



CASE REPORT

Management of Puff Adder (*Bitis Arietans*) Snake Bite and Envenomation in Dogs: Case Report

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ARTICLE INFO

Received: July 01, 2014
Revised: July 09, 2014
Accepted: July 13, 2014

Key words:

Antihistamines
Anti-snake venom
Dog
Snake bite

ABSTRACT

Two mongrel dogs were presented with a history of recumbency, salivation, dullness and depression that had started following snake bites. Physical examination revealed swellings with fang marks and hemorrhage in the area of bites. The hematological parameters showed reduced values of erythrocyte counts, platelet counts, hemoglobin, packed cell volume and increased total leukocyte count. The biochemical values showed elevated levels of alanine aminotransferase and creatinine. The successful treatment was done with anti-snake venom, fluids, corticosteroid, antihistamines and antibiotic.

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Cite This Article as: Mwangi WE, P Kimeli, LW Mathai, DW Muasya and AN Kipyegon, 2014. Management of puff adder (*Bitis arietans*) snake bite and envenomation in dogs: case report. *Inter J Vet Sci*, 3(3): 160-162. www.ijvets.com

INTRODUCTION

The puff-adder (*Bitis arietans*) is considered one of the most medically significant snakes in Africa, primarily due to a combination of its extensive geographical distribution, common occurrence and highly potent haemorrhagic and cytotoxic venom (Currier *et al.*, 2010). The puff-adder venom interferes with the haemostatic system to cause severe local and systemic effects such as swelling, haemorrhage and necrosis (Warrell *et al.*, 2010). The severity of snakebite in animals depends on the type of snake, age of the animal, size of the animal, the number of bites and the amount of venom injected (Palanivel *et al.*, 2007). The clinical effects are more severe in small animals as compared to large animals.

Puff-adder bites and envenomation is an emergency which requires immediate medical attention (Ananda *et al.*, 2009). Delayed and inadequate antivenom and supportive therapy may lead to untoward and fatal consequences (Warrell *et al.*, 2010). Reports on medical management of snake bite have been documented in dog (Vijay Kumar *et al.*, 2001; Ananda *et al.*, 2009). In these reports dogs have been treated using anti-snake venoms, fluids, corticosteroids and antibiotics. However, there are no reports on the use of antihistamines due to its perceived ability to potentiate the toxic action of the snake

venom (Ananda *et al.*, 2009). The current study reports on successful use of antihistamine together with anti-snake venoms, fluids, corticosteroids and antibiotics with no untoward effects.

Case history and clinical findings

Two mongrel dogs, one a male aged 6 months and another a female aged two years were presented to the small animal clinic, University of Nairobi with a history of salivation, dullness, depression and staggering gait with patients preferring a recumbent position. According to the owner, the dogs had sustained snake bites six hours prior to presentation. During the fight, the dogs had managed to kill the snake which was presented to the hospital for identification. Physical examination of the dogs revealed swollen areas with fang marks on the lateral aspect of the right elbow of the female dog (Figure 1) and sub-mandibular region for the male dog (Figure 2). The bite sites were oozing dark colored blood and upon palpation exhibited severe pain and were warm to touch.

The clinical parameters that included rectal temperature, pulse and respiratory rate for the male dog were 39.0°C, 80 beats/minute and 16 breaths/minute, respectively while those of the female dog were 38.5°C, 60 beats/minute and 12 breaths/minute, respectively. The blood samples from both dogs were collected for



Fig. 1: Arrow showing swollen right forelimb



Fig. 2: Arrow showing swollen sub-mandibular region.



Fig. 3: Picture of the puff adder snake

hematology and biochemistry. Blood for hematology was collected in sterile vacuum tubes containing ethylene diamine tetra acetic acid (EDTA) and analyzed using automatic cell counter (MS4 VET hematology machine, Melet Schloesing pharmaceuticals S.A, Suisse, Switzerland) for hematological parameters. Blood for biochemistry was collected in plain, sterile vacuum tubes and analyzed using a spectrophotometer machine (Spectrophotometer, Biomerieux, France) for biochemical parameters. The hematological parameters revealed decreased erythrocyte count (3.84 M/mm³, 4.16 M/mm³), total platelet count (107 M/mm³, 114 M/mm³), hemoglobin concentration (12.6 g/dl, 13.2g/dl) and packed cell volume (35%, 40%) and increased total leukocyte count (22.82 M/mm³, 18 M/mm³) in male and female dog, respectively. The biochemical values showed elevated levels of alanine aminotransferase (80 IU/dl, 90 IU/dl) and creatinine (2.2 mg/dl, 1.96 mg/dl) in male and female dog, respectively.

The snake presented to the clinic was identified as puff adder (*Bitis Arietans*) based on its characteristic chevron striations, head morphology and fang length (Figure 3). Based on the history, clinical presentation and physical examination of the dogs, a diagnosis of snake bite was confirmed and emergency treatment initiated.

Treatment

Both dogs were treated with lyophilized polyvalent anti-snake venom (Serum institute of India). 5ml of water for injection was added to the anti-snake venom which was in a powder form. The clear supernatant obtained after dilution was then infused into 500 ml of lactated ringer solution (Hartmanns solution, infusion Medicare ltd, Nairobi, Kenya) and administered slowly intravenously over a period of 2 hours to each dog. Dexamethasone (Colvasone®, Norbrook laboratories, Newry, Northern Ireland) at the dose of 2mg/kg was administered intravenously s.i.d once to each dog and tripelethamine hydrochloride (Bimahistamine, Bimeda ltd, Dublin 24, Ireland) at the rate of 1.1 mg/kg twice a day intramuscularly. Further procaine penicillin and dihydrostreptomycin sulphate (Pen Strep, Norbrook laboratories, Newry, Northern Ireland) at a dose of 5 mg/kg, i/m was administered to each dog. The animals were then kept under observation in kennels individually. Twenty four hours following antivenom therapy, the swelling at the site persisted and daily antihistamine therapy was administered orally for four more days. The antibiotic therapy was continued for 5 days to both dogs. The patients recovered uneventfully and were discharged after one week of treatment.

DISCUSSION

To the researchers' knowledge, this is the first reported case of successful use of antihistamine in combination with anti-venom, corticosteroid, antibiotic and intravenous fluids in the management of snake bite and envenomation in adult dogs. Snake venom is a complex mixture of proteins and peptides, consisting of both enzymatic and non enzymatic compounds (Warrell, 2010). The toxins found in *Bitis arietans* include; snake venom metalloproteinases (SVMPs), serin proteases, C-

type lectin like proteins, phospholipases A₂ (PLA₂), disintegrin bitistatin and cystatin. In addition the venom also contains inorganic cations such as sodium, calcium, potassium, magnesium, and small amounts of zinc, iron, cobalt, manganese, and nickel. The other components of snake venoms are glycoproteins, lipids, and biogenic amines, such as histamine, serotonin and neurotransmitters like catecholamines and acetylcholine (Klaassen, 2008).

Clinical signs such as salivation, dullness, muscular weakness with abnormal gait observed in the present case have also been observed by Ananda *et al.* (2009). This clinical signs can be attributed to the enzymatic and non enzymatic compounds in the snake venom. According to Klaassen (2008), hyaluronidase cleaves internal glycoside bonds in certain acid mucopolysaccharides resulting in decreased viscosity of connective tissues which allow other fractions of venom to penetrate the tissues. The edema observed at the site of bite may be attributed to enzyme hyaluronidase which acts as a spreading factor.

The alterations in the hematological parameters might be due to damage to the blood cells by snake venom (Ananda *et al.*, 2009). However, increased leucocytes count is attributed to systemic infection as snake fangs and oral cavity has bacterial contaminants (Blaylock, 2001). The increased biochemical values like alanine aminotransferase and creatinine may be due to the hepatotoxic and nephrotoxic effect of snake venom (O'Shea, 2005).

Corticosteroid was administered in this case to counteract development of shock due to hemorrhage as well as to overcome the untoward effect to antivenom as lyophilized polyvalent anti-snake venom may sometimes cause anaphylactic reactions (Sai *et al.*, 2008). Although, antihistamines can at certain times potentiates the toxic action of the snake venom (Ananda *et al.*, 2009), there use is important as it counteracts the severe side effects produced by histamine in snake venom. Broad spectrum antibiotics were administered to the dogs, as snake fangs are contaminated with different types of bacteria which

are mainly gram negative enterobacteriaceae (Blaylock, 2001).

Conclusion

The study recommends the use of antihistamine together with conventional regime in management of snake bites and envenomation in dogs. Antihistamines counteract the severe side effects produced by histamine in snake venom therefore minimizing morbidity and mortality.

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