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Successful medical management of snake envenomation in a jersey crossbred cow

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Abstract
A Five years old Jersey crossbred cow was presented with the history of anorexia, weakness and marked swelling in left forelimb and blood oozing out on the brisket region. On clinical examination the fang mark below the swelling, haematuria, melena, pain and oedema at the swelling site was noticed. 20 minutes whole blood clotting time test was prolonged and hemato-biochemistry revealed anemia, neutrophilia and increased alanine aminotransferase, total protein, albumin and globulin and treated for snake bite envenomation with polyvalent anti snake venom, tetanus toxoid, fluids, antibiotic and animal made an uneventful recovery. Successful medical management of snake envenomation in a Jersey crossbred was reported.

Keywords: Snake envenomation, whole blood clotting time, hemato-biochemical, anti-snake venom, cow

Introduction
Snake bite envenomation is a routinely occurring life threatening emergency condition in livestock in tropical countries like India. So far 216 species of snakes have been identified in India, of which 52 are known to be poisonous [1] and Cobra, King Cobra, Russell's Viper, Saw Scaled Viper and Krait are the most common species of snake bites encountered in animals. Snake bite in animals usually accidental and occurs while grazing, hunting or playing in the garden. Depending on type of snake bite the animals may be presented with the signs of cardio pulmonary dysfunction, local tissue damage, blood coagulation defects, ataxia etc. Snakebite with envenomation in animals is an emergency and attended immediately, if delayed or improper treatment may cost the life of animal [2].
In snakebite endemic countries such as India, 68% of the population lives in rural areas [3] and up to 70% of households keep livestock, including cattle, buffaloes, goats, sheep, pigs, or poultry [4]. As rural communities strongly dependent on these animals for food, work or as a direct source of revenue [5] which offers 70% employment to rural women, mortality or impaired productivity of livestock heavily affect their livelihoods, because major assets of rural households for livelihood support in general and small and marginal households in particular. Thus, the impact of snakebite can go beyond direct impact on human health and associated healthcare costs urging for an integrated One Health approach [6] to the study and response to snakebite in poor rural areas of the world. The present clinical report discussed a case of snake bite envenomation and its successful therapeutic management in a Jersey crossbred cow.

Materials and Methods
Five years old Jersey crossbred cow was presented with history of swelling in the left forelimb, blood oozing out on the brisket region, coffee colored urine and melena. On clinical examination, the animal was dull and depressed, incoordination, frothy salivation, ruminal tympany, congested mucous membrane, rectal temperature of 38.2 °C, heart rate of 52/min and respiratory rate of 21/ min was observed. In addition the fang mark was noticed below the swelling. Oedema and pain evinced at the swelling site. The blood samples were collected in a blood collection tube with EDTA and without any anticoagulant by jugular puncture for hemato-biochemical analysis and observed for whole blood clotting time (WBCT). It was not clotted for more than six hours. The hematology and biochemical values were presented in Table 1. It showed decreased hemoglobin concentration, total RBC counts and packed cell volume and increased total leukocyte count with neutrophilia.

The clinical biochemistry revealed increased levels of alanine aminotransferase, total protein, albumin and globulin whereas BUN and creatinine were normal. Urine collected and kept which revealed hematuria. Finally, the case was confirmed as snake bite envenomation of hemotoxic type.

Table 1: Hemogram and clinical biochemistry values of snake bitten cow

Hemogram		Clinical biochemistry	
Hemoglobin (g/dL)	8.7	BUN (mg/dL)	1.8
RBC (x10^6/mL)	5.4	Creatinine (mg/dL)	15
PCV (%)	28	Albumin (g/dL)	4.9
Total Leukocyte count (m/cmm)	17400	Globulin (g/dL)	4.4
Neutrophils	71	Total protein (g/dL)	9.3
Lymphocytes	26	ALT (IU/dL)	260
Monocytes	2		
Eosinophils	1		
Blood picture	Neutrophilia		

Results and Discussion

The cow was treated with 40 ml of polyvalent anti snake venom (Bharat Serums and vaccines limited, Mumbai) diluted with 2lit of Normal saline i.v, 1lit of 5% Dextrose i.v, Inj Cefoperazone sulbactam sodium 10 mg/ kg i.v, Inj. Dexamethasone sodium 0.5mg/ kg i.v, Inj. Ethamsylate 10 mL i.v, Inj, Frusemide 0.5mg/kg i.v and Inj. Tetanus toxoid 5 ml s.c. The antibiotic and supportive therapy continued for 3 days. The animal was kept under close observation with careful monitoring. The animal made an uneventful recovery.

Snake venom are complex mixture of many enzymes, proteins and peptide compounds [7] and toxins in venom are broadly classified into neurotoxin (mostly in elapids) and haemotoxin (mostly in viperids) [8]. Neurotoxin acts by disrupting the neuromuscular junctions at molecular levels and limits the muscular activity whereas haemotoxin induce destruction of tissue in body systems by their effect on circulatory system [9]. Clinical signs of salivation and swelling at the bite site might be due to the enzymatic and non-enzymatic compound present in the snake venom [2] and the latter is attributed to hyaluronidase activity which act as a spreading factor and cleaves internal glycoside bonds in certain acid mucopolysaccharides resulting in decreased connective tissue viscosity and allows other fractions of venom to penetrate the tissues. And it cause increased tissue permeability and proteolytic enzymes destruct the endothelium and basal membrane of capillaries (cytotoxic effect); results in the occurrence of oedema [10]. Lervik *et al*. [11] and Anlen [12] observed pyrexia, depression and anorexia in some dogs and horses after viper bite respectively which concurs with our findings.

Using 20 mins WBCT we can diagnose snake envenomation as it is a simple bedside test of coagulopathy to rule out snake bite in animals [13]. In our case haemogram revealed mild haemolysis and moderate neutrophilia. Intravascular haemolysis is attributed by phospholipase A in the venom which might acted directly on erythrocyte membranes or indirectly through the production of lysolecithin and thereby decreased osmotic erythrocyte resistance. Neutrophilia observed in the present case could be due to systemic infection introduced from contaminated snake mouth with bacteria [14]. Serum biochemistry revealed increased activity of ALT, total protein, albumin and globulin which is in line with Senthikumar *et al* [15].

Since the owner was unaware of species of snake bitten polyvalent snake anti-venom was preferred in the present case as it provides protection against the venom of common cobra, common krait, saw scaled viper and russell viper. Polyvalent antivenin, tetanus toxoid and broad spectrum antibiotics are recommended for the treatment of snake envenomation by Bailey and Garland [16] which was followed in the present case too. Administration of dexamethasone in snake bite cases to counteract untoward action of antivenom but the use is still controversial [17]. To avoid potentiation of the toxic action of the snake venom by antihistamines [18], corticosteroid was used in the present case. Contaminated snake mouth may introduce tetanus spores into animal body through bite and tetanus toxoid administration provides protection against it [19].

Conclusion

In general, the disease ecology of snakebite in both human and animals and the distribution and behavior of many of the most medically important species is still unknown, particularly in areas where snakebite burden is more important. Snake bite cases are difficult to diagnose in the filed since mostly type of snake bitten unknown and as it is a life threatening emergency needs rapid diagnosis and proper treatment immediately thereby can save the life of an animal and livelihood of farmer. We need to identify hotspots of snakebite risk to both human and domestic animals, and policy designing should be focused on prevention and treatment of snakebite for humans and animals.

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