

Snake Bite: Diagnosis and Management

KUHS MBBS FMT - colorful, study-friendly university exam notes

Case clue

A farmer with local swelling, bleeding from bite site, bleeding gums, haemoptysis and shock after snake bite is most likely suffering from viper bite with vasculotoxic envenomation.

1. Probable Snake and Justification

Probable Snake

Viper, most likely:

- Russell's viper
- Saw-scaled viper

Justification

Features suggest vasculotoxic / haemotoxic envenomation:

- Local swelling
- Bleeding from bite site
- Bleeding gums
- Haemoptysis
- Shock

Viper venom causes endothelial damage, haemolysis and consumption coagulopathy, leading to systemic bleeding and circulatory collapse.

2. Classification of Poisonous Snakes Commonly Found in India

Family / Group	Main venom action	Examples
Elapidae	Neurotoxic	Common cobra King cobra Common krait Banded krait
Viperidae	Vasculotoxic / Haemotoxic	Russell's viper Saw-scaled viper Pit vipers
Hydrophidae / Hydrophiinae	Myotoxic	Sea snakes

Big Four Snakes in India

Common cobra - Common krait - Russell's viper - Saw-scaled viper

3. Differences Between Poisonous and Non-poisonous Snakes

Feature	Poisonous Snakes	Non-poisonous Snakes
Belly scales	Large, cover entire breadth of belly	Small, do not cover entire breadth
Head scales	Small in vipers; cobra and krait have large shields	Usually large
Fangs	Long, hollow, canalized	Short and solid
Bite marks	One or two fang puncture marks	Multiple small teeth marks in semicircle
Tail	Compressed, especially in sea snakes	Not markedly compressed
Habits	Mostly nocturnal	Mostly diurnal

4. Head Differences of Viper and Cobra

Diagrammatic Points to Draw and Label

VIPER HEAD	COBRA HEAD
Triangular head Broad head Narrow neck Small scales Vertical slit pupil Long movable fangs	Small head Large head shields Hood present Spectacle mark on hood Round pupil 3rd supralabial shield touches eye and nasal shield

Viper Head

- Large, flat, triangular head
- Head broader than neck
- Covered by small scales
- Vertical slit-like pupil
- Long, canalized and movable fangs
- Pit vipers have heat-sensing pit between eye and nostril

Cobra Head

- Small head, not triangular
- Covered by large scales / shields
- Round pupil
- Hood present with spectacle mark
- 3rd supralabial shield touches both eye and nasal shield

5. Venom Action

Snake venom is modified saliva, protein in nature, containing enzymes such as phospholipase A2, hyaluronidase and proteases.

Venom type	Main effects	Outcome
Viper venom - Vasculotoxic	Endothelial damage; increases vascular permeability; causes haemolysis; produces consumption coagulopathy / DIC	Spontaneous bleeding, shock and renal failure
Cobra / Krait venom - Neurotoxic	Acts on motor nerve cells and neuromuscular junction; produces pre-synaptic or post-synaptic inhibition	Weakness and paralysis of muscles of face, throat and respiration
Sea snake venom - Myotoxic	Causes generalized muscle destruction	Rhabdomyolysis and myoglobinuria



6. Clinical Features

A. Viper Bite

Local Features	Systemic Features
Severe pain Local swelling Redness Oozing of blood from bite site Serous or serosanguinous blisters Local necrosis May lead to dry gangrene	Petechial haemorrhages Bleeding gums Epistaxis Haemoptysis Haematemesis Haematuria Bilateral parotid swelling - viper head Hypotension and shock Acute renal failure with oliguria or anuria DIC and circulatory collapse

B. Cobra Bite

Local Features	Systemic Features
Small reddish wheal Local necrosis May cause wet gangrene with putrid smell	Earliest and commonest manifestation is ptosis. Classical features are 5 Ds and 2 Ps: Dyspnoea, Dysphonia, Dysarthria, Diplopia, Dysphagia, Ptosis, Paralysis Other features: Hypersalivation; generalized muscle weakness; poor neck lift / broken neck sign; respiratory muscle paralysis; death due to respiratory paralysis.

7. Investigations

A. 20-Minute Whole Blood Clotting Test

Most useful bedside test for viper bite

Method:

- Take fresh venous blood in a clean, dry glass tube.
- Keep undisturbed for 20 minutes.
- If blood remains unclotted, it indicates incoagulable blood due to hypofibrinogenaemia and venom-induced consumption coagulopathy.

Test / Investigation	Use / Findings
Single Breath Counting Test	Used to detect respiratory muscle weakness in neurotoxic bites.
Haemoglobin and haematocrit	Routine laboratory test.
Platelet count	Routine laboratory test.
WBC count	Routine laboratory test.
Urine examination	For haematuria / myoglobinuria.
Blood urea and serum creatinine	For renal failure.
Blood film	For haemolysis.
ELISA and radio-immunoassay	May be used for species identification using venom antigens from bite site swab.

8. First Aid Treatment

Do It RIGHT

- Reassure the patient.
- Immobilize the bitten limb with splint or sling.
- Get to hospital quickly.
- Tell the doctor details of bite and symptoms.

General First Aid	Pressure Immobilization	Do Not
Keep patient calm. Immobilize bitten limb. Keep limb below heart level. Cover wound with clean dressing.	Useful mainly in elapid / sea snake bites. Not advised in viper bite, as it may increase local necrosis and compartment syndrome.	Do not apply tight tourniquet. Do not incise the wound. Do not suck venom. Do not apply ice. Do not manipulate or massage the wound.

9. Hospital Treatment

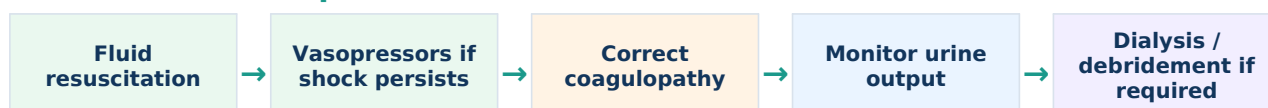
A. Anti-snake Venom

Polyvalent anti-snake venom / ASV is the specific antidote

It is effective against the big four: Cobra, Common krait, Russell's viper, Saw-scaled viper.

ASV Dose

- Initial dose: 8-10 vials of freeze-dried ASV.
- Reconstitute and dilute in 200-500 mL isotonic saline.
- Give by slow IV infusion over about 1 hour.
- Children receive the same dose as adults.
- Repeat dose is guided by clinical response and coagulation profile.
- For viper bites, repeat dose may be guided by the 6-hour rule.
- For neurotoxic bites, repeat dose may be guided by the 1-2 hour rule.

B. Treatment of Viper Bite

- Fluid resuscitation with normal saline or Ringer lactate.
- Vasopressors such as dopamine if shock persists.
- Fresh frozen plasma, fresh blood or platelet concentrate for coagulopathy.
- Monitor urine output.
- Haemodialysis for acute renal failure.
- Debridement of necrotic tissue if required.

C. Treatment of Cobra / Elapid Bite

- Maintain airway and breathing.
- Endotracheal intubation and mechanical ventilation for respiratory paralysis.
- Neostigmine may be given to reverse neuromuscular paralysis.
- Atropine should be given before neostigmine to prevent muscarinic side effects.

D. Supportive Treatment**Supportive Treatment**

Tetanus prophylaxis
 Broad-spectrum antibiotics
 Analgesics
 Surgical debridement if gangrene or necrosis develops
 Fasciotomy if compartment syndrome develops

10. Medico-legal Importance

- Most snake bites are accidental.
- Common occupational hazard among farmers, plantation workers, villagers and outdoor labourers.
- Homicide is rare, but may occur by deliberately placing a venomous snake near a sleeping person.
- Suicide by snake bite is extremely rare.
- Snake venom may rarely be used for cattle poisoning.
- Drug addicts may intentionally get bitten for euphoric or psychoactive effects.
- Medical negligence may be alleged if: envenomation is not recognised; ASV is not given when indicated; patient is discharged prematurely; patient is not observed adequately.
- Patients with history of snake bite should be observed in hospital, even if initially asymptomatic.

Conclusion

The farmer's features are diagnostic of viper bite with vasculotoxic envenomation. Immediate management includes reassurance, immobilization, urgent transfer, 20 WBCT, ASV administration, correction of coagulopathy, treatment of shock and renal monitoring.