• Tourniquet, Pressure immobilisation (Crepe Bandage in Krait bite)
• Care of the wound
• Shifting of pt. to proper hospital
• Vital time should not be wasted with Mantriks & Quacks.

Be Alert

Tourniquet should not be released immediately before administration of ASV because patient may develop fast & severe envenoming.
**Management - General T/t**

- I.V. line
- TT, antibiotics, anti-inflammatory, anxiolytics, don’t allow pt. to sleep
- Observation minimum for 24 hrs in every case, if doubt observe up to 48 hrs.
- Dietic advise :- Normal diet if no complications, NBM if pt. has vomitings, GI bleeding or neuroparesis, low K+ & calculated fluids if renal failure.

**Management - Specific ASV Schedule**

- IV route only, polyvalent from Haffkin, Serum Institute.
- Dose of ASV is still empirical.
- Previous Mortality was 4.7% & now it is less.
- Average yield of venom per bite :
  - Cobra 60 mg., R-Viper 63 mg., Krait 20 mg., Saw-scaled 13 mg. (Fatal dose 12mg., 15mg., 6mg., 8mg. Respectively. 1 ml of Polyvalent ASV will neutralize 0.6 mg Cobra & R-Viper, 0.45 mg of Krait & Saw-scaled venom.

**Cobra :**

- 10 vials in 200ml normal saline IV drip in 1st hr as a loading dose.
- 2 to 5 vials as per the need by microdrip in further period i.e. 24 hrs more after complete reversal of neuroparesis to prevent recurrence.

**Krait :**

- 10 vials in 200ml normal saline IV drip in 1st hr &
- 2 to 5 vials in further 24 hrs by microdrip.
- If pt. is on ventilator, Neostigmine & large dose of ASV is not needed.

**Saw-Scaled Viper :**

- 2 to 4 vials in 200ml normal saline IV drip in 1st hr
- 2 vials in further 24 hrs. by microdrip.
- ASV is indicated only if swelling occurs within 1 hr. of bite or blood is incoagulable by 20 WBCT.
- If pt. comes late with abnormal 20 WBCT give ASV.

**Russell’s Viper :**

- 10 vials in 200ml of 5% glucose in 30 mins.
- If active bleeding do not stop within 30 mins. give 5 vials in 200ml 5% glucose over 2 hrs.
- 5 vials by microdrip in further 24 hrs.
- Observe pt. clinically & by 20 WBCT 6 hrly.
- If bleeding persists or blood is incoagulable give fresh blood.
- Maintenance ASV should be given for further 24 hrs after blood becomes coagulable to prevent recurrence.

**ASV Schedule (Contd...)**

- Dose in pediatrics is same as adults
- Low dose & adequate therapy should be used due to cost, reactions & short supply.
• Regionwise change in ASV doses due to variation in venom toxicity
• Dose required for saw-scaled viper in Marathwada is less as compared to Kokan & South India

**ASV Sensitivity Test**

20 to 30 min prior to therapy, Not always reliable, Not possible in emergency, Many studies have not recommended. 13% anaphylaxis in personal experience previously.

Now we are using prophylactic 0.25 cc subcut. Adrenaline before ASV (if not contraindicated) & observed drastic reduction in anaphylaxis

**ASV Reactions**

1. Early Anaphylactic Reaction
   - within 10 to 180 mins, mild to severe
   - Treat. – adrenaline (IM), steroids, antihistaminics.
   Rinsing of empty syring of adrenaline in IV drip is beneficial in treating severe shock

2. Pyrogenic Reactions.
   - within 1 to 2 hrs. after treat.

3. Late (Serum Sickness) Reactions.
   - From 1 to 12 days, rare
   - Treat. Oral steroids & antihistaminics

**ASV Schedule and special situations**

• Delayed admission with bleeding give full dose of ASV.
• Delayed admission no external bleeding but incoagulable blood give full dose of ASV.
• If recurrence of symptoms & signs give 50% of loading dose of ASV.

**T/t of Neuroparesis**

• Due to pre & post synaptic blockade in Krait & postsynaptic blockade in Cobra bite.
• Neostigmine & Atropine - 1/2 hrly 6 doses of neostigmine (50 mcg./kg) and Atropine as per the need in Cobra & Krait bite
• Drastic improvement in Cobra bite
• Neostigmine not much beneficial in Krait bite.

**Kind Attention**

Fixed & dilated pupil in neurotoxic snake bite is a sign of envenoming and not the sign of brain death. Patient may recover totally.

**T/t of Respiratory Paralysis**

• Intubation & ventilation (Ambu Bag or Ventilator)
• Oxygenation
• Care of tube etc.

**T/t of Cardiac Complications**

**Shock** : IV fluids, dopamine & dobutamine

**Arrythmias** : Orciprenaline for sev. bradycardia if not responding to atropine (1.2 mg.)

**Myocardial Infarction** : Treat of Infarct.
**Snake Bite**

**Cardiac arrest** : Cardiac resuscitation

**T/t of Hyperkalemia S.K+ > 5**
- Calcium gluconate IV, Sodium bicarbonate.
- Dextrose & insulin., Salbutamol inhalation.
- Dialysis.

**T/t of Hypoglycemia**
In R.Viper bite - IV glucose & Steroids

**T/t of Renal Complications**
- Renal angle tenderness is a early sign
- Proper hydration
- Prophylactic frusemide or Torsemide.
- Diuretics – 500mg of frusemide can be tried through IV drip within 24 hrs in ARF
- Dialysis (Haemo / PD)

**T/t of Bleeding Complications**
- Fluids, ranitidine, sucralfate
- Use of bortrophase & ethamsylate
- Blood transfusion, FFP.
- Platelet transfusion.

**T/t of Non- Healing Ulcers, Contractures, gangrene**
- Surgical debridement, amputation
- Proper, aseptic dressing
- Skin grafting, plastic surgery

**Pregnancy & Envenoming**
- Treated with same protocol, no maternal & foetal mortality in our experience

**Delayed Complications**
- Persistence of swelling in viper bite
- Serum sickness
- Pituitary dysfunction – Sheehan’s syndrome Not observed in our study.
- Hypothyroidism

**Recurrence of Systemic Envenoming**
- Seen in cobra & vipers within 24 to 48 hours or even days after initial response .
- Due to absorption of venom from the depot at the site of bite, perhaps due to correction of shock,hypovolaemia etc.
- After elimination of antivenom. Half life of IgG 35-70 hrs,Fab 12-18,F(ab)2 80-100 hrs. and venom may reappear in circulation as long as 130 hrs.
- Need of long acting monovalent ASV.

**Cause of Death**
- Prolonged respiratory arrest leading to cerebral anoxia & brain death in elapidae bite.
Flow Chart of management of snake bite

ASV – anti snake venom, N-Neostigmine, A-Atropine
RF-Renal failure, DIC- Disseminated intravascular coagulation

- Shock, DIC and ARF in vipers (bite cases referred to tertiary care centre were followed).

Analysis of Bite cases from 01-01-2003 to 31-08-2004
Total Bite Cases = 206 (Snake Bite 144 + Unknown Bite 62)
Snake Bite Cases = 144 (Poisonous 68 + Nonpoisonous 76)

Analysis of Poisonous Snake Bite Cases

<table>
<thead>
<tr>
<th>Type of Snake</th>
<th>No of Cases</th>
<th>Dry Bite</th>
<th>Complications</th>
<th>ARF</th>
<th>ASV Schedule</th>
<th>ASV Reactions</th>
<th>Ventilation Time</th>
<th>Referred</th>
<th>Cured</th>
<th>Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobra</td>
<td>22</td>
<td>Nil</td>
<td>10 (45.45%)</td>
<td>Nil</td>
<td>80 to 340 (145 ml.)</td>
<td>02 (6.12 hrs)</td>
<td>Nil</td>
<td>22</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>Krait</td>
<td>09</td>
<td>02</td>
<td>02 (22.22%)</td>
<td>Nil</td>
<td>120 to 180 (151 ml.)</td>
<td>Nil</td>
<td>24 to 56 (42.85 hrs)</td>
<td>Nil 09</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>Russell’s Viper</td>
<td>15</td>
<td>01</td>
<td>Nil</td>
<td>01 (7.14%)</td>
<td>60 to 200 (140 ml.)</td>
<td>02</td>
<td>-</td>
<td>02</td>
<td>14</td>
<td>01</td>
</tr>
<tr>
<td>Echis</td>
<td>22</td>
<td>02</td>
<td>Nil</td>
<td>20 to 60 (47 ml.)</td>
<td>01</td>
<td>-</td>
<td>Nil</td>
<td>22</td>
<td>Nil</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>68</td>
<td>05</td>
<td>12</td>
<td>01 (7.93%)</td>
<td>-</td>
<td>05 (1.58%)</td>
<td>-</td>
<td>02</td>
<td>67</td>
<td>01</td>
</tr>
</tbody>
</table>

0.25 cc subcut adrenaline used prior to ASV
Snake Bite

Analysis of Bite Cases at Punde Hospital, Mukhed, Nanded (M.S.)
1/9/2004 To 31/12/2007

Total Cases = 450 (Snake Bite 382 + Unknown Bite 68)
Snake Bite = 382 (Poisonous 205 + Nonpoisonous 177)
Poisonous Snake Bite = 205 (Cobra - 66 / Krait - 19 / Rusell's Viper - 95 / Echis - 25)

Analysis of Poisonous Vasculotoxic Snake Bites (Group-A)

<table>
<thead>
<tr>
<th>Type of Snake</th>
<th>No. of Cases</th>
<th>Dry Bite</th>
<th>ARF</th>
<th>Bite to ARF time interval in hrs.</th>
<th>ASV dose given in ml</th>
<th>ASV Reactions prior (0.25 cc) sc Adrenaline given</th>
<th>Time required for Normalisation of clotting time in hrs.</th>
<th>Referred cases</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russell's Viper</td>
<td>95</td>
<td>03</td>
<td>19</td>
<td>12 to 96 (32.11)</td>
<td>60 to 240 (152.10)</td>
<td>09</td>
<td>6 to 48 (16.90)</td>
<td>24</td>
<td>07</td>
</tr>
<tr>
<td>Echis Carinatus</td>
<td>25</td>
<td>01</td>
<td>Nil</td>
<td>-</td>
<td>40 to 60 (44.11)</td>
<td>01</td>
<td>12 hrs</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>Total</td>
<td>120</td>
<td>04</td>
<td>19</td>
<td></td>
<td></td>
<td>10 (8.62%)</td>
<td>(20.68%)/07 (13.14%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Analysis of Poisonous Neurotoxic Snake Bites (Group – B)

<table>
<thead>
<tr>
<th>Type of Snake</th>
<th>No. of Cases</th>
<th>Dry Bite</th>
<th>Resp. Paralysis</th>
<th>Bite to Resp. Paralysis time interval in hrs.</th>
<th>ASV dose given in ml</th>
<th>ASV Reactions</th>
<th>Mean Ventilation time in hrs.</th>
<th>Time required for reversion of Neuropa-ralysis in hrs.</th>
<th>Referred cases</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cobra</td>
<td>66</td>
<td>3</td>
<td>24</td>
<td>1/2 to 4.5 (1.37)</td>
<td>100 to 240 (132.25)</td>
<td>03</td>
<td>2 to 30 (8.33)</td>
<td>1 to 30 (5.0)</td>
<td>1</td>
<td>01</td>
</tr>
<tr>
<td>Krait</td>
<td>19</td>
<td>Nil</td>
<td>08</td>
<td>2 1/2 to 7 (4.0)</td>
<td>100 to 160 (146.31)</td>
<td>Nil</td>
<td>14 to 80 (46.37)</td>
<td>8 to 96 (33.55)</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>Total</td>
<td>85</td>
<td>3</td>
<td>32</td>
<td></td>
<td></td>
<td>3 (3.66%)</td>
<td>(39.02%)</td>
<td>1 (1.22%)</td>
<td>1(1.22%)</td>
<td></td>
</tr>
</tbody>
</table>

Analysis of table A & B

- Mortality was higher in Vasculotoxic than Neurotoxic group.
- Bite to ASV interval was higher in 7 fatal cases of Vasculotoxic group. (6hr, 3hr, 12hr, 8hr, 4 1/2hr, 2hr, 4hr) indicating need of early administration of ASV.
- Cause of death in Vasculotoxic group was refractory shock leading to ARF and needs more research (referred cases were followed) Mortality was very low in neurotoxic group due to early admissions, adequate and optimum ASV, anticholinesterases and timely artificial ventilation.
- Early admissions were due to continuous mass awareness programmes conducted by us in rural areas.
- Prior use of 0.25 cc subcutaneous adrenaline showed significant reduction in incidence of ASV reactions.

- A & B group taken together :
  - ASV Reaction - 6.50 %
  - Mortality - 4.04 %
• Analysis of A & B groups shows that 80% of Vasculotoxic and 98% of Neurotoxic snake bite cases can be managed successfully in rural setup.

**Health Education**

• Responsibilities of physicians are:
  • Education of GPs
  • Education of society

**Education of GPs**:

• Diagnosis
• Primary aid
• Education of basic life support
• Proper referral
• Common tendency is not to treat & only refer to Govt. hospitals. This should be changed & primary T/t should be given & delay in further admissions & complications should be avoided

**Health Education**

*Education of Society About*:

• Primary aid, misinformation, quacks
• Proper clothing, wearing shoes.
• Use of stick & torch in night hrs.
• Sleeping habits
• Control of rodents
• Kerosene swabs as snake repellant
• Advise about RCC construction if possible
• Advise about planitation around houses
• Killing of snakes (controversial)
• Careful handling of dead snakes
• Mass education through awareness camps in rural areas

**Conclusions**

• Cobra, Krait, R. viper & Saw-scaled viper are poisonous snakes
• Mortality is high due to illiteracy, misbeliefs poverty etc.
• In view of CPA risk of ASV therapy should be explained to patient and relatives. Benefit should exceed the risk.
• Prophylactic adrenaline if not contraindicated should be used Low adequate ASV therapy should be applied considering cost & short supply.
• Proper primary aid, early administration of ASV, proper use of anticholinesterases & timely endotracheal intubation with Ambu bag or ventilator are important for saving life.
Take Home Message

Catch a breath

Save the life

Recommendations

• Declaration of snake bite as a notifiable occupational disease.
• Establishment of National programme for snake bite.
• Education of GPs by Health Dept.
• Education of society by NGOs & Health Dept.
• Need of more ASV in Rural Govt. Hospitals and free supply of ASV to private Hospitals by Govt.
• Need of venom detection kits (VDK) and monovalent long acting ASV
• Research about pharmacological antidote to venom and chemical receptors.
• Insurance of Labourers & Farmers should be considered & promoted by the Government.
• Establishment of regional research, anti-venom & Snake bite treatment centre.

Our Experience
Analysis of Bite Cases Treated

<table>
<thead>
<tr>
<th>Period</th>
<th>Poisonous Snake Bites</th>
<th>Nonpoisonous Snake Bites</th>
<th>Unknown</th>
<th>Total</th>
<th>Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>01/01/1992 to 31/12/2001</td>
<td>427</td>
<td>206</td>
<td>255</td>
<td>888</td>
<td>20</td>
</tr>
<tr>
<td>01/01/2002 to 31/12/2002</td>
<td>47</td>
<td>34</td>
<td>47</td>
<td>128</td>
<td>0</td>
</tr>
<tr>
<td>01/01/2003 to 31/08/2004</td>
<td>68</td>
<td>76</td>
<td>62</td>
<td>206</td>
<td>0</td>
</tr>
<tr>
<td>01/09/2004 to 31/12/2007</td>
<td>205</td>
<td>177</td>
<td>68</td>
<td>450</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>747</td>
<td>493</td>
<td>432</td>
<td>1672</td>
<td>29</td>
</tr>
</tbody>
</table>
Table 2

<table>
<thead>
<tr>
<th>Type of Snake</th>
<th>Period</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>01/01/1992 to 31/12/2001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>01/01/2002 to 31/12/2002</td>
<td></td>
</tr>
<tr>
<td></td>
<td>01/01/2003 to 31/08/2004</td>
<td></td>
</tr>
<tr>
<td></td>
<td>01/09/2004 to 31/12/2007</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cobra</td>
<td>71</td>
<td>171</td>
</tr>
<tr>
<td>Krait</td>
<td>42</td>
<td>79</td>
</tr>
<tr>
<td>Russell’s Viper</td>
<td>40</td>
<td>161</td>
</tr>
<tr>
<td>Echis</td>
<td>274</td>
<td>336</td>
</tr>
<tr>
<td>Total</td>
<td>427</td>
<td>747</td>
</tr>
<tr>
<td>Referred</td>
<td>46</td>
<td>74</td>
</tr>
<tr>
<td>Death</td>
<td>20</td>
<td>29</td>
</tr>
</tbody>
</table>

Mortality 3.88%.

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