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Snake bite in a domesticated dog and its successful management

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Abstract
Snake bite is a life threatening emergency which requires immediate therapy and care as inadequate treatment may prove fatal. Snake bites are commonly found in cattle, sheep, goat and dogs. Depending on type of snake, the clinical signs varies but mostly cases are presented with cardiopulmonary dysfunctioning and coagulopathies. In the present study, a three year old male pug breed pet dog was presented to the Veterinary Clinical Complex with a history of dog bite two days ago. Pet was found to be lethargic, depressed, dehydrated, having respiratory distress, bilateral purulent ocular discharge and apparent blindness. The dog was treated successfully with antibiotic Ceftriaxone tazobactam, slow infusion of polyvalent snake venom anti-serum, along with intravenous administration of Dextrose, Normal Saline, Inj. Metronidazole and Dexamethasone, antihistaminic and bronchodialator.

Keywords: Snake bite, clinical signs, fang marks, polyvalent serum, hematology

Introduction
Snake bite is a common life threatening emergency with significant morbidity and mortality (Lobetti *et al*., 2003) [12]. Snake venom comprises of a mixture of toxins whose composition varies depending on the type of snake. Approximately 375 snake species around the world are venomous and are considered dangerous (Rolan, 2015; Vonk *et al*., 2011) [16, 23]. Five most common poisonous snakes found are Cobra, King Cobra, Russell's Viper, Saw Scaled Viper and Krait. In Indian context 52 snakes are identified to be poisonous (Bhardwaj, 2011; Turkar *et al*., 2017) [3, 20]. Snake bites are reported to be common in animals like cattle, sheep and goat, but more common in horses and dogs (Garg, 2000) [6]. Among the domestic animals, dogs are most frequently attacked and killed by the snakes (Osweiler, 1996) [14]. Cattle and horses are generally attacked while grazing, dogs are bitten while hunting or while playing in the garden while cat is not often attacked because of its greater caution and superior agility when hunting (Shukla, 2009) [18].
Snake bite with envenomation is an emergency and rapid examination and initiation of adequate and supportive treatment is essential (Vijaykumar *et al*., 2001) [22] otherwise delayed and inadequate treatment may prove fatal (Warrell *et al*., 2010) [24]. The clinical effects are more severe in small animals as compared to large animals (Mwangi *et al*., 2014) [13]. Diagnosis of snake bite is most often based on the clinical presentation because the interaction between the pet and the snake is often not witnessed. The animals exhibit various symptoms like cardio pulmonary dysfunction, local tissue damage, blood coagulation defects, ataxia etc, depending on type of snake bite.
A three year old male pug breed pet dog was presented to the Veterinary Clinical Complex, Hisar, Haryana with a history of snake bite two days ago. On general examination the pet was found to be lethargic, depressed, dehydrated, had having respiratory distress, bilateral purulent ocular discharge and apparent blindness. Sub cutaneous haemorrhage and multiple bite marks were observed on the legs and inguinal area. The owner reported that the dog was kept in the farm land which had made his easy access to the wild and had a snake bite two days ago. The pet was treated with home remedies by the owner for two days and was brought to the out patient department noticing deterioration of his condition. Clinical examination revealed slight hypothermia (100.2° F), while heart rate and respiration rate were65 beats/min. and 28breathe/min. respectively.

Results and treatment
The dog was confirmed to be bitten by a snake as the owner had himself witnessed the bite. On physical examination evidence of multiple fang marks and haemorrhage under the skin were

found on the inguinal region and legs (Figure 1). The blood sample (2ml) was collected in a vial containing EDTA and subjected to haematological examination (haemoglobin, packed cell volume, total and differential leucocyte count, thrombocyte count) done through haemato-analyser (MS4Se-melet Schloesing Laboratories-France). The haematological parameters revealed anaemia, as the pet was having lowered hemoglobin concentration (7.5 g/dl), packed cell volume (25 %) and TEC (3.92 × 10^6/µL). Erythrocyte indices calculated includes MCV (65fl), MCH (63.77pg) and MCHC (30%) indicated normocytic hypochromic anaemia. There was marked leucocytosis (60.39 x 10^3/µL with lymphocytosis (43%) and neutropenia (50%).Monocyte count was 7% and thrombocyte count was observed to be 459 x 10 ^{6}/ mm^3.

Fig 1-2: Showing multiple fang marks in the inguinal region and limb respectively.

Fig 3: Showing purulent bilateral ocular discharge.

The challenge was to treat the dog for the complication originated from the septicaemia due to secondary bacterial infection and respiratory distress. The dog was treated with antibiotic Ceftriaxone tazobactam @25mg/kg b.wt. i.v, slow infusion of reconstituted 5 ml of polyvalent snake venom anti-serum (Serum institute of India Ltd. Pune, India) along with intravenous administration of 150 ml of Dextrose Normal Saline, Inj. Metronidazole @20mg/kg b.wt. I/v and Dexamethasone (Dexona, Cadila Pharma) @ 1mg/kg i.m., antihistaminic chlorpheniramine malate 2ml (Avil) i.m and bronchodialator deriphylline. In addition, tetanus toxoid (serum institute of India) 1ml deep i/m was also given. The antibiotic therapy was continued for a week. The nasal passages were cleared and antiseptic dressing of the wound was done with povidone iodine twice a day. The owner was also advised to put gentamycin eye drops in both eyes twice a day for a week. The dog recovered uneventfully after seven days of care and treatment.

Discussion

Reports on snake envenomation in small animals (Heller *et al*., 2007; Jacoby-Alner *et al*., 2011; Boller *et al*., 2020) [8, 9, 4] and successful therapeutic management of snake bite have been reported by several authors (Vijay Kumar *et al*., 2001; Ananda *et al.*, 2009) [22, 2] in past but the clinical signs reported by owners and treating veterinarians as well as the diagnostic procedures and treatments of elapid snake envenomation conducted by veterinarians in small animal practices are poorly described. Dogs are the commonest snakebite victims encountered in veterinary practice (Garg, 2002; Adhikari *et al*., 2019) [7, 1]. In majority of snake bite cases the description of the snake or the snake itself are not presented to the veterinarians that makes the therapeutic management of the snake bite more challenging and therefore necessitating the syndrome management. Clinical features of envenomisation in dogs depends upon the dose and type of venom; the anatomical site, number of bites; the age, size, and health status of the victim; and the time between the bite and admission for veterinary care.

Clinical signs such as muscular weakness, respiratory distress as observed in the present case had also been observed earlier by Sooryadas, 2011 [19] and Turkar *et al*. (2017) [20]. According to Karalliedde, 1995 [10] competitive binding of the cobra toxin to the nicotinic receptors inthe post-synaptic membrane of skeletal muscles, prevents binding of acetylcholine resulting in dyspnea which is seen in the present case, though the snake was not identified in the said case. In the present study, anaemia, leucocytosis, lymphocytosis and neutropenia, was observed. The alterations in the haematological parameters observed in the present case are in accordance with the earlier reports by Pal *et al*., 2012 [15]. Tetanus toxoid and broad spectrum antibiotic were administered to the ailing dog as the fangs of the snake are supposed to be contaminated with various types of bacteria (Shukla, 2009) [18]. Broad-spectrum antibiotics, tetanus toxoid and polyvalent snake venom antiserum have earlier been tried successfully for the treatment of snakebite envenomation in dogs (Kumar *et al*., 2016). The haemorrhage from the wound were suggestive of the interference of venom in many components of haemostatic system (Wolff, 2006; Chandrashekar *et al*., 2016) [25]. Anti snake venom is well

known to cause anaphylactic reactions (Sai *et al*., 2008) [17] therefore in the present study antihistaminic was administered to counteract the adverse effects of histamine present in snake venomas also suggested by Ananda *et al.*, 2009 [2]. Some authors have suggested not to use the antihistamines as they can potentiate the toxic action of the snake venom (Ananda *et al*., 2009) [2]. Similarly Turkar *et al*., 2017 [20] have used antihistaminic with success in treating a dog envenomized by a cobra. Introduction of any foreign material into the body causes inflammation thereby releasing mediators like cytokines. Steroids were administered in the affected dog to reduce the inflammatory process as also suggested by Swaminathan, 2005 [21]. In addition the use of corticosteroid prior to the polyvalent snake anti-venom also inhibits serum sickness (Shukla, 2009) [18]. On the other hand the use of steroids in the snake bite is still debated by several authors.

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