CASE REPORT

Therapeutic Management of Haemotoxic Snake Envenomation in Dogs – A Field Study

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Snake envenomation is a life threatening, emergency and challenging case to be handled by veterinarians especially in the rural parts of India. Out of 3500 different species of snakes around the world, about 600 species were found to be poisonous (Sandhu and Brar, 2008). In India, about 216 species of snakes are present, out of which 60 species are reported to be poisonous (Gupta and Peshin, 2014). The snake envenomation in livestock and companion animals occurs commonly in summer months. It is more prevalent in rural areas of India which are filled with bushes and trees (Garg, 2002). Most snake bites occur usually on head and extremities in small animals and on legs in large animals (Sandhu and Brar, 2008). The clinical signs caused by the snake envenomation depend upon the type of toxins present in the venom. The neurotoxic venom causes paralysis of respiratory centre /respiratory muscles, whereas haemotoxic venom causes coagulopathies/bleeding disorders, haemolysis and cardiotoxicity (Sandhu and Brar, 2008). The current paper describes the haemotoxic snake envenomation in three dogs and its therapeutic management.

Case History and Observations

***Patient 1*:** One year old non-descript (ND) male dog weighing around 14 kg was presented with the anamnesis of sudden swelling on the face which extended up to the neck area and restlessness for past 2 hours. On clinical examination, the rectal temperature, heart rate and respiration rate were found to be normal. The physical examination of the dogs revealed soft cyanotic swelling with fang mark near the nostril (Fig. 1).

***Patient 2*:** Two years old non-descript male dog weighing around 18 kg was presented with the anamnesis of sudden restlessness, vocalization and mild apparent blindness for the past half an hour. The owner reported that the dog was playing in the backyard bushy area which was a usual habitat of snakes. The owner previously lost another dog two months before due to unawareness about snake envenomation. The clinical parameters revealed that the temperature, heart rate and respiration rate were found to be 39.5°C, 100/min and 35/min, respectively, with mydriasis in both the eyes**.** On further physical examination, fang mark was found in the left side neck region (Fig. 2).

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***Patient 3*:** Five years old female German shepherd cross weighing around 35 kg was presented with the anamnesis of dyspnea and swelling on the face for past 3 hours. On clinical examination, the rectal temperature, heart rate and respiration rate were found to be 38.6°C, 90/min and 30/min, respectively. On further physical examination, fang mark was found below the left mandible region (Fig. 3).

Whole blood (2 mL) collected from all the three dogs were subjected to 20 min clotting test (20WBCT) (WHO, 2016) and the results revealed unclotted liquid blood even after 20 min. Thus, based on clinical examinations and 20WBCT, the cases were diagnosed to be snake envenomation by haemolytic snakes probably viper snake based on owners statement.

Treatment and Discussion

The dogs were treated with lyophilized polyvalent snake venom antiserum of equine origin (Bharat serums and vaccines limited). The 10 mL clear liquid obtained after reconstituting the snake venom antiserum with sterile water was slowly infused intravenously along with 5% Dextrose Normal Saline (15 mL/kg). Along with the fluid therapy, Amoxycillin at the dose rate of 20 mg/kg was administered

intravenously. Dexamethasone at the dose rate 2 mg/kg and Frusemide at the dose rate of 3.5 mg/kg were administered subcutaneously. On the next day, blood sample was collected and again tested for clotting time and found to clot within 20 min. The mydriasis and apparent blindness in patient 2 was also reduced and became normal on day 3. The swelling reduced drastically, and antibiotic was continued for 5 days along with the liver supplements. All the animals recovered uneventfully (Fig. 1, 2, 3).

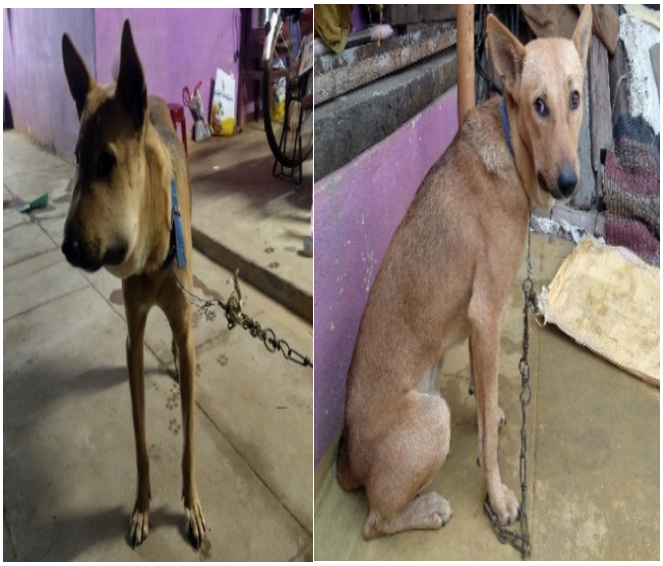

Fig. 1: Patient 1: One year old ND before and after recovery

Fig. 2: Patient 2: Fang mark (left), mydriasis (middle) and after recovery (right)

Fig. 3: Patient 3: Five years old GSD before and after recovery

The snake venom, produced from the parotid gland is an amber colored clear fluid composed of amino acids, carbohydrates, metals, lipids, inorganic materials, etc. The venom also contains enzymes like proteases, hyaluronidase, phosphodiesterases, acetyl cholinesterase, phospholipases, nucleases, ATPases, ophio-oxidases, L-amino oxidases etc., helping in the rapid spread of the venom, blocking prey's energy/cardiac/muscular systems (Sandhu and Brar, 2008). The composition of snake venom varies between species, seasons, sexes and even within the geographical region (WHO, 2016). The toxins in venom include cardiotoxins, cytolisins, haemolysins/haemorrhagins, myotoxins, nephrotoxins, and neurotoxins (Constable *et al.,* 2016). The haemotoxins have anticoagulant/procoagulant actions. The anticoagulant property is due to the fibrinolytic, fibrinogenolytic action and interference of the normal function of the clotting factors; thus, leading to clinical signs like prolonged blood clotting, epistaxis and bloody diarrhoea. The procoagulant property is due to the thrombin like enzymes in the venom. The neurotoxins in the venom can act pre-synaptically by inhibiting the release of acetylcholine as well as post-synaptically by curare like action and acetylcholine esterase effects (Sandhu and Brar, 2008).

The sequela of snake envenomation in dogs and cats would be intravascular haemolysis (Constable *et al.,* 2016).

The haemotoxic snake envenomation in small animals may result in pulmonary edema; hence in the present study the diuretic, frusemide was used to reduce it. Rarely, snake venom antiserum can result in some undesired anaphylactic reactions, hence to overcome these adverse reactions dexamethasone was administered in the present cases (Sandhu and Brar, 2008), despite the controversies in usage of steroids. Antibiotics were used along with the antivenom, since the fangs of the snakes have numerous types of bacteria, which may contaminate the wound and cause several opportunistic infections due to break in the skin epidermis (Kumar *et al.,* 2016). To protect the animal from shock, hypotension and haemolysis, fluid therapy was given along with corticosteroids (Peterson, 2017). Liver supplements were also given to prevent oxidative stress produced by the venom to the liver. The prognosis in the present cases was favourable since the envenomated animals were given proper antivenom treatment within 2-5 h before the animals entered the state of shock.

Thus, from the present study, it was concluded that though haemotoxic snake envenomation is a serious, life threatening, environmental hazard to companion animals it can be managed with proper diagnosis and appropriate timely treatment.

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