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Snake Bite Management in Domestic Animals

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Introduction

Snake bite envenomation is a life-threatening unnoticed neglected tropical disease of humans and domestic animals estimated to cause more than a lakhs of death per annum. It is an occupational disease of rural people primarily affecting the poor agricultural farmers and the livestock species. As India, primarily an agricultural-based country accounts for more deaths due to snakebites. It not only threat life the livestock but also makes the livelihood of the farmers questionable. Hence it needs rapid medical emergency to save the animal from snake envenomation.

Snakes In India

Snakes are long, slender cold-blooded vertebrates belonging to the order Squamata (Sub order: Serpents) of class Reptilia. In India, there are approximately 300 different species of snakes. As nearly 90% of snakes are non-venomous (**e.g., Phython**), only about 10% of snakes are venomous. Venomous snakes are mainly classified into two families namely **Elapidae** and **Viperidae**. The Elapidae family consists of **cobras, mambas, kraits**, **coral** snakes etc. They have short fangs to deliver venom to their victims where some cobras can spray the venom into the eyes of prey. The Viperidae family has two subgroups namely Viperinae (Typical vipers have long and strong tubular fangs with broad scales on the belly and pupil is like a vertical elliptical slit - **e.g. Russel's viper**) and Crotolinae (Pit vipers have a depression on each side between the eye and the nostril in which a special sense organ is situated for detection of warm blooded prey **e.g. rattle snakes**).

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The most commonly found snakes in India are

1. Cobra (Naganaga),
2. Common Krait(Bungaruscaeruleus),
3. Russel's Viper (Daboiarusselii),
4. Saw scaled Viper(Echiscarinatus).

Snakebite In Animals

Snakebite in animals occurs mostly during grazing or hunting. As most of the snakes are non-venomous, their bite won't affect the health of the animals. After a long interval, the first bite of the venomous snake is highly dangerous whereas the last bite of that interval is potentially non-fatal because the concentration and the amount of venom delivered is less and in some cases the snakebite doesn't deliver any venom where it is known as **dry bite**. Kraits are more active during night hours whereas Viper and Cobra bites occur during the day time. Snakebites are more common in Dogs than other animals. Dogs and cat are most often bitten around heads and limbs and they are highly susceptible to death because of its relatively small size in proportion to the amount of venom injected. For large animals, the bite occurs most commonly near Muzzle, head or neck which produces dyspnoea as a result of excessive swelling. If the bite occurs near the coronary band of limbs, then sloughing off of hoof may occur. In Pigs due to thick skin, death from snake bite is rare.

Clinical Signs in Envenomation

Elapids (Neurotoxic) **e.g.** Cobra, Common Krait	**Viperidae (Hemotoxic)** **e.g.** Russel's Viper, Saw scaled viper
Pain and swelling are minimal	**E**xtensive swelling with more pain
Viscid Saliva	More Salivation
Ptosis of eyelids	Severe Local tissue damage with marked discolouration
Tremors and Paralysis of muscles	Dark blood oozes out from the fang marks
Dysphagia, and decreased gag reflex due to pharyngeal paralysis	Gangrene formation and sloughing of epidermis
Dyspnoea with abdominal breathing due to respiratory muscle paralysis	Epistaxis, Hematemesis and melena
Ataxia and Muscular weakness	Hypotension and tachycardia
Diplopia and Pupillary dilation	Excitement and Incoordination
Death may be due to Respiratory failure	**Death may be due to either cardiac failure (shock) or respiratory failure.**

In **small animals**, the commonly observed signs with **viper** snake bite include vomition, hypotension with tachycardia, dyspnea, salivation, diarrhoea, convulsions, renal failure, and shock. Death occurs due to circulatory or respiratory failure.

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In **large animals**, the signs include epistaxis, respiratory distress, frothy salivation, and bluish discoloration of bitten site but mostly death does not occur directly from the venom, occurs due to secondary bacterial contamination. Death occurs in 2-4 days.

Diagnosis of Snake Bite

The diagnosis of snake bite first depends on identifying the **fang marks** in the animal. At the site of the bite, swelling and erythema are noticed. As our domestic animal's skin is covered with wool/hair, it has to be clipped down to identify the fang mark over the area of swelling. (In the case of a viper bite, sloughing of the epidermis may occur due to local tissue necrosis during clipping). After identifying the fang marks, a circle was made with a marker at the lean edge of swelling at frequent intervals to monitor the progress of swelling and to identify the nature of the snake either a Viperidae or Elapidae. Later look over the systemic signs namely Nausea, Vomiting, Hypotension, Tachycardia, Tachypnea and respiratory distress. In case of severe envenomation by Viperidae snakes, the coagulation time is significantly increased. It is identified by means of the Whole Blood Clotting Time Test (WBCT). On Laboratory diagnosis of serum, the liver enzymes GGT and GGDH show a significant increase even after 6 months of snake bite.

Whole Blood Clotting Time Test (WBCT)

2ml of blood fresh blood was collected in a new clean dry glass test tube and kept undisturbed for 20 minutes at room temperature. Then the test tube was gently taken without shaking and then slightly tilted. (**Note**: The Normal blood clotting time in most of domestic animals is 2-3 minutes but in cattle is about 6 minutes.)

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If the blood is still liquid, the patient has incoagulable blood which indicates that the animal is bitten by a hemotoxic viper snake.

If the blood gets coagulated within 20 minutes, but has the systemic signs of nervous disturbances, difficulty breathing and ataxia with fang marks indicate a neurotoxic Elapidae snake bite.

Feature	Cobra	Krait	Russell's viper	Saw scaled Viper
Local Pain/ Tissue damage	Yes	No	Yes	Yes
Ptosis, Neurological sign	Yes	Yes	No	No
Hemostatic abnormality	No	May occur	Yes	Yes
Renal complication	No	No	Yes	No
Response to ASV	Yes	Yes	Yes	Yes

Differential Diagnosis: (If fang marks are unable to identify)

1. Abscess (by needle aspiration),
2. Hymenoptera stings,
3. Scorpion envenomation and Spider bites,
4. Actinomycosis,
5. Poisoning cases (confused with Cobra bite)

Anti Snake Venom (ASV)

Anti snake venoms are the antibodies (Immunoglobulin IgG) produced from the hyper immunized horse and sheep serum by administering low non-lethal doses of snake venom. Anti-snake venom is the only means of neutralizing snake venom. These antivenoms either be **Monovalent** or **Polyvalent**. Monovalent ASV is active against a particular species snake whereas Polyvalent ASV is active against a combination of species. Polyvalent ASV's are region specific. As in India Polyvalent ASV contains antisnake venom prepared against the most common four snakes namely Cobra, Krait, Russell's viper and Saw scaled Viper. Approximately 1 ml ASV neutralizes about 0.6mg of Cobra and Russel's viper venom, 0.45 mg of Krait and Saw scaled viper venom.

Treatment For Snake Bite

The initial management of snake envenomation deals with airway, breathing and treatment of shock.

1. **Anti-snake venom** with continuous monitoring every 6 hours. After the initial dose, no additional ASV should be given until the next clotting test at 6 hours. This is due to the

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inability of the liver to replace clotting factors in less than 6 hours. If WBCT is more than 20 minutes repeat dose i.e., 1/2–1 full dose, should continue 6 hourly till coagulation is restored.

2. **Neostigmine** with **Atropine** in case of a **cobra** bite. Neostigmine is an anticholinesterase, which is particularly effective in postsynaptic neurotoxins such as those of cobra and is not useful against presynaptic neurotoxins i.e. common Krait and Russell's viper. Neostigmine test should be performed by administering 0.5–2 mg IV and if neurological improvement occurs, it should be continued 1/2 hourly over the next 8 hours.
3. 0.5 – 1ml of 1:1000 **Epinephrine** in S/C or I/V@ 1st sign of anaphylaxis.
4. **Tramado**l, Analgesic to relieve pain.
5. **Tetanus Toxoid,** if the skin is breached.
6. Fluid therapy – **DNS/NS (Crystalloids** have to be used which prevent hypotension**)**
7. Diuretics, **Fruosemide** to reduce swellings.
8. Antibiotics**–Metronidazole/Streptopenicillin/Amoxicillin/ Enrofloxacin. (Fangs** of snake contains some pathogenic bacteria**)**

The prognosis of treatment mainly depends upon the type of snake, location of bite, size of the victim the degree of envenomation and the time interval between the bite and the treatment. If timely treated, Elapids show a complete recovery but in the case of Crotolids (Viperidae), long-term effects particularly Amputation or Tissue necrosis may be evident.

Management of Snake Bite

- Animal should be presented to the veterinarian as soon as possible.
- Do NOT waste time in traditional first aid methods (Black stone scarification/Herbal therapy)
- Do NOT allow the animal to become over-exerted. If possible, immobilise the affected part with a splint.
- Do NOT apply a tourniquet over the bitten area which resists swelling and causes tissue necrosis due to blockage of blood supply.
- Do NOT apply ice or any cooling objects on the bitten area.
- Do NOT cut the snake-bitten area with a knife or razor.
- Do NOT try to wash the wound or to suck out the venom by mouth.
- Do NOT give stimulants or pain medications unless a doctor tells you to do so.
- Don't apply electric current shock.

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- Do NOT attempt to kill or catch the snake as this may be dangerous. Do NOT waste time hunting the snake, if possible, bring the dead snake in a safe because a snake can bite for several hours after dead (from a reflex).

Conclusion

Snakebite with envenomation is a true medical emergency and death can be prevented cent per cent if the animal is presented to a veterinarian at the proper time. Fatality due to snake venom in India is mostly due to wide species variation, shortage of snake venom, poor compliance with treatment protocols and lack of public education about the management of snake bites among farmers to present the case as early as possible to the veterinarian. Thus we have to create awareness among the farmers about the management of snake bites to avoid this fatality.

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