



## ANTIBIOTIC USE AND INFECTION IN SNAKEBITE VICTIMS

R S Blaylock

**Objectives.** To determine the incidence of infection in snakebite patients, the bacterial species involved, and the indication for antibiotics.

**Method.** A prospective trial was undertaken at Eshowe Hospital, KwaZulu-Natal, involving 363 snakebite patients (records available for 310 patients). It was protocol not to give antibiotics unless necrosis was present or anticipated. Bacterial species were identified from necrotic areas and abscesses. A swelling classification was devised.

**Results.** The syndromic presentation included no clinical envenomation (12%), painful swelling (85%), weakness (1.8%), venom ophthalmia (0.6%) and other presentations (0.6%). There was 1 death, of an 11-year-old with gross swelling and thrombocytopenia. 15.2% of patients received antibiotics. Protocol was broken in 23 patients. None of the patients who did not receive an antibiotic became infected, and hospital stay was not prolonged in this group. Of 20 bacteria isolated, 18 were Gram-negative aerobic enterobacteriaceae. No anaerobes were cultured.

**Conclusions.** Antibiotics should be reserved for those snakebite patients with necrosis (< 10%) and should cover Gram-negative aerobic bacilli and Gram-positive aerobic cocci.

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Routine use of antibiotics in the treatment of snakebites is controversial, except when gangrene is present.<sup>1,6</sup> For this reason, a prospective trial was undertaken at Eshowe Hospital in KwaZulu-Natal on antibiotic usage in the treatment of snakebites. Bacteria from infected cases were identified.

### MATERIAL AND METHODS

During the period January 1990 to June 1993, 363 patients with snakebites were admitted to Eshowe Hospital in KwaZulu-Natal. Three hundred and ten were available on antibiotic usage. It was protocol not to give antibiotics to snakebite patients unless gross swelling was present, or there was necrosis or an abscess.

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Syndromic presentation of these cases included no clinical envenomation (12%), painful swelling (85%), weakness (1.8%), venom ophthalmia (0.6%) and other presentations (0.6%).

Most bites (85.6%) occurred on a distal extremity (foot and ankle 72.7%, hand 12.9%). There was one death, which occurred in the swelling group. As swelling is by far the most common presentation of snakebite in this region, and since most bites occur on a distal extremity, a swelling classification was devised as follows (see Table I): (i) minimal swelling — local swelling at the bite site; (ii) mild swelling — swelling involving a whole hand or foot; (iii) moderate swelling — swelling from a foot to the proximal thigh, or from a hand to the shoulder; (iv) severe swelling — swelling to the groin or ipsilateral chest wall, from a foot or hand bite respectively; and (v) gross swelling — swelling to the trunk from a foot bite, or to the contralateral chest, neck or abdomen from a hand bite.

If the bite is not on a hand or foot, an equivalent amount of swelling can be estimated.

Abscesses, haematomas or necrotic areas were swabbed only if closed, and at the time of surgery. These swabs were submitted to the hospital laboratory for aerobic and anaerobic bacterial cultures. Antibiotics, when given, were commenced soon after admission, or peri-operatively.

### RESULTS

#### No clinical envenomation group

Thirty-seven patients received no antibiotics and were discharged, on average, at 2.5 days (day 1 being the day of the bite). Two patients were inadvertently given antibiotics and they too were discharged at 2.5 days.

#### Weakness group

There were 6 patients in this group, discharged on average at 3.2 days. No patient was given antibiotics. Two patients were ventilated, 1 was intubated without ventilation, 2 responded to intravenous antivenom and 1 patient responded to sympathy alone.

#### Swelling group (Table I)

There was 1 death (not included in Table I). A child of 11 years with gross swelling was submitted to fasciotomy in the presence of thrombocytopenia. He died on day 4 with a haemoglobin of 2 g/dl in spite of transfusion of 13 units of freeze-dried plasma and 10 units of blood (platelets were unavailable).

#### Bacteria cultured from snakebite patients (Table II)

Fourteen closed necrotic areas, abscesses or haematomas were swabbed at the time of surgery. Open necrotic areas, draining abscesses and haematomas were not swabbed in view of possible secondary bacterial contamination. At surgery pus was



Table I. Severity of swelling among patients (N = 265)

	Swelling severity				
	Minimal	Mild	Moderate	Severe	Gross
No. of patients (total 265)	30	94	118	15	8
Days in hospital (No. of patients)					
No antibiotics (no necrosis/ abscess)	3.6 (26)	4 (75)	5.7 (93)	7.5 (11)	17.7 (3)
No antibiotics (necrosis/ abscess)	—	9 (2)	21 (9)	—	15 (1)
Antibiotics given (for necrosis/ abscess)	—	5 (1)	39.9 (8)	40.8 (4)	68.3 (4)
Antibiotics inadvertently given	4.3 (3)	5 (14)	5.2 (6)	—	—
Antibiotics given for coincidental disease	6 (1)	9.5 (2)	10 (2)	—	—

Table II. Bacteria cultured from snakebite patients

Patient No.	Snake	Bacteria
1	Unknown	<i>Proteus</i> spp.
2	Unknown	<i>Proteus</i> spp.
3	Unknown	<i>Serratia</i> spp.
4	Unknown	<i>Morganella morganii</i>
5	Unknown	<i>Morganella morganii</i>
6	Unknown	<i>Morganella morganii</i>
		<i>Enterobacter agglomerans</i>
7	Unknown	<i>Staphylococcus</i> spp.
		<i>Escherichia coli</i>
8	Unknown	<i>Serratia liquifasciens</i>
9	Unknown	<i>Citrobacter diversus</i>
		<i>Escherichia coli</i>
10	Unknown	<i>Citrobacter diversus</i>
		<i>Proteus</i> spp.
11	<i>Atractaspis bibronii</i>	<i>Proteus</i> spp.
		<i>Morganella morganii</i>
12	<i>Naja mossambica</i>	<i>Salmonella arizonae</i>
13	<i>Naja mossambica</i>	<i>Citrobacter freundii</i>
14	<i>Naja mossambica</i>	<i>Serratia liquefaciens</i>
		<i>Streptococcus</i> group A

odourless in all cases, as opposed to the foul-smelling pus of anaerobic sepsis.

## DISCUSSION

Antibiotics were not given to 263 of the 310 patients (84.8%). They were, however, prescribed for 5 patients with coincidental infections (septic scabies, pneumonia), for 17 patients with necrosis or an abscess, and for 23 patients where the protocol was not observed. Antibiotics were not prescribed for 12 patients with either an abscess or necrosis.

The absence of antibiotic usage in 37 of 39 patients without clinical envenomation did not prolong hospital stay.

The average length of stay in the 6 patients presenting with weakness was 3.2 days, despite 2 patients being ventilated and

the non-use of antibiotics. Hospital stay in these patients may have been longer if antibiotics had been prescribed because the course may have been completed in hospital.

The swelling group of patients (265) was the most interesting since they presented with signs normally associated with bacterial infections, namely swelling, heat, tenderness, regional lymphadenopathy, pyrexia and raised white cell counts. However this inflammation is toxin- and not bacterial infection-mediated. In the minimal, mild and moderate swelling categories, there was no difference in the length of hospitalisation for patients without necrosis or an abscess who were not given antibiotics, and those who were inadvertently given antibiotics.

Patients in the gross swelling category group were often very sick with an increased incidence of necrosis, compartment syndromes and thrombocytopenia, and required blood transfusion. Four of 8 patients in this category without necrosis did not receive antibiotics and survived, with relatively short hospital stays of 17 days as opposed to 68.3 days for the necrosis and antibiotic group.

None of the patients without necrosis and who were not given antibiotics developed significant infection.

Bacteria isolated from the infected cases were similar to those isolated from other snakebite cases where the author was involved. (Table III). Furthermore, these bacterial species were identical to South African snake mouth flora (RSM Blaylock — unpublished data).

These results, suggesting reduced antibiotic use in treatment of snakebite, are supported by authors elsewhere. For example, antibiotics are not indicated for adder bite poisoning in the UK,<sup>2</sup> prophylactic antibiotics have been found to be unnecessary in treating non-venomous snakebite in Massachusetts,<sup>3</sup> and the prophylactic use of antibiotics in crotalid envenomation is not recommended.<sup>4,5</sup> Theakston *et al.*<sup>6</sup> suggest that secondary bacterial infection is an important complication of Malayan pit viper bites, especially if necrotic. A combination of gentamicin and benzyl penicillin was recommended.



Table III. Bacteria cultured from other snakebite victims

Snake	Bacteria
<i>Naja mossambica</i> (Pretoria)	Patient 1
	<i>Proteus vulgaris</i>
	<i>Staphylococcus aureus</i> necrosis
<i>Naja mossambica</i> (Swaziland)	Patient 2
	<i>Streptococcus group D</i> necrosis
	<i>Staphylococcus aureus</i>
<i>Bitis arietans</i> (Carletonville)	<i>Providentia</i> spp. necrosis
<i>Causus rhombeatus</i> (Eshowe)	Closed blister over necrosis
<i>Naja nivea</i> (Cape Town)	No growth
	No growth from blister fluid
	Normal skin flora from small abscess

It is suggested that antibiotics be used to treat southern African snakebites if there is necrosis or an abscess (9.4%), and only if deemed necessary.

There is no rush in the administration of antibiotics since the organisms involved are generally of low pathogenicity, and small in number. Necrosis can be anticipated by the development of a blister (necrosis not invariable with adders and stiletto snakes), or a dark discolouration at the bite site, (necrosis invariable with cobras and rinkhals). Antibiotics may be reserved for peri-operative use only.

If antibiotics are used, it is suggested that Gram-negative aerobic enterobacteriaceae and *Staphylococcus* spp. must be covered. Which antibiotic is used is dependent on what is available, and how ill the patient is.

Before culture and sensitivity results, a combination of penicillin or ampicillin plus gentamicin would be reasonable.

Administration of tetanus toxoid is dependent on the immune status of the patient. There is not recorded case of tetanus following a southern African snakebite, but it has been recorded elsewhere.<sup>6</sup>

It is suggested that sepsis without necrosis or a haematoma following a snakebite in southern Africa is rare because of the low numbers of bacteria in snake mouths, their relatively low pathogenicity, and the antibacterial properties of snake venom (RSM Blaylock — unpublished data).

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#### References

1. Blaylock RSM. The treatment of snakebite in Zimbabwe. *Cent Afr J Med* 1982; 28: 237-246.
2. Reid HA. Adder bites in Britain. *BMJ* 1976 2: 153-156.
3. Weed HG. Nonvenomous snakebite in Massachusetts: Prophylactic antibiotics are unnecessary. *Ann Emerg Med* 1993; 22: 220-224.
4. Clark RF, Selden BS, Furbee B. The incidence of wound infection following crocrotid envenomation. *J Emerg Med* 1993; 11: 583-586.

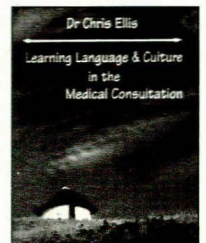
5. Kerrigan KR, Mertz BL, Nelson SJ, Dye JD. Antibiotic prophylaxis for pit viper envenomation: Prospective controlled trial. *World J Surg* 1997; 21: 369-373.
6. Theakston RDG, Phillips RE, Looareesuwan S, Echeverria P, Makin T, Warrell DA. Bacteriological studies of the venom and mouth cavities of wild Malayan pit vipers (*Calloselasma rhodostoma*) in southern Thailand. *Trans R Soc Trop Med Hyg* 1990; 84: 875-879.

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