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28. POISONOUS SNAKE BITES IN GERMANY

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Poisonous snake bites are only of little importance in Germany, thus most doctors are not familiar with a proper treatment, and there are only a very few publications dealing with the problem of snake bite in Germany.

The only native poisonous snake to be found in Germany is the adder or common viper (Kreuzotter, *Vipera berus*, as it is called in Latin) which belongs to the viper family, and in addition, we find the *Vipera aspis* (*Aspis viper*) in the southern part of the Black Forest (Schwarzwald). Bites caused by these two kinds of snakes do not produce grave symptoms and it is mostly the children who are bitten by snakes while strolling across the moors or through the meadows.

The board of statistics (Statistisches Bundesamt) at Wiesbaden cannot provide with any recent statistics concerning either adder — or poisonous snake bites in general or the deaths resulting from them. A partial statistical collection of snake bite accidents during the years 1883 and 1892 — this is before the introduction of the serumtherapy — indicates 14 deaths (that is 6.4%) out of 216 adder bites. Between 1907 and 1912, 265 adder bites were reported officially and only 6 deaths (that is 2.3%) were recorded. During the last 20 or 30 years the number of bites and deaths resulting from them has been decreasing, the reasons being both the introduction and the use of the serumtherapy and the housing development which naturally caused a further decrease in the number of the adder family. (Part of the decrease, by the way, is certainly due to offering rewards to people who caught adders.)

Notes on bite accidents are now only to be found from time to time in some publications. Between 1951 and 1956, for example, only 19 adder bites were treated in the hospital department of the Institute for Tropical Medicine in Hambourg, where snake bite accidents occurring in the northern part of Germany are looked after, and none of the patients died.

If, however, you compare the number of killed and injured persons due to traffic accidents in Hambourg, with its population of two million people, e.g. in April 1966 1,010 people were injured and 25 died, while in December 1965, 134 deaths caused by various accidents were registered, and now compare to these figures those of the snake bites, you will certainly realize the little importance of adder bites for the doctor in general.

Fatal adder bites are nowadays seldom heard of in Germany. In 1930, Fock reported the death of a girl harvest worker, who was bitten in an ankle vein and died 3 hours later. In 1952, Kirsch reported 2 deaths out of 20 cases treated for adder bites. Only lately it was made known to me that in 1959 a weak-hearted 60 year-old lady died of an adder bite. The case has never been published

officially. In comparison to the bites of the rather harmless German adders those of the imported tropical snakes are more serious and often prove fatal. Such accidents occasionally happen in the dock areas during unloading of imported fruits (e.g. bananas), when the poisonous snakes travelling as stowaways are disturbed. Furthermore similar accidents are reported from zoos, snake farms, pet shops, fairs, and snake fanciers. From 1951 until 1966, for example, 4 tropical snake bites were treated in the hospital department of the Institute for Tropical Medicine in Hambourg, 2 being from a *Bothrops schlegelii* which, concealed in a cluster of bananas, bit 2 stevedors, the other two being bites of a *Crotalus viridis* and a *Bitis arietans* which bit 2 pet handlers. In all cases the bites could be treated successfully.

The fatalities caused by tropical snakes in Germany are far more frequent than those resulting from adder bites. Since 1956 three fatal Cobra bites were reported, which, because of their rarity and dramatical singularity, were widely covered by the press, and in one case resulted in court proceedings: A showman in Königswinter on the Rhine suffered the first of these bites. In 1956 he was bitten in the tip of his right forefinger by a 4½ year-old *Naja naja* which he had reared from an egg. He made an incision himself and applied a tourniquet to his arm. It was 1½ hours later when he first called for a doctor and then was injected with a Cobra anti-serum (5 ml locally and 5 ml intramuscularily) which was already outdated for one year. Further anti-serum, which had been ordered immediately afterwards, was injected 3¾ hours after the bite occurred. However, although it was only a 10 ml polyvalent serum dose, produced by the Behring Werke for treatment of bites from European and Mediterranean vipers and not effective against Cobra bites, it was nevertheless injected. 6 hours and 10 minutes after the accident the patient died from respiratory paralysis. In December 1962 an experienced 55 year-old animal keeper was bitten by a 120 cm long Indian cobra in the tip of his right forefinger, while working in an animal compound in the Bremen Zoo. Hardly 10 minutes later the patient, a tourniquet already applied, was in hospital, where the specific antivenom not being available, he was injected locally and intravenously with 20 ml of an anti-serum for the treatment of European an Mediterranean snake bites. 1½ hours after the bite 30 ml of a polyvalent serum, produced by the Behring Werke for treatment of bites from North African vipers and some kinds of Cobra snakes, which had been ordered in the meanwhile, was injected. Only 5 hours after the bite 60 ml of a polyvalent serum for Cobra venom intoxication which had been flown in by helicopter could be injected intravenously. In addition, a Ringer drop infusion, blood transfusions, gammaglobulin, and a 4 hourly injected dose of 40 mg prednisolone (Urbason) were given, and, at intervals, artificial respiration was carried out. The patient at first responded well to the treatment and the situation seemed less grave, however he died suddenly 17 hours after the bite from respiratory paralysis. In April 1963 another bite from a Cobra (*Naja naja*) proved fatal. The 37 year-old owner of a small snake farm in the Danube region was bitten in the left forefinger while removing the poison from the snake's venom-tooth. He tied off his forefinger himself and only an hour later he went to the hospital where he brought with him 3 different ampules of a polyvalent anti-venom for the treatment of bites from Mediterranean vipers and the poisonous snakes of Africa, Central and South America. Before removing the tourniquet and after a thorough excision of the wound was carried out, he was injected intra-muscularily with a serum against poisonous snakes of the African continent. After this treatment the patient left the hospital against the strong advice of the

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doctor. But 2½ hours he was admitted to the hospital again because of an acute deterioration of his state. He was given a drop infusion and artificial respiration was carried out. After 12 and about 18 hours after the bite, 10 ml of African snake serum were injected again besides the daily injection of 5 mg Decortin H which was given intravenously. 28 hours after the bite the patient suddenly died from heart failure and respiratory paralysis.

The 3 cases reported have the following in common:

1. The patients bitten though handling poisonous snakes every day were not sufficiently informed about the danger of a snake bite.
2. They did not possess a specific antivenom.
3. Even the doctors who had to carry out the treatment could only apply the antivenom — if at all — too late.

After this exposition of the snake bite situation in Germany kindly allow me to give you some details about the treatment of snake bites usually carried out in Germany.

The treatment is divided into first aid measures and the definite therapy including the application of antivenom.

First aid measures are fairly well known to doctors and laypeople. The application of a tourniquet and absolute immobilization of the bitten limb is a measure everybody seems to know. Incision, suction, and sometimes cooling the bitten area is done in most cases. Sometimes bleeding from the bitten area is allowed. In order to stimulate the patient's blood circulation coffee or tea is administered to the bitten person. Whenever a person is bitten by an adder in Germany specific antivenom is readily available at many chemist's, usually as polyvalent serum of the "Europe"-type, produced by the Behring Werke. This antivenom may be injected by the doctor administering first aid when immediate transportation to a hospital is not thought necessary. It is interesting to note that surgeons usually make incisions in order to open the bitten area, whereas internal specialists commonly prefer the more conservative treatment without the surgical knife.

From my own experience with tropical snake bites as well as adder bites in Germany I must confess that I have never seen advantages of the incision therapy. On the contrary, there were more disadvantages because of delayed healing and heavy scars in the incision area.

Chemical neutralization of the snake venom or burning out the wounds is no longer part of the snake bite treatment in Germany. Unfortunately there is still the practice of spraying potassium permanganate solution into the fang marks, though this treatment is ineffective or even harmful. Cryotherapy is of no importance in Germany. Besides the nonspecific therapy the administration of antivenoms is the treatment generally chosen even in cases of adder bites. According to the seriousness of the case — concerning age and health of the patient, and taking the locality and the symptoms of the bite into consideration — 10 to 20 ml are injected, partly locally, partly intramuscularily or even intravenously. In order to avoid allergic reactions serum tests are always recommended. 20 up to 30 ml, at the most, of antivenom have proved to be sufficient in cases of adder bites. There is not one case report in the literature available to me, where larger doses were used. Since the first publications about using corticosteroids in the

treatment of snake bites (Metts, 1951; Hoback & Green, 1953) providing good results this treatment has found its way into Germany being tried increasingly.

Besides the specific therapy with antivenom and antihistamines treatment with corticosteroids is regarded to be the most effective one. In the German medical literature Haas, Hartmann & Wündisch, and Lieske have published successful treatment of snake bites using corticosteroids. These authors strongly suggest a combined treatment of snake bites administering antivenom and cortisteroids, although they have not had a chance, so far, to use the combined treatment with more than half a dozen patients. Haas has given a review of the literature dealing with the use of corticosteroids and after detailed research comes to the conclusion that the treatment with corticosteroids can only be efficient, if the drug is administered in time and in sufficient quantities. 100 up to 400 mg intravenously or intramuscularily injected seem to be helpful in the treatment of bites from Elapides, Viperides, and Crotalides.

While Benyajati and col. in Thailand observed, in 1961, that even after application of 100 mg of hydrocortisone only patients already seemed to be responding to the treatment, whereas patients who had been given little or no antivenom were in a deep coma with respiration difficulties, the injection of 5 mg Decortin H daily or 40 mg of Urbason four times a day did not rescue the patients in Germany, who were bitten by a cobra.

In Scandinavia Tallqvist and col., in 1961, out of 163 adder bites treated 11% with antivenom and cortisone, and 8% with cortisone only and even then saw favourable results.

The fatality of the bites from tropical snakes in Germany during the last few years only results from the total lack, or the delayed injection, of a sufficient dose of antivenom, as the 3 cases of fatal cobra bites clearly demonstrate. This is partly due to commercial reasons: The antivenoms are expensive, they have a limited durability, and bites are rare.

The fatal snake bite cases in mind it has been discussed in Germany that owners or keepers of exotic snakes should be forced by law to have the specific antivenom at hand, but the government has not reacted to these suggestions yet.

Nowadays there are only a few leaflets issued by the Behring Werke or notifications in the medical press from time to time making known to the public where snake bite antivenoms are available in Germany, when snake bite accidents occur.

Of course there is a nonspecific treatment besides the combined antivenom-corticosteroid therapy. Salt solutions, plasma and blood infusions form a helpful measure in fighting the collapse or shock syndrome. Prophylactic measures against secondary infection, such as tetanus and gas-gangrene, are usually carried out. To avoid the fatal respiratory paralysis in cases where neurotoxic venoms have been inoculated, internal specialists, surgeons, and specialists for anaesthesia should cooperate in applying artificial respiration if necessary. In Germany iron lung therapy has not been used yet.

May I draw these final conclusions:

1. Bites by the native German adder do not bring forth serious problems. Treatment is easy and even without antivenom there are hardly fatal cases.

2. Bites from imported exotic poisonous snakes are highly dangerous and should be treated immediately with specific antivenom and corticosteroids.

3. Lethality after exotic snake bites is significantly higher than after native adder bites, the reasons being both the ignorance about the dangerousness of exotic snakes and the impossibility to get hold of the specific antivenom in cases of emergency.

4. Increasing imports of exotic snakes and more frequent travelling to the tropics are compelling German doctors to look into the problems of poisonous snake bites and develop a keen interest in the best treament.

TREATMENT OF ADDER BITES IN GERMANY

Author		Kellner	Lieske	Tropenkranken-haus *
Number of cases		10	8	8
First aid measures	Tourniquet	4	4	1
	Suction	2	1	1
	Incision	0	2	0
Medical treatment and therapy during hospitalization	Incision	10	1	0
	Antivenom locally	3	2	3
	Antivenom intramusc.	6	7	7
	Antivenom intraven.	4	0	1
	Corticosteroids	0	1	1
	Antihistamines	0	3	4
	Antibiotics	5	1	1
	Tet.-prophyl.	2	2	3
	Additional therapy	cognac, splint	glucose sympatol, splint	Periston, splint, Stroph.

* Not yet published.

DISTRIBUTION OF ADDER BITES IN GERMANY

Author		Kellner	Lieske	Tropenkranken-haus *
Number of cases		10	8	8
Children up to 16 years of age		4	6	1
Localization of bite	hand	8	7	5
	foot	2	1	3
Time of bite (month)	May	?	3	3
	June	?	1	0
	July	?	4	1
	August	?	0	4

* Not yet published.

FATAL COBRA (*Naja naja*) BITES IN GERMANY

Year	1956	1962	1963
Profession	showman	animal keeper	snake farm owner
Localization of bite	right forefinger	right forefinger	left forefinger
Type and quantity of antivenom injected	1) outdate Cobra antivenom 10 ml i.m. loc. 2) poliv. Europ.-Medit. antivenom 10 ml i.m.	1) Europ.-Medit. antivenom 20 ml i.v. 2) poliv.-Afric. antivenom 30 ml i.v. 3) poliv. Cobra antivenom 60 ml i.v.	1) African antivenom 10 ml i.m. 2) African antivenom 10 ml i.m. 3) African antivenom 40 ml i.m.
Time between bite and antivenom treatment	1) 1½ h 2) 3¾ h —	1) 15 min. 2) 1½ h 3) 5 h	1) 1 h 2) 12 h 3) 18 h
Corticosteroids	No	every 4 h 40 mg = 160 mg	5 mg daily = 10 mg
Antihistamines	No	No	Yes
Additional therap. measures	Oxygen, vasopressors	artif. respiration, gamma globulin, Ringer sol., blood	artif. resp., infus.
Hospitalization	No	Yes	Yes
Time between bite and death	6 h 10 m	17 h	28 h
Cause of death	respirat. paralys	respirat. paralysis	respirat. paralysis

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Discussion

P. J. Deoras: "Können bei Bissverletzungen in Deutchland mit tropischen Giftschlangen nicht polyvalente Seren verwendet werden?"

H. Lieske: "Da es sich bei tropischen Giftschlangenbissen immer um dem Opfer bekannte Giftschlangen handelt, ist natürlich monovalentes dem polyvalenten Serum vorzuziehen, falls solches vorhanden ist. Hinsichtlich der deutschen Antiseren kann Ihnen auch Dr. Zwisler von den Behringswerken Auskunft geben."

O. Zwisler: "Antisera produced by the Behringswerke AG, Germany, are polyspecific and direct against *Crotalus* and *Bothrops* species."

H. Pesce: "En los casos en que no se dispone de suero antiofídico específico, se ha aplicado con éxito en Iran el "Periston-N" polivinílico de la Bayer, en perfusión intravenosa, 500 cm.? ¿Que experiencia hay en Alemania?"

H. Lieske: "Periston-N (Bayer) ist in Deutschland bei Giftschlangenbissen bisher wenig verwendet worden. Über gute Erfahrungen zur Behandlung haemolytischer Vorgänge berichtet jedoch Hentsch aus Indonesien, der bis zu 2 Mal tgl. 500 ml. intravenös als Schnelltropf (45-60 Tropfen pro Min.) gab."