do Rego Leal, Marta Lizandra; Rodrigues Aires, Adelina; Fillapi, Andreane; Trost, Maria Elisa
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Universidade Federal do Rio Grande do Sul
Porto Alegre, Brasil

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Clinical and Pathological Observations Associated with Snake Envenomation in Two Sheep

Marta Lizandra do Rego Leal¹, Adelina Rodrigues Aires¹, Andreane Fillapi¹ & Maria Elisa Trost²

ABSTRACT

Background: Snake attacks on sheep, horses, cattle and, most frequently, dogs, have previously been described but few of these cases involve highly lethal poison, especially with farm animals. In Brazil, most attacks on humans involving poisonous snakes are related to the genus *Bothrops* sp. Information about snakebites in sheep is usually obtained from experiments. There are few reports of natural cases and their clinical and pathological characteristics. The aim of the present study was to report the clinical and pathological characteristics of two spontaneous cases of snake envenomation in sheep.

Case: Two sheep were sent to the UFSM Veterinary Hospital after being found in the lateral decubitus position by their owner. The two sheep came from a farm located near the University. The animals were subjected to a thorough clinical examination. Blood was collected from one animal for a hemogram and biochemical tests. The animals died about two hours after their arrival at the veterinary hospital. During the necropsy, the first ewe exhibited severe dyspnea, swelling of the submandibular and periorbital regions, and unilateral nasal serosanguineous secretion. The second animal exhibited nasal and ocular bilateral bleeding, hematoma and intense gingival bleeding. The left eye was completely obliterated. In the blood and serum analysis, this animal exhibited a low content of plasma proteins. During the clinical examination, both animals exhibited severe swelling and a hemorrhage in the head suggested snakebite. The tissue samples were fixed in formaldehyde, routinely processed for the histology and stained with hematoxylin and eosin. The owner reported the presence of *Bothrops alternatus* snakes on the farm.

Discussion: Most cases of snakebite occur in spring and summer. Severe edema and bleeding are characteristic of snakebites from the genus *Bothrops* sp. Snakebites involving sheep usually occur in the head region, as in the cases reported herein. According to the literature, the attacks occurred during Spring, in the months of September and October. Both animals dies less than two hours after arriving at the Veterinary Hospital, indicating that the species of snake involved was very poisonous. In the necropsy, both sheep exhibited skin and subcutaneous hemorrhage, as well as severe edema. When a snake bite involving the genus *Bothrops* sp. occurs in the head, there is a local reaction which can produce severe edema that affects the neck and thoracic regions. One of the animals exhibited pulmonary edema, hemorrhagic lesions in the heart and petechiae in the serous surface of the intestine. Two perforating lesions, two centimeters away from each other, were found on the right nostril of one animal whereas the lesions were found in the left labial commissure of the second animal, which suggested a snake attack. In the bite region, hydropic degeneration of the keratinocytes and moderate spongiosis were observed microscopically. In the small intestine, the lamina propria exhibited moderate eosinophilic and lymphoplasmacytic inflammatory infiltrate. The heart exhibited multifocal areas of coalescent hemorrhage and moderate edema of the interstitium. The speed with which the animals died demonstrated the high lethality of snakebites in farm animals. The diagnosis of snake envenomation was based on the epidemiological, clinical, and pathological findings and was attributed to the *Bothrops* sp. of snakes.

Keywords: snake envenomation, *Bothrops* genus, sheep diseases, pathological findings.

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¹Departamento de Clínica de Grandes Animais, Hospital Veterinário, Universidade Federal de Santa Maria (UFSM), Santa Maria, RS, Brazil. ²Laboratório de Patologia Veterinária, UFSM, Santa Maria, RS. CORRESPONDENCE: A.R. Aires [adelina_ravet@yahoo.com.br - Tel.: +55 (55) 3220-8469]. Hospital Veterinário, Prédio 97, Av. Roraima n. 1000 - Campus Universitário, UFSM. CEP 97105-900 Santa Maria, Rio Grande do Sul, Brazil.
INTRODUCTION

In Brazil, most attacks on humans involving poisonous snakes are related to the *Bothrops* genus [2,4]. Bothropic envenomation seems to be more common in animals. Descriptions of spontaneous cases of this type of poisoning are available for both livestock and pets. Data is also available related to the clinical and pathological state caused by snake venom in animals [9]. Attacks on sheep [1], horses [3] and cattle [13] have been previously described, but the animals most commonly attacked are dogs [4,9].

Generally, the diagnosis is concluded by the information from experiments that demonstrate how the venom of some snakes has the capacity to cause lesions and death among animals [7, 11]. However, important data obtained during anamnesis, such as the presence of snakes in the region, reports of other attacks and the evolution of clinical signs, may provide strong evidence that poisoning occurred [4].

The aim of the present study was to report two spontaneous cases of snake envenomation in sheep which occurred in Rio Grande do Sul State and were attributed to *Bothrops* genus snakes. The clinical and pathological aspects of the attacks were described to facilitate the diagnosis of this type of poisoning in sheep.

CASE

Two sheep were brought to the Veterinary Hospital of the Universidade Federal de Santa Maria (UFSM). The two sheep belonged to a farm located near the University. The animals were kept at pasture during the day and housed in an enclosed area at night.

A ewe (Ile de France crossbreed) of approximately two years old and weighing 40 kg was found in the lateral decubitus position at the end of a day at pasture. A physical examination revealed discomfort, severe dyspnea, facial edema, swelling of the submandibular and periorbital regions and unilateral nasal serosanguineous secretion (left nostril). In the labial commissure and inner side of the left upper lip, two wounds, which appeared to be punctures, were detected close together, as well as hematoma and intense gingival bleeding. The clinical suspicion was poisonous accident. During the night, approximately two hours after the examination, the animal died. It was sent to the Laboratório de Patologia Veterinária of UFSM in the morning. Due to the advanced state of autolysis, only fragments of organs from the second sheep were collected.

In the second case, a two year old Texel cross-breed ewe exhibited edema in the entire head which extended to the submandibular region and neck. The animal exhibited nasal and ocular bilateral bleeding (Figure 1) and made loud noises during inspiration and expiration. In the physical examination, it was possible to detect two perforating lesions on the right nostril, 2.0 cm apart (Figure 2). In the area that was shaved for blood collection for the hemogram and biochemical tests, there was a rapid formation of a hematoma and continuous bleeding at the site of venipuncture. The animal died one hour after arriving at the hospital and was immediately sent for a necropsy. The tissue samples were fixed in formaldehyde, routinely processed for histology and stained with hematoxylin and eosin.

![Figure 1. Ewe with diagnostic of bothrops snake bite, characterized by facial edema nosebleeds, eye and mouth.](image1)

![Figure 2. Aspect of bite site in ewe diagnosed with snake bite. Presence of perforating lesions, bruising and bleeding characteristic.](image2)
rhagic and the teeth were loose. There was diffuse edema and hemorrhage in the skin and subcutaneous tissue of the head and neck. Multifocal suffusion was observed in the subcutaneous tissue of the right thoracic wall. In the lung and the serous surface of the small intestine, there were multifocal hemorrhagic areas. No abnormalities were found in the brain, urogenital or musculoskeletal system. The macroscopic lesions were highly suggestive of snakebite from the genus *Bothrops* sp.

Edema of the eyelids and blood clots in the orbital cavities were found in the necropsy of the second animal (Figure 3). The subcutaneous tissues of the head, submandibular region and masseter muscle were edematous and hemorrhagic. The ventral region of the neck and upper thorax were also hemorrhagic (Figure 4). A small amount of red froth was detected in the light lumen of the trachea. In the heart, there was an extensive area of hemorrhage in the epicardium and endocardium (Figure 5). The small intestine exhibited multiple petechiae all along the wall. The internal iliac lymph nodes were diffusely hemorrhagic and the mesenteric lymph nodes exhibited petechiae. No alterations were observed in the urogenital and nervous systems. Microscopically, marked hydropic degeneration of the keratinocytes and moderate spongiosis were observed in the lip, mucocutaneous junction and epidermis. In the dermis, a large area of hemorrhage was observed, involving the adjacent muscles. The heart exhibited multifocal areas of coalescent hemorrhage and moderate edema of the interstitium. In the small intestine, the lamina propria exhibited moderate eosinophilic and lymphoplasmacytic inflammatory infiltrate. The lesions were highly suggestive of snakebite, probably by a snake of the genus *Bothrops* sp.

**Figure 3.** Ewe with diagnostic of bothrops snake bite featuring edema of the eyelids and blood clots in the orbital cavities.

**Figure 4.** Ewe with diagnostic of bothrops snake bite featuring, at necropsy, hemorrhage and edema in the ventral region of the neck and upper thorax.

**Figure 5.** Ewe with diagnostic of bothrops snake bite featuring, at necropsy, heart with marked hemorrhage.

**DISCUSSION**

In Rio Grande do Sul, venomous snakes belong to the genera *Bothrops, Micrurus* and *Crotalus*. More than 90% of cases involve bothropic snakebites [8]. Most attacks by snakes of the genus *Bothrops* sp. occur during the spring and summer [10,11], as in the cases presented herein, which were in September and November.

Herbivores are more susceptible than carnivores to the effects of a venomous snakebite [13]. Snakebites involving sheep are generally in the head region, as in these cases, although they have also been reported on the legs and abdomen [9]. Two puncture wounds were detected in the left labial commissure and on the right nostril of the animals (Figure 1A). When a snakebite involving the genus *Bothrops* sp. occurs in the head, there is a local reaction which can produce severe edema that affects the neck and thoracic regions.
[5], leading to the breathing difficulty (grunting) that occurred in both cases. The increase in volume is the most obvious clinical sign of bothropic poisoning. Local edema in these cases is due to the direct action of the venom components, increasing the permeability of capillaries and venules [6].

An increase in coagulation time, the presence of sclerotic and mucosae congestion, systemic hemorrhage, epistaxis and shock are the most common signs of bothropic envenomation [9], all of which were observed in both reported cases. These results are compatible with acute anemia, a consequence of the hemorrhagic action of the venom. There is a decrease in the total plasma protein level, which may be associated with the proteolytic effect of bothropic venom [8] or bleeding.

In the report of an outbreak on a farm in a central region of Rio Grande do Sul [10], 16.3% of a herd of 135 animals were bitten and 8.1% of these died. The main clinical sign was extensive edema distributed outside the region of the bite. Death occurred 24-48 hours after the bite. In the cases described in the present study, the exact time of the snake attack could not be determined, although the interval between the bite and death of the animals was confirmed as less than 12 hours.

The increase in volume is the most obvious clinical sign of bothropic poisoning, and its severity is directly proportional to the time elapsed since the inoculation of venom [3,9]. According to Tokarnia et al. [12], the swelling starts quickly after the bite of Bothrops jararaca, and reduces over time. In the present study, there was no regression, which may indicate the involvement of a more venomous species of the same genus of snake.

Considering the clinical findings related to the animals, the presence of perforating injuries and the necropsy findings, the definitive diagnosis in both cases was bothropic snakebite. This affirmation was reinforced by the presence of Bothrops alternatus snakes on the property where the animals were attacked.

REFERENCES