

ORIGINAL RESEARCH

## *Vipera berus* Bites in the Region of Southwest Poland— A Clinical Analysis of 26 Cases

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**Objective.**—*Vipera berus* is the only naturally occurring venomous snake in Poland. Its venom is primarily vasculotoxic and evokes both local and systemic findings. The aim of the study was to review a series of clinical cases of *V berus* bites occurring in southwest Poland.

**Methods.**—The charts of 26 patients (age range, 16–66 years; mean, 42 years) hospitalized with *V berus* bites were retrospectively analyzed using a data collection tool. Demographic and clinical data were extracted.

**Results.**—The most common local findings of envenomation were edema of the bitten limb with associated extravasations observed in 24 (92.3%) patients, but in only 1 (3.8%) case did the edema spread to the trunk. In 22 (84.6%) cases edema disappeared within 2 weeks after the bite. Systemic disturbances observed in the patients were: shock (1 case), mild transient hypotension (1 case), prolonged hypotension (3 cases), bronchospasm and laryngeal edema (1 case), diarrhea (1 case), transient supraventricular arrhythmias (2 cases), neutrophilic hyperleukocytosis (2 cases), and thrombocytopenia below 50 000 cells/ $\mu$ L (5 cases). In 16 patients (61.5%) the envenomation was classified as moderate and this type was predominant. Six cases were classified as severe. No fatal case was reported. Treatment included the administration of specific antivenom in 14 cases (in all severe and half of moderate cases) and symptomatic treatment applied in all cases.

**Conclusions.**—Moderate envenomation prevailed among the patients analyzed in the study. Antivenom treatment is primarily necessary in cases of severe (grade 3) and in some cases of moderate (grade 2) envenomation, especially in patients with persistent or recurring hypotension.

**Key words:** *Vipera berus*, bites, venom, envenomation, antivenom, snake, snakebite, Poland

### Introduction

*Vipera berus* is the only naturally occurring venomous snake in Poland. Its venom is primarily vasculotoxic and contains hyaluronidase, which facilitates the tissue spread of other venom components such as proteolytic enzymes, toxic polypeptides, amino acids, and a small amount of carbohydrates.<sup>1</sup> Phospholipase A<sub>2</sub>, one of the most important constituents, detaches arachidonic acid from cell membrane phospholipids and starts an inflammatory cascade. Inflammatory mediators together with vasoactive substances liberated from injured tissues are responsible for vascular damage and increased perme-

ability, which subsequently leads to edema and the extravasation of cellular blood elements.<sup>1,2</sup> Because the venom of *V berus* spreads mainly throughout lymphatic vessels, regional lymphadenitis can be one of the findings. Envenomation has more severe consequences in small children, probably because of the higher dose of venom compared with body weight.<sup>1,3,4</sup>

*V berus* bites remain problematic in Poland and concern not only toxicologists, but also the emergency service, pediatricians, and family doctors. Mortality in cases of *V berus* bites is rare and does not exceed 1%.<sup>3</sup> However, the disease may diminish physical and professional activity for several weeks. Because of the potentially dangerous course of envenomation and possible severe complications, proper management of such bites is very important.

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**Table 1.** Clinical gradation of envenomation after viper bite

Grade	Envenomation	Signs and Symptoms	No. of patients (%)
0	No envenomation	Fang marks, no edema	2 (7.7)
1	Mild envenomation	Local edema around the bite, no systemic symptoms	2 (7.7)
2	Moderate envenomation	Edema of the limb, mild systemic symptoms (diarrhea, transient hypotension, etc)	16 (61.5)
3	Severe envenomation	Extensive edema spreading to the trunk, shock, prolonged hypotension, bleeding, etc.	6 (23)

The aim of this retrospective case study was to collect epidemiological and clinical data from patients bitten by *V. berus*. We evaluated signs and symptoms, severity of envenomation, clinical course, treatment, and outcome.

### Methods

The medical records of adult patients hospitalized due to *V. berus* bites at the Toxicological Unit of T. Marciniak Hospital in Wrocław, Poland from 2000 to 2008 were retrospectively analyzed. A data-gathering form was filled out by one medical doctor and reviewed by another. Data collected included: epidemiologic data, local findings, systemic symptoms, laboratory findings, complications, and treatment.

All cases of *V. berus* bites were recorded from the region of Lower Silesia (southwest Poland), which has an area of 19 946.77 km<sup>2</sup> and a population of 2 878 410. T. Marciniak Hospital is a major hospital and the only toxicologic referral center for adult patients in this area. All adult patients with moderate and severe *V. berus* bites are hospitalized in this center. Patients were observed in hospital until all swelling was gone. There was no patient follow-up.

Mild cases may be treated in local hospitals. However, each of these cases is generally reported to the referral unit. Eighteen cases of bites were reported to us by telephone from 2000 to 2008. These cases were not included in this analysis due to a lack of detailed medical data from the respective hospitals. However, they were classified as mild by the reporting doctors.

The grading scale of Audebert et al with the modification by Petit was used for clinical evaluation.<sup>3</sup>

Children under age 16 from the region of Lower Silesia are treated in another pediatric unit and were not enrolled in this case study.

Because the study is the retrospective analysis of clinical cases, institutional review board approval was unnecessary.

### Results

This retrospective case study involved 26 patients (16 men and 10 women; age range, 16–66 years; mean, 42

years). Most often the patients were bitten in the forest (20 cases), more rarely in the countryside (5 cases). One case of viper bite happened in town, in a garden bordering a house. The annual incidence of *V. berus* bites varied widely, from 0 in 2001 to 8 cases each in 2006 and 2008. Moreover, the incidence of *V. berus* bites showed a distinct seasonal pattern, with a higher frequency in late spring and summer; all of the patients were bitten from May to September and 61% of the bites occurred in June and July. All of the patients were bitten during the day, with a peak between 11 AM and 4 PM. In 22 cases (84.6%) the bites were located on the lower limbs after the patient accidentally stepped on the viper. In the other 4 cases (15.4%) the bites were located on the hands and were incurred while the patient was catching the viper. No multiple bites were registered.

In our patients, moderate *V. berus* envenomation predominated (Table 1). At the time of admission to the toxicologic unit, fang marks were observed in all patients, who also reported local pain just after the viper bite. Edema was the next most common manifestation of bites (92.3% of cases), lasting up to 2 weeks in most cases (Table 2). In 16 cases (61.5%) the edema was painful and the patients required treatment with analgesics: 4 cases with tramadol, 1 case with ketoprofen, and 2 cases with metamizol. Paracetamol or tramadol was used in 11 patients (42.3%) who received low-molecular weight heparin (LMWH) as prophylaxis against deep vein thrombosis following lower limb bites. Edema-associated pain usually disappeared or was considerably diminished within 1 week after the bite. Widespread extravasations were always observed together with the edema and usually disappeared just after the edema had subsided (Figure). In 1 case, axillary lymphadenitis developed after a bite on the hand and was accompanied by edema of the whole upper limb.

The most common systemic finding of envenomation was hypotension: mild and transient in 1 case (3.8%) and prolonged without clinical symptoms of inadequate perfusion of vital organs in 3 cases (11.5%) (Table 3). No cases of deep vein thrombosis were recorded. Detailed laboratory findings are presented in Table 4. In 16 cases

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