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Therapeutic management of saw scaled viper (*Echis carinatus*) snake envenomation in a goat

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Abstract

A three years old female non-descript goat was presented with the history of saw scaled viper snake bite over the face and subsequent dullness, anorexia, epistaxis and facial swelling. Fang marks and swelling over right cheek and lower jaw were noticed. Elevated temperature, tachycardia and tachypnoea were observed. Haematobiochemical parameters showed moderate anaemia and thrombocytopenia. The 20 minutes whole blood clotting test (20 WBCT) was prolonged. The goat was administered with two doses 10 ml of polyvalent snake venom antiserum with normal saline intravenously. Streptopenicillin and furosemide for three days and tetanus toxoid (0.5 ml) for one day were administered intramuscularly. The goat showed uneventful recovery.

Keywords: Snake envenomation, goat, saw scaled viper, polyvalent snake venom antiserum

Introduction

Snake envenomation is rare in goats and occurs during grazing in the field. Snake envenomation is more commonly observed in rural areas especially adjacent area near to forest. The incidence of snake envenomation in animals is more during summer months and bites are mainly over the head because of the inquisitive behavior of the bitten animals (Constable *et al.*, 2017) [1]. In India, there are 236 species of snakes, most of them are nonvenomous snakes and only 13 species of snakes are venomous (Warrell, 1999) [2]. In general, snake venom contains several toxins include; necrotizing, anticoagulant, and procoagulant fractions and neurotoxic, cardiotoxic, myotoxic, nephrotoxic, cytotoxic and haemolytic and haemorrhagic fractions. Different snakes have varying combinations of these toxins in their venom. The presence of hemorrhagins in the viper venom leads to endothelial cell damage, increase vascular permeability, coagulation defect and extravasation of fluid into inflamed tissues. Phospholipase-A₂ is the chief component in the most of the snake venoms. It contains both pro-coagulant and anticoagulant activities by inhibition of the prothrombinase, inhibition and activation of platelet aggregation, and activation of Factor V and plasminogen. The most common coagulopathy associated with snake envenomation is venom induced consumptive coagulopathy (Shiloah *et al.*, 1973; Isbister, 2010; Goddard *et al.*, 2011) [3-5]. Indian saw scaled viper snake is also called as carpet snake and is smallest venomous snake among the big four venomous snakes in India. Saw scaled viper (SSV) venom is a highly complex mixture of a variety of biological substances including protein and non protein toxins (Cortelazzo *et al.*, 2010) [6]. Snake envenomation is an emergency condition in animals and early clinical diagnosis and treatment is to be initiated (Vijayakumar *et al.*, 2001) [7].

Case History and Observations

Animal: A three years old female non-descript goat was presented to the Large animal outpatient unit of Veterinary Clinical Complex, Veterinary College and Research Institute, Namakkal with the history of saw scaled snake bite over the face and subsequent dullness, anorexia, nasal bleeding and facial swelling.

Clinical Examination: The goat was dull and depressed. It showed pink and moist conjunctival mucous membrane, swelling of lower jaw and right cheek, epistaxis and fang marks over right cheek (Fig. 1). There was elevated temperature (40.5°C), tachycardia (86/min) and tachypnoea (38/min).

Haemato-biochemical examination: Two milliliters venous blood in a vacutainer with EDTA for haematology and 3 milliliter of blood in a vacutainer without anticoagulant for serum biochemistry. Haematobiochemical evaluation of goat revealed moderate anaemia (decreased haemoglobin, packed cell volume and red blood cells) and thrombocytopenia (Table 1)

Twenty minutes whole blood clotting test: Two milliliters of blood was collected in a dry test tube without any anticoagulant and kept for 20 minutes. Then, it was checked for clotting. The clotting was delayed more than 20 minutes indicating that the 20 minutes whole blood clotting test (20 WBCT) was positive.

Based on the history, clinical signs, haematological evaluation and blood clotting defect, the case was diagnosed as snake envenomation due to saw scaled viper.

Treatment and Discussion

The goat was administered with polyvalent snake venom antiserum (contain snake venom antiserum against cobra, krait, russell's viper and saw scaled viper) 10 ml with 200 ml of normal saline intravenously. The goat was also administered with streptopenicillin @ 10 mg/kg bwt i/m, furosemide @ 2 mg /kg bwt i/m and tetanus toxoid 0.5 ml i/m. After six hours of first treatment, the clotting time was checked and found to be more than 20 minutes. Second dose of 10 ml of polyvalent snake venom antiserum mixed with 200 ml of normal saline was administered intravenously. Streptopenicillin and furosemide were administered for next three days. The animal showed remarkable improvement on facial swelling on the second day of treatment. Saw scaled viper bite caused local swelling, bleeding and coagulopathy (Gnanathanan *et al.*, 2012; Fonseka *et al.*, 2013)^[8,9]. Epistaxis and local swelling in the present case might be due to viperidae snake venom with haemotoxic and cytotoxic effect. The haemoconcentration was noticed in Viper snake envenomation in animals due to splenic contraction and localized swelling by the effect of haemorrhagins on tissues and subsequent shifting of protein and fluids from circulation to the inflamed tissue, which served as a third space fluid accumulation causing transient haemoconcentration (Hackett

et al., 2002; Lobetti and Joubert, 2004)^[10, 11]. However, anaemia and venom induced thrombocytopenia were observed often in animals with viper snake envenomation. Thrombocytopenia in viper envenomation might be due to vasculitis, sequestration of platelets in inflamed area, and consumption of platelets with disseminated intravascular coagulation (Segev *et al.*, 2004)^[12]. Blood urea nitrogen, serum creatinine and transaminases were within the normal limit in saw scaled viper snake envenomation (Fonseka *et al.*, 2013)^[9]. Polyvalent snake venom antiserum, fluids, antibiotics, furosemide and tetanus toxoid were the therapeutic strategies followed in viper snake envenomation in a goat (Sivaraman *et al.*, 2016)^[13] and cattle (Sasikala *et al.*, 2016)^[14]. The 20 minutes whole blood clotting test was repeated at 6 hourly intervals to ensure the coagulation status and further dose of antivenom should be administered if blood clotting is delayed (Reid and Theakston, 1983; Gnanathanan *et al.*, 2012)^[15, 8]. The tetanus toxoid was protecting the animal from tetanus spores that might have entered to site of bite through contaminated snake fangs (Shukla, 2009)^[16]. In the present study, the goat with saw scaled viper snake envenomation was successfully treated with two doses of snake venom antiserum, streptopenicillin, furosemide and tetanus toxoid.



Fig 1: Goat with saw scaled snake envenomation - fang marks, swelling in right cheek and lower jaw and epistaxis

Table 1: Haematobiochemical examination of goat with saw scaled viper envenomation

S. No.	Parameters	Observed value	Reference range (Kaneko <i>et al.</i> , 1997) ^[17]
1.	Haemoglobin (g/dl)	7.0	8.0 – 12.0
2.	Packed cell volume (%)	21	22 – 38
3.	Red blood cells (x10 ⁶ /cumm)	7.2	8.0 – 18.0
4.	White blood cells (/cumm)	8,400	4,000 – 13,000
5.	Thrombocyte (/cumm)	1,12,000	3,00,000 – 6,00,000
6.	Total protein (g/dl)	7.2	6.4 – 7.0
7.	Albumin (g/dl)	3.1	2.7 – 3.9
8.	Blood urea nitrogen (mg/dl)	22	10 – 20
9.	Creatinine (mg/dl)	1.2	1.0 – 1.8
10.	Aspartate aminotransferase (IU/L)	68	46 – 161

Conclusion

A goat with saw scaled viper envenomation was diagnosed based on history, clinical signs, haematological evaluation and blood clotting defect and was treated successfully with two doses of snake venom antiserum, streptopenicillin, furosemide and tetanus toxoid.

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