



ISSN (E): 2277-7695  
ISSN (P): 2349-8242  
NAAS Rating: 5.23  
TPI 2022; SP-11(8): 681-684  
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Received: 25-05-2022

Accepted: 28-06-2022

#### Sundararajan RC

Assistant Professor,  
Department of Veterinary  
Medicine, Veterinary College and  
Research Institute, Tirunelveli,  
Tamil Nadu, India

#### Pavithra Pugal

Final Year, Veterinary College  
and Research Institute,  
Tirunelveli, Tamil Nadu, India

#### V Vijayanand

Associate Professor and Head,  
Department of Veterinary  
Medicine, Veterinary College and  
Research Institute, Tirunelveli,  
Tamil Nadu, India

#### K Gopal

Assistant Professor,  
Department of Veterinary  
Pathology, Veterinary College  
and Research Institute,  
Tirunelveli, Tamil Nadu, India

#### M Balangatharathilagar

Associate Professor and Head,  
Veterinary Clinical Complex,  
Veterinary College and research  
institute, Tirunelveli, Tamil  
Nadu, India

#### E Madhesh

Assistant Professor,  
Department of Veterinary  
Medicine, Veterinary College and  
research institute, Tirunelveli,  
Tamil Nadu, India

## Successful management of snake envenomation in three dogs: A case report

Sundararajan RC, Pavithra Pugal, V Vijayanand, K Gopal, M Balangatharathilagar and E Madhesh

#### Abstract

Three dogs *viz.*, a three year old female Boxer, 8 month old female German shepherd and 3 years old Labrador Retriever dog was presented to Veterinary Clinical Complex, with a history of fang marks in ventral neck region, severe facial swelling, bleeding from nostrils and frequent snake attacks in their neighbourhood in all the three dogs. Physical examination of the animal revealed dull mentation, congested conjunctival mucous membrane, swelling in face and neck region. Whole blood clotting time was 20 minutes in Boxer and German shepherd and 30 minutes in Labrador Retriever. Haematology revealed anaemia, hemodilution and neutrophilia. Serum biochemistry revealed elevated BUN, sodium and decreased potassium levels. Radiography revealed Interstitial lung pattern and splenomegaly. The case was diagnosed as Snake envenomation based on history and physical examination. Treatment was done with antivenom, fluids, antibiotics, and cortico steroids and the animal showed uneventful recovery.

**Keywords:** Snake envenomation, anti snake venom, German shepherd, boxer

#### Introduction

Snake envenomation is a common case presented to Veterinary clinicians worldwide. Most of the snake bites in dogs were noted in head, neck and limbs which is due to its playing and attacking nature (PK Ramkumar *sss.*, 2020) [6]. The snake venoms are either neurotoxic or hemotoxic in nature. Viper venom's hematotoxic nature is attributed by the presence of proteases, hemorrhagins (metaloproteinases), amino acid esterases, phospholipase-A2, phospholipase-B and neurotoxins (Saravanan *et al.*, 2017) [5]. Bites from a venomous snake can produce symptoms like localized swelling, pain on bitten area, convulsions, vomiting and even paralysis (PK Ramkumar *et al.*, 2020) [6].

#### Case history and observation

A three old female Boxer dog, 8 months old female German shepherd dog and 3 years old Labrador retriever dog was presented to Small Animal Medicine Unit of Veterinary Clinical Complex, Veterinary College and Research Institute, Tirunelveli, with a history of fang marks in mandible region, ventral neck region, facial swelling, nasal bleeding (Fig. 12) and frequent snake attacks in neighbourhood respectively. Physical examination revealed dull mentation, congested conjunctival mucous membrane (Fig. 3), fang marks in the ventral neck region (Fig. 2) and mandible region (Fig. 7) swelling in the angle of mandible region (Fig. 1) and bleeding from nostrils. Whole blood clotting time for all the three dogs for the treatment period is as follows., For boxer was 20 minutes (Fig. 8) on day 1, 14 minutes on day 2, 10 minutes on day 3&4, 8 minutes on day 6, 7 minutes on day 7, 4 minutes on day 8, 3 minutes on day 9. For German shepherd it was 20 minutes on day 1, 10 minutes on day 2&3, 7 minutes on day 4, 6 minutes on day 5&6, 5 minutes on day 7 and 3 minutes on day 8; while for Labrador Retriever it was 30 minutes on day 1, 10 minutes on day 2, 7 minutes on day 4 and 4 minutes on day 5.

#### Corresponding Author

##### Sundararajan RC

Assistant Professor,  
Department of Veterinary  
Medicine, Veterinary College and  
Research Institute, Tirunelveli,  
Tamil Nadu, India

**Table 1:** Proforma for snake envenomation in dogs

S. No		Boxer	German shepherd	Labrador retriever			
1.	<b>Presenting signs</b>						
a.	Fang marks	✓	✓	✓			
b.	Swelling	✓	✓	✓			
c.	Bleeding	-	-	✓			
d.	Frothy salivation	-	-	-			
2.	Blood clotting time (minutes)	20	20	30			
3.	<b>Haematology parameters</b>						
a.	Haemoglobin (g/dL)	11.1	3.7	20.8			
b.	Packed cell volume (%)	35.7	11.1	62.4			
c.	Total leucocyte count (/cmm)	19100	15200	36600			
4.	<b>Serum biochemistry</b>						
a.	BUN (mg/dL)	95.80	82.25	98.92			
b.	Creatinine(mg/dL)	1.8	0.8	1.5			
c.	Sodium(mmol/dL)	190.44	156				
d.	Potassium(mmol/dL)		2.52				
5.	Dose of antivenom	10 ml in 500ml normal saline	10ml in 500ml normal saline	10ml in 500 ml normal saline			
6.	Day of administration of anti-venom	Day 1	Day 1	Day 1			
7.	<b>Antivenom therapy and clotting time (minutes) follow-up on next visit</b>						
a.	Day 2	✓	14	✓	10	✓	10
b.	Day 3	✓	14	-	10	-	7
c.	Day 4	-	8	-	7	-	***
8.	<b>Assessment of renal function after 7 days of therapy</b>						
a.	BUN(mg/dL)	79	71	Owner not reported			
b.	Creatinine(mg/dL)	2.1	1.1				



**Fig 1:** Swelling in the angle of mandible region



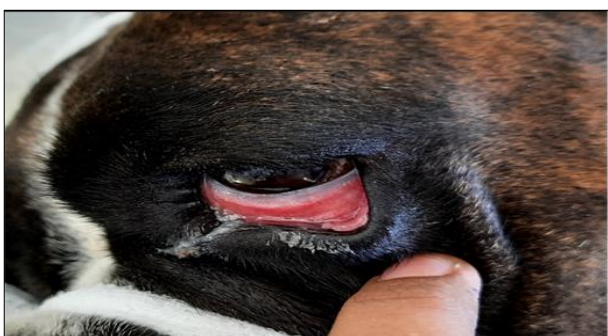
**Fig 4:** Interstitial lung pattern



**Fig 2:** Snake bite mark on the ventral neck region



**Fig 5:** Splenomegaly



**Fig 3:** Congested conjunctival mucous membrane



**Fig 6:** Swelling noticed in the facial region



**Fig 7:** Fangmarks noticed in mandible region



**Fig 8:** Unclotted blood after 20 minutes



**Fig 9:** Clotted blood after treatment for a week



**Fig 10:** Recovered animal with reduced swelling in the face



**Fig 11:** Lyophilized snake venom antiserum



**Fig 12:** Nasal bleeding and swelling around nostrils



**Fig 13:** Post-treatment, the animal has reduced swelling and bleeding

**Treatment and Discussion**

Boxer was treated with Parenteral administration of equine serum derived polyvalent snake antivenom while German shepherd and Labrador retriever was treated with Lyophilized Polyvalent snake antivenom (Fig. 11), 10 ml titrated to 500 ml of Normal saline at continuous rate of infusion @ 20 drops /min for 3 hours, Inj. Ringer’s Lactate @ 10 ml/ kg b.wt, Inj. Amoxicillin & Cloxacillin @ 10 mg/kg b.wt, Inj. Flunixin @ 1.1 mg/kg b.wt for all three dogs, Inj. Chlorpheniramine maleate @ 0.5mg/kg b.wt for German shepherd and Labrador Retriever , Inj. Prednisolone @ 1 mg /kg b.wt was administered in Boxer dog only. Treatment was continued for 8 days until blood clotting time reduced to 4 minutes (Fig. 9) and animal showed uneventful recovery. (Fig. 10, 13)

Snake venoms consists of a complex mixture of proteins and peptides, which includes both enzymatic and non-enzymatic compounds. Snake venoms also contain inorganic cations such as sodium, calcium, potassium, magnesium, and small amounts of zinc, iron, cobalt, manganese and nickel. Klaassen C.D, 2008 [2] adds that the other components of snake venoms are glycoproteins, lipids, histamine, serotonin, catecholamines and acetylcholine [2]. Yogesh Priya *et al.*, 2017 [5] reported that the animals exhibit various symptoms like cardio pulmonary dysfunction, local tissue damage, blood coagulation defects, ataxia etc, depending on type of snake bite [5]. These clinical signs observed in the cases might be due to the above mentioned enzymatic and non- enzymatic compounds. Ananda KJ *et al.*, 2009 [1] observed that the haematological parameters in snake envenomation revealed decreased hemoglobin concentration, packed cell volume and increased total leucocyte count [1]. This is in concordance with O’Shea, 2005 [3], who also reported that the above alterations in the cases might be caused by snake venom that mainly damages the blood cells [3]. Blaylock, 2001 [4] emphasized that an increased leucocyte count might be due to systemic infection caused by snake fangs and oral cavity that has bacterial contaminants [4].

Heller J *et al.*, 2005 [7] observed that intravenous fluid therapy and anti-venom administration remained the most effective treatment option used in all situations because anti-venom binds and neutralizes the venom and prevents further damage [7]. Yogesh Priya *et al.*, 2017 [5] reported that corticosteroids can be preferred over antihistamines because, in some cases, antihistamines potentiates the toxic action of the snake venom but corticosteroids counteract the shock due to haemorrhage. Corticosteroids can also be given to overcome the untoward effect caused by lyophilized polyvalent anti-snake venom. Broad spectrum antibiotics were administered to dogs as snake fangs are contaminated with different types of bacteria which are mainly gram negative Enterobacteriaceae [5].

In the present case, Post anti-venom usage after 7 days, there was slight damage to kidneys, with elevated BUN and creatinine values which might be due to the fact that the usage of high molecular substance such as anti- venom continuously has impaired the renal parenchyma resulting in renal damage.

### Conclusion

Snake envenomation in animals is an emergency, which requires rapid treatment, prompt care and attention; any delay would lead to unlikely consequences. The above proforma for snake envenomation can be utilized to assess the therapeutic response of the antivenom and to monitor the renal function on par with treatment. Early identification of snake bite and initiation of anti-snake venom is important for successful management of snake envenomation.

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