

ADDER BITES. A REPORT OF 68 CASES

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ABSTRACT

Background and Aims: The adder (*Vipera Berus*) is the only venomous snake that exists naturally in Scandinavia. The aim of this study is to estimate the severity of adder bites, to form a general picture of symptoms of bites and to find out how effective the present treatment methods of adder bites are.

Material and Methods: 68 true adder bites treated in Turku University Hospital during the years 1995–2000 were reviewed retrospectively.

Results: There were no deaths in this material. A bite caused severe symptoms to 10 % of the patients. The symptoms were moderate in 21 %, mild in 34 % and minor in 35 % of the cases. Children under 10 years were the proportionally biggest age group and severe poisonings were most frequent among small children. Rapidly progressive oedema, gastrointestinal symptoms, hypotension and early leucocytosis were signs of more severe poisonings. Antivenom therapy with specific ovine Fab antivenom proved to be an effective and safe treatment in severe poisonings.

Conclusions: An adder bite may also cause severe symptoms for adults. All patients should be observed at least few hours after the bite and parental fluid therapy should be started at an early stage. In the treatment of severe poisonings an antivenom therapy should be considered. Rapidly progressive symptoms and early leucocytosis may serve as a warning signal for higher probability of severe reactions.

Key words: Snakebite; adder; antivenom; *Vipera Berus*

INTRODUCTION

According to general opinion adder bites are dangerous for children and elderly persons only. Some authors suspect that the danger of adder bites has been underestimated. Due to effective treatment, deaths from adder bites are nowadays very rare. Severe poisonings do, however, occur and without

effective treatment there may be a threat to life for adults as well (1, 2).

There are some commonly accepted forms of treatment for adder bite victims. For example, corticosteroids and antibiotics are used prophylactically extensively although their efficiency has never been documented (3).

The aim of this study is to estimate the severity of adder bites, form a general picture of the symptoms of adder bites and to find out how adder bite victims are treated. Safer and more effective antivenom for adder bites was taken in to clinical use in the early 90's. This new antivenom has broadened the indications for the antivenom treatment. The experi-

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TABLE 1

Severity of poisoning according to Persson and Irestedt (B).

A) Minor (or no) reaction	Local swelling. No general symptoms except those of fright.
B) Mild reaction	Local or more extensive swelling, with or without gastrointestinal symptoms but without other systemic effects
C) Moderate reaction	Extensive oedema. Shock lasting for less than two hours. Other signs of moderate systemic poisoning
D) Severe reaction	Shock lasting for more than two hours or recurring episodes of shock, other signs of severe systemic poisoning
E) Fatal reaction	

ences of the new ovine Fab antivenom (Therapeutic Antibodies Inc.) are also of interest.

PATIENTS AND METHODS

The medical records of 186 patients with animal bites, treated at Turku University Hospital (TUH) during the years 1995–2000, are reviewed. There were 130 cases of suspected adder bite, of which 68 patients meet the criteria of a true adder bite. According to the criteria, the bite is evidenced when it was clearly seen, the bite marks typical, or the patient showed symptoms matching those of an adder bite.

In this retrospective study, data concerning the age and gender of the victim, the site and time of the bite, and the time lag to medical treatment, as well as the symptoms, the degree of leucocytosis, the treatment and the duration of hospitalisation are recorded. The Pearson correlation coefficient is calculated to show the correlation between the severity of poisoning and early leucocyte number.

The severity of the poisoning is assessed using the classification presented by Persson and Irestedt (1) (Table 1).

RESULTS

In South Western Finland adder bites occur from April to September. The bites accumulate strongly in time period from June to August and 89.7 % of all cases occur during these months.

60 % of patients were bitten in the foot and 40 % in the hand. Most often the bite was situated in the ankle. Patients bitten in the foot were usually young (average age 24 years), while patients bitten in the hand were usually middle-aged (average age 47 years). The site of the bite had no effect on the severity of the poisoning.

The time lag to medical treatment is recorded in 52 cases. The time lag varies from 15 minutes to 24 hours. Most patients arrived at the hospital within two hours after the bite.

There were no deaths recorded in this material. Severe poisonings developed to seven patients. They were all treated in the ICU and six of them were also treated with antivenom. In the classes moderate, mild

TABLE 2

Distribution of the 68 adder bites by severity of poisoning in different age groups.

Severity of poisoning	Age group (years)				Total	%
	< 6	6–15	15–65	> 65		
A) Minor	3	6	14	1	24	35 %
B) Mild	3	6	12	2	23	34 %
C) Moderate	2	2	5	5	14	21 %
D) Severe	5	0	2	0	7	10 %
E) Fatal	0	0	0	0	0	0 %
Total	13	14	33	8	68	100 %

TABLE 3

Symptoms of 68 adder bites.

	Number of cases	%	%
Oedema	62		91.2
local swelling		22	32.4
moderate oedema		26	38.2
extensive oedema		14	20.6
Bruising	35		51.5
Swelling of lips and tongue	10		14.7
Gastrointestinal symptoms	18		26.5
Cardiovascular symptoms	12		17.6
slight hypotension		6	8.8
severe hypotension		4	5.9
Shock		2	2.9
CNS depression	10		14.7
Leucocytosis (> 10 E9/l) n = 59	32		54.2
Leucocytosis > 15 E9/l		18	30.5
Respiratory distress	8		11.8

and minor poisonings, there were 14, 23 and 24 patients, respectively.

There were no differences in the occurrence of adder bites between genders. The age distribution of the patients is shown in Table 2. Children were the biggest group of victims, and 39.7 % of patients were younger than 15 years. Severe poisonings were most frequent among small children. Five of the seven patients with severe poisoning were less than six years old.

The most common symptoms of the 68 adder bites are presented in table 3. Oedema occurred in 62 cases (92.1 %). The oedema was extensive, affecting the whole limb and extending to the trunk in 14 cases (20.6 %). Bruising was noted in 35 cases (51.5 %). Swelling of the face, lips or tongue developed to 10 patients (14.7 %).

Gastrointestinal symptoms like vomiting, diarrhoea and abdominal pain occurred in 18 cases (26.5 %). In most cases with severe and moderate poisoning the gastrointestinal symptoms were obvious. Hypotension was problem with 12 patients (17.6 %). Shock related symptoms developed to six patients (8.8 %) and difficulties in breathing to eight (11.8 %) patients. CNS disturbances were noted in 10 patients (14.7 %). CNS symptoms like somnolence and confusion were rather mild in all cases. Pain in the area bitten was reported only in 12 cases (17.6 %).

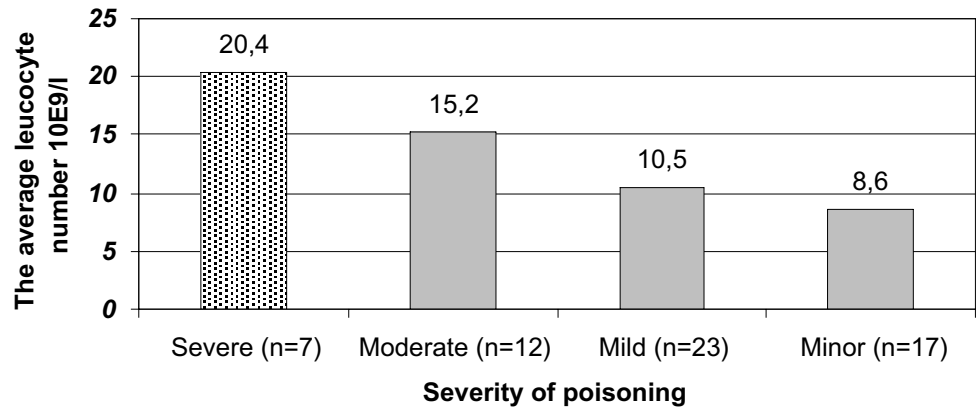


Fig. 1. Leucocytosis seemed to indicate a severe poisoning very well. Correlation coefficient was 0.65.

The white cell count was taken in 59 cases. The leucocyte count exceeded 15×10^9 in 18 cases (30.5%). Leucocytosis seemed to indicate a severe poisoning very well. This has also been reported in other studies (1, 3). In groups severe, moderate, mild and minor the average leucocyte count was 20.4 (26.9–7.4), 15.2 (25.3–6.7), 10.5 (19.3–4.3) and 8.6 (15.2–4.5), respectively (Figure 1). Correlation coefficient between the severity of the poisoning and early leucocyte number was 0.65.

Three patients were sent to other hospitals after the immediate acute phase. Therefore the duration of hospitalisation is known only in 65 cases. After 2–6-hour follow-up ten patients were sent home and were treated in outpatient care. There were 25 patients treated partly in the ICU. The patients with severe poisoning spent about 4.8 (6–3) days in the hospital, of which 1.57 (4–1) days in the ICU. In the moderate, mild and minor poisoning groups the average time spent in hospital was 3.5 (7–1), 3.1 (8–0) and 1.0 (4–0) days, respectively.

Of the patients included in the study, 19 had taken hydrocortisone on their own initiative prior to other treatment. Intravenous corticosteroids had been given to 47 patients (69%) before they arrived at the first aid department of TUH. In TUH intravenous cortisone was given to 41 patients (60%). There were only four patients with minor symptoms and were not treated with intravenous corticosteroids at any stage. In our material prophylactic antibiotic treatment was given in 47 cases (69%). Adrenaline was given to eight patients suffering from hypotension. Parenteral fluid therapy was reported in 36 cases. Antivenom treatment with an ovine Fab Vipera berus antivenom, (Therapeutic Antibodies Inc.) was given to eight patients (six of these patients were classified to have a severe and two a moderate poisoning).

DISCUSSION

Of the total of 130 patients treated as possible snake bites, finally only 68 patients who were considered as having true bites were included in the study. The criteria for this were either a witnessed snakebite, typical bite marks or symptoms matching those of

an adder bite. It is possible that some of the light cases were not included, and thus the severity of adder bites may be slightly overestimated in this study. Moreover, numerous adder bite victims who do not seek medical help. Not included are also those adder bite victims who were treated completely in the primary health care. Therefore, the incidence of adder bites cannot be estimated in this study.

Most of the bites occurred during the summer holiday months. The bite was in the foot in 60% of patients and in hand in 40% of the patients. Adults were often picking berries or mushrooms when the adder bite occurred. Children in turn stepped on an adder while playing in the yard. However, according to this study, the site of the bite has no influence on the severity of poisoning. In the rare cases where the bite is in the face or the neck severe symptoms may occur due to local swelling.

Almost 40% of the patients treated in TUH were less than 15 years of age. Presumably almost all children who have been bitten by an adder attend a physician, while a part of adults follow up their symptoms at home. The children more often than the adults are admitted to a hospital by a physician in the primary health care. The children have serious reactions to adder bite more often than the adults (6), as the venom content in the tissue rises to higher levels. In our study five of the seven patients with severe poisoning were less than six years old. However, severe and moderate symptoms were also seen in adults and without an effective treatment some of these cases might have been life threatening.

Symptoms caused by adder bites are variable and unpredictable. Age, weight, previous health condition and the unpredictable amount of poison injected may all have an effect on the severity of the symptoms. The venom of *Vipera berus* contains large amounts of cytotoxic proteases, hyaluronidase, phospholipases and peptide hydrolases (7). In addition to cytotoxic effects the venom may also have allergenic effects causing anaphylactic reactions in some patients.

A local oedema was the most common symptom of the adder bite and occurred almost in all cases. If there is no swelling at all, it is unlikely that any poison has been injected (8). The extent of oedema cor-

relates to the severity of the poisoning. A rapidly progressing oedema was also noted to indicate a more severe poisoning. Gastrointestinal symptoms like vomiting and diarrhoea were the most common systemic reactions. Gastrointestinal symptoms shortly after the bite are an alarming sign of a severe systemic poisoning. Other general symptoms were hypotension and CNS disturbances.

In the group of severe poisonings the early leucocyte number exceeded 15×10^9 in all except one case (85.7 %), while in the group of minor poisonings, the leucocyte number exceeded 15×10^9 only in one case (4.2 %). These findings support the previous studies (2, 4) and suggest that early leucocytosis may serve as a warning signal for higher probability of severe reactions. Cortisone increases the amount of leucocytes in peripheral blood by releasing granulocytes from leucocyte reserves, for example, bone marrow and spleen. Therefore only early leucocytosis is notable while estimating the severity of the poisoning.

The reactions to the adder bite were minor or mild in 69 % of the cases. In these poisonings the clinical picture could possibly have been almost the same regardless of a given treatment. 21 % of the patients developed symptoms of a moderate poisoning. These patients had many symptoms indicating a systemic poisoning, and without an effective symptomatic treatment the situation could probably have developed into much more severe. 10 % of the patients developed a severe poisoning. In some of these cases, the treatment given in the ICU can be considered life-saving.

In Finland, a snake bite first-aid kit containing 150 mg of hydrocortisone is available for the layman. It is commonly used, although its efficiency has not been proven (9). Comparing the patients who took hydrocortisone orally before seeing a doctor with those who did not take it, there was no difference in the severity of symptoms. 69 % of the patients received intravenous cortisone in primary health care. Neither did this have an effect to the subsequent clinical picture. Thus it seems that early cortisone has no effect on the symptomatology of adder bites (1, 3). As all the patients with severe or moderate symptoms were treated with intravenous cortisone, the value of corticosteroid therapy cannot be assessed in this study.

It has previously been reported that prophylactic use of antibiotics is not indicated since infections are not usually a problem in adder bites (1, 3, 5, 10). The routine use of antibiotics is still extensive. In our material, the antibiotic treatment was given in 47 cases (69 %). In most of these cases the use of antibiotics was explained by the risk of tetanus.

Hypotension was quite a common symptom of an adder bite (17.6 % of patients). Therefore, establishing an intravenous line and when necessary, starting parental fluid therapy at an early stage is justified. Adrenaline had a good response in the acute phase treatment of severe hypotension caused by an adder bite.

Antivenom therapy was given to eight patients (11.8 %). Common to all these cases was that symp-

toms developed rapidly. One patient received 100 mg of intravenous ovine Fab antivenom, while all others received 200 mg of the same antivenom. No one needed repeated doses. In all cases the antivenom was given within five hours of the bite. All patients benefited from the antivenom therapy and their symptoms, such as progressive oedema, hypotension and shock, resolved quickly. There were no adverse reactions to antivenom. This supports the previously reported findings concerning the safety and effectiveness of this specific, ovine Fab antivenom in the treatment of adder bites (11).

CONCLUSION

The adder bites caused severe poisonings, but deaths were successfully avoided. Rapidly progressive oedema, gastrointestinal symptoms, hypotension and early leucocytosis are signs of more severe poisoning. The antivenom therapy with ovine Fab antivenom proved to be an effective and safe treatment in severe poisonings.

Because the symptoms of adder bites may develop rapidly and unpredictably all adder bite victims should seek medical help. The affected limb should be immobilized and antitetanus prophylaxis given. Patients should be carefully observed and parenteral fluid therapy should be started at an early stage. In severe cases antivenom therapy should be considered.

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