

Three cases of severe neurotoxicity after cobra bite (*Naja kaouthia*)

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Snakebites represent a health-care problem in Africa and Asia [1, 2]. In Africa, for example, snakes are responsible for hundreds of deaths each year and thousands of cases of permanent physical handicap [2].

In Switzerland, venomous snakes enjoy a growing popularity as domestic animals. For that reason the number of cases of illnesses caused by snake bites is rising [3]. We report on three patients with severe neurotoxic symptoms of poisoning after a bite by the Thai cobra *Naja kaouthia* (Figure 1). In 1964,

an investigation of 47 patients bitten by Malayan cobra *Naja naja* subspecies observed the occurrence of neurotoxic symptoms in only 4 of the 47 cases [4]; whereas a study in 1986 showed 14 of 24 cases exhibited neurologic deficiencies after a bite by the Thai cobra *Naja kaouthia*. An ELISA test detected the presence of *Naja kaouthia* poison antigen in the serum of 22 of these Thai victims [5]. In both publications mentioned all patients who exhibited a local necrosis at the area of the bite wound developed signs of neurotoxicity.

Our three patients were all hospitalised as emergencies and monitored in the intensive care unit. The time interval between the snake bite and the first detectable neurologic symptoms varied from a few minutes to four

hours (Table 1). All patients had a local inflammation and a swelling around the bite wound (Figure 2); laboratory findings documented an elevation of inflammatory parameters.

Patients 1 and 3 exhibited ptosis, dysphagia, dysarthria, and somnolence after four and two hours respectively. One of them had to be intubated and ventilated mechanically because of a respiratory insufficiency resulting from an increasingly shallow breathing. Patient 2 developed signs of anaphylactic shock a few minutes after the snake bite. During the transport to the hospital a cardiac arrest occurred. The patient was successfully resuscitated, intubated and ventilated mechanically. In this case (Patient 2, Table 1) it was impossible to assess how far the life threatening symptoms were neurotoxic or rather allergic, or both. The two patients who required intubation received a treatment with a *Naja kaouthia* specific monovalent antivenom (Thai Red Cross Society, Queen Saovabha Memorial Institute [QSMI], Bangkok).

In one case the course was complicated by a phlegmona of the hand that made surgical debridement necessary. The isolated germ was *Morganella morganii*, a bacterium naturally resistant to amoxicillin/clavulanic acid [6] and frequently detected in the flora of a snake's mouth [7]. In the patient who had the anaphylactic shock at the initial phase, extubation was delayed despite regained consciousness and spontaneous breathing activity because of an extensive swelling of the tongue and the pharyngeal area. The third patient developed a deep vein thrombosis. All our patients recovered completely without further sequelae.



Figure 1

Photograph of *Naja kaouthia* taken by Patient 3 immediately before he was bitten.



Figure 2

Bite wound of Patient 2; note the necrosis around the bite site.

Conclusions

According to the course of our three cases and the recommendations documented in the literature [1], we propose the following procedure in case of a cobra bite.

Every cobra-bite incident demands hospitalisation of the victim for at least 12 to 24 hours even if poisoning symptoms are not apparent at initial presentation. The involved snake has to be identified as precisely as possible and classified with the scientific terms of the species and subspecies. Thereafter, a professional institution for the management of snake bites should be consulted to get further

assistance (in Switzerland the *Schweizerisches Tox-Zentrum*, phone number: 041 / 251 51 51; or the *Tropeninstitut Basel*, phone number: 061 / 284 82 55).

If local signs occur, e.g. swelling around the bite wound, necrosis at the bite site (see Figure 2), monitoring in the intensive care unit is required and a specific antivenom should be obtained, because neurotoxicity has to be expected [4]. Any applied tourniquet or pressure dressing should be removed in a controlled manner (released by 10 mm Hg every 15 minutes) in intensive care setting only,

since this procedure can provoke a dangerous systemic influx of venom. In case of neurotoxic symptoms, e.g. ptosis, dysphagia or respiratory failure, administration of a specific antivenom is required. The initial dose should amount to a minimum of 5 vials, corresponding to 50 ml of antivenom. The administration can be repeated. The use of 0.25 ml of 1:1000 adrenaline given subcutaneously immediately before the injection of antivenom serum reduces the incidence of acute adverse reactions to the serum [8]. Additional treatment with 100 mg of intravenous hydrocorti-

Table 1

Features of the three cases bitten by Thai cobra *Naja kaouthia*.

age / gender	Patient 1; 22 years old, male	Patient 2; 39 years old, male	Patient 3; 47 years old, male
bite site	middle finger of the right hand	right retroauricular area of the head (Figure 2)	forefinger of the left hand
<i>clinical features</i>			
local reaction	necrosis at the wound area, swelling of the right arm	small necrosis at the bite site, slight oedema of the wound area	serious swelling of the back of the left hand
time interval bite – first neurologic symptoms	4 hours	3 minutes	2 hours
neurological symptoms, systemic reactions	hazy sight, ptosis, dysarthria, dysphagia, dysaesthesia, somnolence, respiratory insufficiency and intubation 7 hours after the snake bite; mechanical ventilation for 24 hours	Quincke's oedema, hypotonia, cardiac arrest; reanimation 20 minutes after the snake bite, intubation after 30 minutes, and mechanical ventilation for 4 days. In this case the contribution of neurotoxicity could not be assessed.	nausea, perioral dysaesthesia, ptosis, dysarthria, somnolence; no mechanical ventilation
<i>therapy</i>			
local	wound drainage by suction/extraction, application of a pressure dressing at the scene	no local therapy	suction/extraction at the scene, application of a pressure dressing
systemic	50 ml of monovalent antivenom (QSMI, Bangkok) intravenously over 80 min, 9 hours after the snake bite and after administration of 0.25 mg of adrenaline 1:1000 subcutaneously antibiotic prophylaxis with amoxicillin/clavulanic acid	50 ml of monovalent antivenom i.v. 3 hours 20 minutes after the snake bite (after administration of 0.25 mg of adrenaline 1:1000 s.c.) another 50 ml of monovalent antivenom 17 hours after the first application (because of persisting comatous state) antibiotic prophylaxis with amoxicillin/clavulanic acid and ciprofloxacin	no specific systemic treatment antibiotic prophylaxis with amoxicillin/clavulanic acid and ciprofloxacin
complications	phlegmona of the hand (<i>Morganella morganii</i> , naturally resistant to amoxicillin/clavulanic acid) Surgical debridement and antibiotic therapy with ciprofloxacin	initial anaphylactic shock prolonged swelling of the tongue and the pharyngeal area (delayed extubation)	deep venous thrombosis of the right leg
duration of hospital stay	11 days	9 days	5 days
outcome	<i>Restitutio ad integrum</i> , no serum sickness	<i>Restitutio ad integrum</i>	<i>Restitutio ad integrum</i>

sone and an intravenously applied antihistaminic drug is recommended if hypersensitivity to the antivenom is expected. Prophylactic antibiotic treatment is controversial [9]. Early administration of antibiotics is probably indicated when a snake bite is located in sensitive tissues, e.g. the hand, or when oedema occurs rapidly [3]. It should cover a broad gram-positive and gram-negative aro-

bic and anaerobic spectrum [3], including the amoxicillin/clavulanic acid resistant germ *Morganella morganii* [6]. Thus, a combination of amoxicillin/clavulanic acid with ciprofloxacin can be suggested. Every bite wound has to be examined by an experienced surgeon because progressive swelling and necrosis may complicate the course and possibly require surgical debridement.

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