

## Snakebite in a Cow - A Case Report

Jožica Ježek<sup>1</sup>, Marija Nemeč<sup>1</sup>, Matija Ježek<sup>2</sup>, Martina Klinton<sup>1</sup> and Jože Starič<sup>1</sup><sup>1</sup>Veterinary Faculty, University of Ljubljana, Slovenia<sup>2</sup>Veterinary Practice Ljubljana, Ljubljana, Slovenia

## Article Information

Received date: Aug 17, 2018

Accepted date: Sep 21, 2018

Published date: Sep 25, 2018

## \*Corresponding author

Jožica Ježek, Clinic for Reproduction and Large Animals, Veterinary Faculty, University of Ljubljana, Gerbičeva 60, 1000 Ljubljana, Slovenia,  
Tel: 386 1 4779216;  
Email: jozica.jezek@vf.uni-lj.si

Distributed under Creative Commons  
CC-BY 4.0

**Keywords** Cattle; Venomous snakebite,  
Clinical signs, Clinical pathology

## Abstract

The clinical course of toxic envenomation of a cow after snakebite is described. The cow was bitten during grazing on a hilly area east from Ljubljana. When the cow returned from pasture in the evening, there was significant facial swelling and systemic clinical signs. The cow was severely depressed and inappetent and developed skin lesions after several days. Clinicopathological examination showed haemolysis, hyperbilirubinemia and increased activity of liver enzymes. Clinical status of the cow has gradually normalized within one month, however liver enzyme elevations (GGT, GLDH), remained even two months after the bite. Based on clinical signs and history a venomous snakebite was suspected.

## Introduction

Three species of poisonous snakes are present in Slovenia: the horned viper (*Vipera ammodytes*), common viper (*Vipera berus*) and the asp viper (*Vipera aspis*). Of these, the most widely spread in Europe is the common viper. According to the Poison Control Centre of Slovenia a total of 39 snakebites in humans were recorded in the years from 1999 to 2008. In about half of the cases, the snake has not been identified, 25% of the bites were attributed to common viper, 18% to horned viper and 10% to non-toxic snakes from the grass snakes family (Colubridae) [1]. The snakebites occur also in domestic animals especially those moving in nature, like dogs, horses, cattle [2-4] but there are just few reports about this.

Poisonous snakes that live in Europe have a similar composition of the venom. The venom of Viperidae snakes has mainly hemotoxic and necrotoxic effects [5]. The venom is viscous, similar to egg white, and consisting of different enzymes (hyaluronidase, proteolytic enzymes, phosphodiesterase, hydrolase, oxidase), proteins having a specific toxic activity (neurotoxic phospho-lipase A2), polypeptides, amino acids, carbohydrates, acetylcholine and metalloproteins [5,6]. After snakebite, the venom is activated by body temperature and tissue pH [5].

Clinical signs after snakebite may be local and/or systemic. On the site of the bite the local swelling, which spreads in the surrounding area, redness, pain, lymphangitis and lymphadenitis occur. Systemic symptoms may occur early or later on and show with gastrointestinal symptoms, hypotension, shock, circulatory and cardiac dysfunction, respiratory and nervous system dysfunction [1,2,4] and anaphylactic reaction to venom proteins (facial, tongue and epiglottic angioedema) [5]. Although the occasional occurrence of venomous snakebites in cattle in the field is mentioned in the literature, we have failed to find clinicopathological descriptions of snake bites in cattle.

In this paper, we present a clinical case of a cow, which was bitten by a snake on the pasture. The course of the disease and the results of haematological and biochemical blood tests over longer period are described.

## Case Presentation

The case occurred in the beginning of May in 7 years old, 5 months pregnant Simmental cow originating from a small farm with 7 cows. The cow was grazing on a hilly area east from Ljubljana during the day. When she returned home from pasture in the evening her head was swollen, she was depressed, tachycardic (95 bpm), tachypneic (40 breaths/minute), decreased ruminations and had moderate fever of 39.5 °C. The cow was treated with prednisolone, penicillin-streptomycin, vitamins and minerals. Based on history and clinical signs snakebite was suspected. The owner said that he already saw snakes on the area where the pastures are, in the past. During the first 6 days after the suspected snakebite, the cow passed foamy and intensively yellow urine. She refused to eat and was depressed for four days, she only drank water. On the third day, she developed crusts on the muzzle. The rumen motility was depressed, body temperature, arterial pulse and respiration rate were normal. Mucous membranes were icteric. The cow had very little milk (only 1.5 dl / milking), which was blue-grey colour. On the fourth day after the bite changes have occurred on the skin of teats, vulva and around the eyes. The skin was erythematous and covered with crusts, which were similar to those on the muzzle. On the 5th day, she started to eat soft hay and on the 7th day, she ate fresh grass and cooked potato with bran. On the sixth day, the changes on the muzzle began

**Table 1:** Results of haematological examination.

Day after the bite	3	9	16	29	65	RR
RBC (x10 <sup>12</sup> /L)	6.64	6.21	6.43	6.45	5.89	5.0-8.5
Hb (g/L)	97	94	95	96	90	90-140
MCV (fl)	47	47	45	44	44	40-60
Ht (L/L)	0.31	0.29	0.29	0.28	0.26	0.28-0.38
WBC (x10 <sup>9</sup> /L)	7.7	8.3	10.1	13.0	9.0	5-10
PLT (x10 <sup>9</sup> /L)	407	772	766	370	399	200-800
MCH (Pg)	14.7	15.1	14.8	14.8	15.2	14-24
MCHC (g/dL)	31.5	32.3	33.1	33.7	34.8	26-35
Segmented neutrophils (%)	53	31	23	20	35	25-45
Eosinophils (%)	2	6	21	42	22	1-10
Basophils (%)	1	0	0	0	0	0-2
Lymphocytes (%)	36	56	53	38	43	45-65
Band neutrophils (%)	3	0	0	0	0	0-2
Monocytes (%)	5	7	3	0	0	2-8

RBC: Red Blood Cell; Hb: Haemoglobin; MCV: Mean Corpuscular Volume; Ht: Haematocrit; WBC: White Blood Cell; PLT: Platelets; MCH: Mean Corpuscular Haemoglobin; MCHC: Mean Corpuscular Haemoglobin Concentration; RR-Reference Range

**Table 2:** Results of biochemical examination.

Days after bite	3	9	16	29	65	RR
Urea (mmol/L)	2.14	2.80	2.41	3.41	3.29	1.66-6.66
Total serum protein (g/L)	67.2	75.1	78.1	76.3	73.6	70-80
Albumin (g/L)	26.9	29.5	28.9	29.2	34.0	27-38
Alb/Glob ratio	0.67	0.64	0.59	0.62	0.86	0.8-1.2
GGT (U/L)	974	839	548	258	59	<36
GLDH (U/L)	19.86	33.65	196.56	18.32	19.80	<11
ALP (U/L)	284	254	345	287	272	<240
AST (U/L)	198	140	158	107	110	52-120
CK (U/L)	47	91	121	134	217	<120
Total Bilirubin (µmol/L)	94.47	37.99	13.66	10.33	6.13	<7.70
Creatinine (µmol/L)	86	92	/	87	86	80-160
Triglycerides (mmol/L)	2.37	2.25	0.85	0.89	0.98	0.17-0.51
Cholesterol (mmol/L)	7.94	7.59	3.85	4.41	5.22	1.33-3.88
Inorganic phosphate (mmol/L)	2.48	2.81	2.36	2.41	2.32	1.61-2.25
Ca (mmol/L)	2.24	2.27	2.29	2.44	2.68	2.25-2.99
Mg (mmol/L)	0.85	1.15	1.03	0.86	1.11	0.69-1.23
Na (mmol/L)	141	142	139	142	141	135-157
K (mmol/L)	4.84	5.18	5.44	5.49	5.81	4.2-5.8
Cl (mmol/L)	97	98	94	98	98	90-108
Fe (µmol/L)	20.9	33.9	29.3	19.2	16.7	21-45

Alb: Albumin; Glob: Globulin; GGT: Gamma-glutamyltransferase; GLDH: Glutamate dehydrogenase; ALP: Alkaline phosphatase; AST: Aspartat-aminotransferase; CK: Creatine kinase; Ca: Calcium; Mg: Magnesium; Na: Sodium; K: Potassium; Cl: Chloride; Fe: Iron; RR-Reference Range

to heal from the centre out. Ten days after the bite local necrosis of the skin on the costal arch was observed. The cow began to eat hay normally not earlier than 20 days after the bite. Twenty days after the bite bloody discharge from the vagina appeared and three weeks later, the cow aborted. The cow stayed inside for 25 days, and then she was let out to graze with her herd. It is interesting that after this incident the cow no longer wanted to be on the pasture what could be related to her previous bad experience with the snake. When she was satiated, she returned (escaped from the pasture) home to the stall.

**Laboratory findings**

The blood samples were taken on days 3, 9, 16, 29 and 65 after snakebite. Three days after the bite haematological values were inside reference range despite haemolysis. At subsequent samplings (9, 16 and 29 days after the bite), the number of white blood cells and the share of eosinophil granulocytes gradually increased. Sixty-five days after the bite, the number of leukocytes and the share of eosinophil granulocytes decreased slightly. Lower values of Hb, Ht and the RBC were also found (Table 1).

The blood serum of the cow 3 days after the bite was haemolytic and greenish colored. Activity of enzyme gamma-glutamyltransferase (GGT) was markedly increased, later it declined slowly, and similar happened with bilirubin. Activity of enzyme glutamate dehydrogenase (GLDH) increased until the 16th day then it decreased slowly (Table 2).

**Discussion**

The diagnosis was made on the base of case history, clinical signs and the exclusion of other potential diagnoses. The cow had a swollen head and signs of systemic reaction (fever, anorexia), which is consistent with signs of moderate envenomation according to Poisoning Severity Score [7]. The fang marks were not found, but they are more difficult to find in animals because of the hair. We suspect that the bite was on the head and that the cow accidentally came across a snake while grazing. Likewise, horses on pasture were mostly bitten on the muzzle [4].

Local swelling at the bite site is common and is described in humans [1,8,9] as well as in animals [2-4,10]. The activity of enzyme hyaluronidase from the venom cause increased tissue permeability and proteolytic enzymes destruct the endothelium and basal membrane of capillaries (cytotoxic effect); thus the capillary permeability increases and results in the occurrence of oedema [5].

The cow had changes (erythema, crusts) on the mucosa of the muzzle and on the skin around the eyes, teats and vulva. Of the cases described in the literature in one horse, extensive local tissue necrosis was observed after common viper envenomation [4] and extensive necrosis of cardiac ventricular tissues was described in two horses bitten by *Vipera palaestinae* [11]. In 32% of dogs bitten by the common viper, evidence of myocardial cell damage was found [12]. In human nationwide study in Sweden was found that local necrosis is uncommon after *V. berus* bites [13]. In the same study, they found exanthema in 3% of patients with symptoms of moderate envenomation [13]. Sometimes vesicles appear on the bite site while necrosis of skin and underlying tissue are rare [1]. Skin necrosis at the snake bite site was observed in 10.7% of patients after Viperidae snake bite [9]. The changes that we have observed on the skin and muzzle

were attributed to local vascular injury and may be associated with cytotoxic effect of the venom on the endothelium of blood vessels [5] this is also linked to local swelling. Clinically the changes on the skin and muzzle were similar as in photosensitization but distribution of lesions was not typical. The skin on the white parts of the body remained normal, but skin necrosis was observed on small area on the costal arch where the skin was brown pigmented. After snakebite, the cow stayed in the stall and skin changes appeared 3-8 days after then. No suspicious plants were found on the pasture. The course of the disease with sudden appearance of swollen head and appearance of the first lesions on the muzzle when she was already housed in stall are not distinctive to photosensitization.

The cow in our case was pyrexia, depressed and without appetite, which was observed also in some dogs and horses after viper bite [2,4]. In dogs, the clinical condition normalized in 4 to 23 days after the bite [2]. In humans, after snakebite the most common symptoms were nausea (86%), headache (79.5%), cardio respiratory ailments (39.7%) and increased body temperature (37.6%) [9].

In our case haematological results revealed mild haemolysis and moderate neutrophilia 3 days after the envenomation. In later samplings after 16 and 29 days leucocytosis and eosinophilia were found indicating inflammatory and possibly allergic reaction. Eosinophilia could be reactive due to over-production of IL-5 by CD4+ helper T cells [14] as response to intoxication and inflammation. Laboratory findings in humans involve leucocytosis (86% of cases) and lowered values of haemoglobin (55.9%), prothrombin time (51.6%), red blood cells (48.3%) and haematocrit (39.7%) [9]. Some patients had signs of haemolysis and blood coagulation [9]. Thrombocytopenia was relatively common in severe poisoning, some patients developed anaemia with delayed onset [13]. Leucocytosis and elevated number of neutrophil granulocytes was found in horses, in some cases with toxic left shift, mild anaemia and elevated levels of fibrinogen [4]. Phospholipase A in the snake venom acts directly on erythrocyte membranes or indirectly through the production of lysolecithin and decreases osmotic erythrocyte resistance, which leads to intravascular haemolysis [5].

Biochemical examination of cow blood serum revealed increased activity of liver enzymes especially GGT and GLDH as well as increased concentration of bilirubin, indicating hepatic injury. In 65% of dogs bitten by the viper, increased activity of at least one liver enzyme was found and increased values were present also in subsequent blood samplings [2]. In approximately one third of people after venomous snakebite, increased activity of liver enzymes was found [9]. Hepatic injury may be from direct cytotoxic effects of snake venom or indirectly as a consequence of vascular damage and ischemia. In half of the dogs bitten by a viper, an increased activity of CK was found but there was no correlation between degree of swelling and value of CK [2]. In our case, slightly increased activity of CK was found in blood samples 16 days and later after envenomation so we cannot attribute it to local muscle damage due to the snakebite.

In conclusion, the diagnosis of venomous snakebite relies on the anamnestic data, clinical signs and exclusion of other potential diagnoses. In our case, the cow had clinical signs of local and systemic reaction. Her clinical condition normalized in approximately one month, although the deviations of liver enzymes (GGT, GLDH), persisted even two months after the bite.

## References

1. Grec D. Bites by venomous snakes (Ugrizi strupenih kač). *Med Razgl.* 2009; 48: 145-151.
2. Berger Lervik J, Lilliehook I, Frendin JHM. Clinical and biochemical changes in 53 Swedish dogs bitten by the European adder-*Vipera berus*. *Acta Vet Scand.* 2010; 52: 26-36.
3. Banga HS, Brar RS, Chavhan SG, Sandhu HS, Kammon AM. Pathology of snake bite in cow. *Toxicol Internat.* 2009; 16: 69-71.
4. Anlen KG. Effect of bites by the European adder (*Vipera berus*) in seven Swedish horses. *Vet Rec.* 2008; 162: 652-656.
5. Adukauskienė D, Varanauskienė E, Adukauskaitė. *Venomous Snakebites. Medicina (Kaunas).* 2011; 47: 461-467.
6. Audebert F, Sorkine M, Robbe-Vincent A, Bon C. Viper bites in France: clinical and biological evaluation; kinetics of envenomations. *Hum Exp Toxicol.* 1994; 13: 683-688.
7. Persson H, Karlson-Stiber C. European snakes. In: *Critical Care Toxicology. Diagnosis and management of critically poisoned patient.* (Brent, J., K.L. Wallace, K.K. Burkhart, S.D. Phillips, J.W. Donovan, Eds.), Elsevier Mosby, Philadelphia, 2005: 1097-102.
8. Garkowski A, Czupryna P, Zajkowska A, Pancewicz S, Moniuszko A, Kondrusik M, et al. *Vipera berus* bites in Eastern Poland-a retrospective analysis of 15 case studies. *Ann Agric Environ Med.* 2012; 19: 793-797.
9. Karlo R, Dželalija B, Župančić B, Bačić I, Dunatov T, Kanjer A, et al. *Venomous snakebites in the Croatian North Dalmatia region.* *Wien Klin Wochenschr.* 2011; 123: 732-737.
10. Ugile SS, Muley VD, Velhankar RD, Dighe DG, Chowdhary AM, Garud KV, et al. Therapeutic management of snake bite in a Great Dane dog - A case report. *Vet Pract.* 2009; 10: 55-56.
11. Hoffman A, Levi O, Orgad U, Nyska A. Myocarditis following envenoming with *Vipera Palaestinae* in two horses. *Toxicon.* 1993; 31: 1623-1628.
12. Pelander L, Ljungvall I, Häggström J. Myocardial cell damage in 24 dogs bitten by the common European viper (*Vipera berus*). *Vet Rec.* 2010; 166: 687-690.
13. Karlson-Stiber C, Salmonson H, Persson H. A nationwide study of *Vipera berus* bites during one year-epidemiology and morbidity of 231 cases. *Clin Toxicol.* 2006; 44: 25-30.
14. Young KM, Meadows RL. Eosinophils and their disorders. In: Weiss DJ, Wardrop KJ. Eds. *Schalm's Veterinary Hematology*, 6th Ed. Wiley-Blackwell, Ames, Iowa. 2010: 281-289.