

A PRESUMPTIVE POISONOUS SNAKEBITE IN A SHEPHERD DOG IN JUIZ DE FORA, MINAS GERAIS, BRAZIL - CASE REPORT*

UMA PRESUMÍVEL PICADA DE COBRA VENENOSA NUM CÃO PASTOR EM JUIZ DE FORA, MINAS GERAIS, BRASIL - RELATO DE CASO

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ABSTRACT. Colling A., Andriolo A. & Campolina I. **A presumptive poisonous snakebite in a Shepherd dog in Juiz de Fora, Minas Gerais, Brazil - Case report.** [Uma presumível picada de cobra venenosa num cão pastor em Juiz de Fora, Minas Gerais, Brasil - Relato de caso]. *Revista Brasileira de Medicina Veterinária*, 33(1):12-17, 2011. Australian Animal Health Laboratory, CSIRO 5 Portarlington Rd. Victoria, Austrália. E-mail: axel.colling@csiro.au

This paper presents a case report of a presumptive poisonous snake bite in a 12 months old shepherd dog in Juiz de Fora, Minas Gerais, Brazil. The dog had returned after wandering around a farm on the afternoon of Day 1. On the morning of Day 2 “Mel” presented a swollen head, hemorrhage from both nostrils and mouth, salivation and weakness. In spite of the evident clinical manifestations, “Mel” was alert during the examination. The body temperature was slightly increased (38.8°C). Despite the apparently stable condition, at the end of Day 2, “Mel” suddenly suffered a severe circulatory crisis with respiratory standstill causing a life-threatening situation, which required immediate intensive hospital care. Infestations with tick-transmitted blood parasites (*Rhipicephalus sanguineus*) such as *Rickettsia* are frequent in the region, and they have the potential to increase the impact of snakebite. At the end of Day 3, “Mel’s” clinical signs were stable again. On the morning of Day 4, treatment was finished and the dog released from hospital. Based on our experience, we recommend suspect snakebites to be treated seriously with patients being hospitalized immediately. A sudden circulatory crisis is possible and may need to be dealt with extreme emergency to avoid life-threatening complications. Farm dogs fulfil important functions such as watch and hunt dogs and frontline biological detectors of venomous animals. Based on anecdotal evidence, we estimate that they are likely to prevent human exposure. But further socio-epidemic studies, *e.g.* comparison of prevalence and incidence rates of contact cases in humans on farms with and without dogs are necessary to test and quantify this hypothesis. We describe clinical signs, treatment and recovery of a supposed bothrops snakebite as a brief case study.

KEY WORDS. Snakebite, antivenom treatment, symptoms, case-study, dog, prevention of human exposure.

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RESUMO. Este manuscrito apresenta um relato de caso presumível sobre picada de cobra venenosa num cão pastor de 12 meses de idade, em Juiz de Fora, Minas Gerais, Brasil. O cão havia retornado, depois de passear numa fazenda à tarde, no primeiro dia. Na manhã do segundo dia “Mel”, apresentou cabeça inchada, hemorragia em ambas as narinas e na boca, salivagem intensa e fraqueza. Apesar das manifestações clínicas evidentes, “Mel” estava alerta e foi participativa durante o exame. A temperatura corporal esteve ligeiramente elevada (38,8°C). Apesar da condição geral estável; de repente, no final do segundo dia, “Mel” começou a sofrer de grave crise cardio-respiratória causando-lhe risco de vida que necessitou imediatamente de cuidados hospitalares intensivos. Houve suspeitas de infestações por hematozoários, transmitidos por carrapato (*Rhipicephalus sanguineus*), tais como: *Rickettsia* spp., bastante frequentes na região e com potencial de aumentar o impacto dos acidentes ofídicos. Ao final do terceiro dia, Mel apresentou parâmetros fisiológicos estáveis novamente. Na manhã do dia 4º, o tratamento foi concluído e o cão liberado da Clínica veterinária. Baseados em nossa experiência, recomendamos que, em casos sérios de suspeita de picada de cobra, os pacientes devem ser internados imediatamente. A súbita crise circulatória é provável de ocorrer e precisa ser tratada com extrema urgência, para evitar complicações sérias. Na fazenda, os cães desempenham funções importantes, como de alerta, busca e detectores de animais peçonhentos. Com apoio em evidências anedóticas, estima-se que fossem susceptíveis de prevenir a exposição humana. Mas, novos estudos sócio-epidêmicos, por exemplo, comparação das taxas de prevalência e incidência de casos em seres humanos em contato com granjas, com e sem cães, são necessárias para desafiar e quantificar essa hipótese. Sendo assim, descrevem-se os sintomas, tratamento e valorização de uma suposta mordida de cobra, como um breve relato de caso.

PALAVRAS-CHAVE. Picada de cobra, tratamento anti-ofídico, sintomas, estudo de caso, cão, prevenção a exposição humana.

INTRODUCTION

There are four genera of poisonous snakes in Brazil. The highest prevalence of snakebite is due to the genus *Bothrops*, which accounts for 73.5% of notified human cases nationally (Acidentes ofídicos, 2010, Ferreira Junior et al. 2004). Decreasing prevalences are reported for snakes belonging to the following genera: *Crotalus* (7.5%), *Lachesis* (3.0%) and finally *Elapidae* (0.7%) with variations depending on the geographic dis-

Table 1. Percentage of registered human accidents with snakes in Brazil (GVE 2010)

Genus or type of snake	Percentage
<i>Bothrops</i>	73.5
<i>Crotalus</i>	7.5
<i>Lachesis</i>	3.0
<i>Elapidea</i>	0.7
Non-venomous snakes	3
Non-identified snake	11.8

tribution (Table 1) (GVE 2010, MS 2005). Recent changes in terminology were applied to “Jararaca” and “Cascaveis”, who belong to the genus *Viperidae*, with the following representatives: *Bothrops*, *Bothriopsis*, *Bothrocophias*, *Bothropoides*, *Caudisona*, *Lachesis* and *Rhinocerothis* (Bérnils 2009). In the state of Minas Gerais, incidents with 12 species of poisonous snakes have been reported. The most frequent incidents occur with *Micrurus ibiboboca* in Northern Minas Gerais and *Bothrops fonsecai* (*Rhinocerothis itapetiningae*) (Bérnils 2009) in the South of Minas Gerais and *Bothrops itapetiningae* (*Rhinocerothis itapetiningae*) (Bérnils 2009) in the region called “Triângulo Mineiro” (Feio & Caramaschi 2002). The incidence of reported cases of poisonous snake encounters increased yearly between 2000-2005 with a peak of 28.597 accidents in 2005 and an overall incidence of 15 cases/100.000 inhabitants in all of Brazil. From 2005 to 2008, the incidence decreased yearly with 26.156 accidents, or 13.8 cases/100.000 inhabitants, in 2008. There is a considerable regional variation in accidents in Brazil with the highest incidences occurring in the Northern and Central-Western parts of the country (MS 2005). In Southern-East Brazil, the number of reported cases was 7.635 (9.5 inhabitants/100.000) (MS 2005). The identification of the snake is often not possible, and a presumptive diagnosis is based on clinical symptoms and epidemiological factors. In 2005, this was the case in 20% of registered snake accidents (MS 2005). A remarkable increase of accidents in humans has been described during the hot and rainy season (January to April), which coincides with increased human agricultural activity. Adult males are the highest risk group with an overall human mortality of 0.4% (Bochner et al. 2003, MS2005, GVE 2010).

Dogs are frequently bitten by poisonous snakes, and the diagnosis of snake envenomation is often based on the clinical signs and epidemiology (Heller et al. 2005, GVE 2010). Survival of dogs appears to be associated with the time between envenomation and administration of antivenom (Heller et al. 2005). Mirtschin et al. 1998 reported that 91% of cats and 75% of dogs in Australia



Figure 1(A, B, C). Day 2 extensive haemorrhagic swelling into the submandibular and upper chest region, haemorrhage from the nostrils and mouth, salivation, weakness and ataxia; (D) from the nostrils originating from two symmetric, approx. 3.5 cm distant lesions on the top of the nose (white arrows), which were supposed to be the venom teeth of the snake.

survived following the administration of antivenom whereas 66% of cats and 31% of dogs survived without antivenom. Ferreira et al. 2004 reported that cattle are the most sensitive to snake venom followed, in decreasing order, by equine, ovine, caprine, canine, swine and feline.

A retrospective study performed in Sao Paulo identified that out of 149 envenomation cases 128 were caused by *Bothrops*, 11 by *Crotalus* and 10 were not identified.

The species with the highest risk were dogs (n=103), horses (n=22), cows (n=17), goats N=4), cats (N=2) and pigs (n=1) (Ferreira et al. 2004). The incidence of cases with poisonous animals in the area of Juiz de Fora, Minas Gerais, Brazil is quite frequent (Oliveira 2004). The farm (Figure 3) where the dog lives had a number of “near misses” with venomous animals such as *Bothrops* “Jararacas”, *Crotalus* “Rattle snakes”, *Micrurus* “Real

Coral Snake” over the years. For example on the day after the snakebite two “Coral snakes” were seen on the farm road 200 m away from the house and in 2007 two “Rattle snakes” were found on the veranda of the upper house in the evening. Usually, when poisonous animals are found on the farm they are professionally captured and delivered to a local assembly point and then forwarded to the “Butantan” anti-venom institute in São Paulo.

HISTORICAL FINDINGS

A 12 month old shepherd dog, “Mel” (“Honey”) returned home on a November afternoon (Day 1) after roaming on a 19 ha farm located in the area of Juiz de Fora, Minas Gerais, Brazil. The farm is located in primary rain forest with plenty of native fauna (Figure 3).

On the next morning (Day 2), “Mel” presented with acute lower jaw and upper chest swelling and haemorrhage from the nostrils and muzzle (Figure 1 A, B, C). The dog was active and alert, e.g. licking, tail wagging, jumping on rear legs when approached by the owner. Because of the severe clinical picture, the dog was admitted to an emergency unit of a local veterinary practitioner where it was given a thorough physical examination. The subcutaneous haemorrhage was found to originate from two symmetric lesions, approx. 3.5 cm apart, on the top of the nose, which presumptively were caused by the venom teeth of the snake (Figure 1D). Based on the size of the wound it was concluded that the snake was at least 1 m long and with a considerable head and fang size.

Intravenous antivenom and fluid therapy were initiated on the morning of Day 2. In spite of the dramatic clinical signs “Mel’s” general status was alert and active. The dog had a temperature of 38.8 C and was salivating and bleeding (Figure 1 B).

At the end of Day 2 “Mel” went into a circulatory shock. After tachypnea, she had a respiratory standstill and circulatory collapse. She was intubated and artificially ventilated to maintain blood oxygen levels. She remained in a critical, but stable, condition and was kept under observation during the night.

On the morning of Day 3 “Mel” had normal temperature, normal feces and urination and, after stabilizing further during the day, was taken home in the evening. She had a meal of cooked rice with beef stew and water *ad libitum*.

By the morning of Day 4, swelling of the lower jaw was less than half the original size, and haemorrhage from the nostrils and muzzle had stopped (Figure 2). “Mel” had a good appetite, appeared clinically normal and went for a



Figure 2. “Mel” at day 3 substantially reduced swelling, no haemorrhage, and alert status.

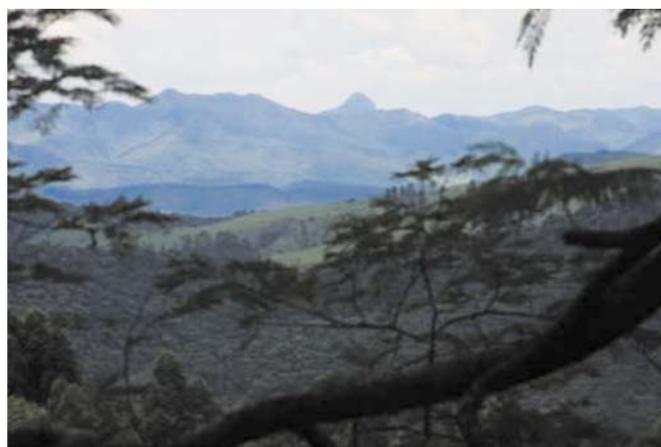


Figure 3. “Paradise” Farm, km 42, Nova Califórnia, Juiz de Fora, Minas Gerais, Brazil.

20 min. walk. By late on Day 4, the swelling in the lower jaw and upper chest had disappeared, the head was normal again, and the dog was considered to be recovered.

The dog was hospitalized and taken into intensive care. Basic parameters, e.g. weight, respiration, pulse frequency and strength, capillary refilling of mucosae, body temperature and general neurological examination (senses, proprio-perception) were assessed. An intravenous catheter was placed in the brachiocephalic vein and the following treatment given:

- Snake antivenom treatment consisted of application of 50 ml of polyvalent antivenom i.v. (Antiophidic serum).

- Ringers Lactate Solution was administered for fluid therapy. The required volume was calculated using the following formula:

Existing deficit (ml): $30 \text{ kg (body weight)} \times 0.08 \text{ (8\%)} \times 1000 = 2.400 \text{ ml}$

Maintenance requirement (ml): $30 \text{ kg (body weight)} \times 50 \text{ ml/kg/day} = 1.500 \text{ ml}$

Continued loss of body fluids (ml): 400 ml

Total: 4.300 ml

- Anti-inflammatory therapy consisted of application of corticosteroids (Prednisolone) using the following dose: $0.5 \text{ mg/kg/12-24h, i.v.}$ or a total of 15 ml.

- Anti-haemorrhage treatment consisted of Tranexamic acid using the following dose: 25 mg/kg given every 8h for 48 hours (Overall dose $750\text{mg}/30\text{kg}$ every 8h)

- Blood examination: *Ehrlichia canis* was detected by light microscope examination of a blood smear from the ear. The treatment consisted in one single dose of 6 mg/kg of Dipropionate Imidocarb (Total of $180 \text{ mg}/30 \text{ kg}$)

- Respiratory support consisted of humidified oxygen for approximately 45 min during the acute phase of circulatory collapse.

DISCUSSION

The case is remarkable because, in spite of the severe envenomation, the dog presented in a stable and alert condition shortly after the presumed snakebite and on the next morning. Based on the dog's general alertness and disposition, it could have been assumed that recovery was complete at this stage, and that no intensive treatment was necessary. Nevertheless, approximately 24 h after the incident, a critical situation developed with circulatory collapse and respiratory standstill, which probably would have killed the dog if it would not have been taken into intensive care. A short movie was taken from this acute crisis, and can be made available upon request by the author for educational purposes. We have no conclusive evidence what snake would have caused this incident but, based on the symptoms and clinical signs, e.g. symmetric bite wound on top of the nose, size and shape of tooth-bite, swelling, haemorrhage, and epidemiology of snake bites in the region, e.g. > 95% Jararaca (Oliveira 2004), we have strong reasons to assume that a snake of the *Bothrops* genus commonly called "Jararaca" has caused this envenomation.

It is likely that the circulatory crisis was caused by the snakebite as *Bothrops* venom is known to cause local inflammation, necrosis, vascular epithelial damage, coagulation, proteolysis and liberation of inflammatory substances such as histamines and bradykinines (Ferreira et al. 2004). The use of premedicants such as antihistamine, adrenaline and corticosteroids to reduce the risk of anaphylactic shock in human cases of elapid antivenom

has been described (Heller et al. 2005). Our treatment included the use of premedicants, and we conclude that the circulatory crisis was due to the snake venom and not to the antivenom. The severe haemorrhage followed by hypovolemia and blood and plasma loss into the submandibular, lower jaw and upper chest tissue is likely to have caused the shock at the end of day 2. Despite of the significant area affected in the lower jaw and upper chest, no skin or other visible tissue necrosis occurred. There was no indication of serum disease 3-4 weeks after the treatment with antivenom.

"Mel" had a heavy infection of *Rickettsia* of the genus *Ehrlichia canis*. The prevalence of infection with *E. canis* and its vector *Rhipicephalus sanguineus* in the region is high. Two other dogs which live together with "Mel" in the same kennel were also infected with *E. canis*. A female, ovario-hystorectomized, 5 year old, albino boxer, "Branquinha" developed severe clinical symptoms such as anaemia, prolonged capillary filling time, fever, depression and weakness. A 2 year old, black, male retriever mix, "Enzo" was also infected but did not show any symptoms. All dogs receive regular treatment to prevent infestation with parasites, such as fleas with deltamethrine, pour-on solution and Mebendazole-based vermifuges for treatment of endoparasites. But despite this, it was concluded that all three dogs were infested with *E. canis*. Infection with blood parasites can cause severe complication in case of intoxication with haemolytic substances such as venom of *Bothrops* species and requires a differentiated treatment. After the envenomation episode all three dogs were treated with Dipropionate Imidocarb.

There are many differential diagnoses for snake envenomation such as poisoning resulting from ticks, organophosphate insecticide, botulism, acute infectious diseases such as canine hepatitis and leptospirosis, heat-stroke and general anxiety manifesting as sympathetic stimulation (Heller et al. 2005). However, in the case of "Mel" in this case report, the bite wound on the top of the nose and the clinical signs were highly suggestive of envenomation due to a snakebite.

CONCLUSIONS AND RECOMMENDATIONS

On Brazilian farms, dogs are frequently kept as watch and hunt dogs and fulfil an important role as "biological" or "frontline detector animals". This means that, by wandering around the farm, they keep poisonous animals "under control" and contribute to preventing potential human exposure and accidents. To our knowledge no estimates are available in the literature about the significance of their contribution to prevent human

accidents with snakes every year on Brazilian farms. However anecdotal evidence suggests that farm animal such as dogs reduce human risk significantly. For example, anti-venomous drugs available on farm are frequently used in these animals after exposure. Further socio-epidemic studies, e.g. comparison of prevalence and incidence rates of contact cases of humans in farms with and without dogs are recommended to challenge and quantify this hypothesis. Results would provide information that allowed better protection of human and animal populations living and producing in rural areas. The impact of other biological factors such as chicken, ducks or wild animals such as seriemas, which represent a pressure on snake populations, would also need to be further investigated.

We recommend regular surveillance of farms to document the presence of poisonous animals such as snakes, spiders and scorpions. If present, these animals should be professionally captured and delivered to a local collection point from where they will be further processed for the national production of antiserum and research.

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