

SNAKEBITE: MANAGEMENT CONTROVERSIES

Abstract

In rural areas where venomous snakes are common, dealing with snakebite is important. However, the definitive treatment of snakebite is a subject of much controversy. The literature is contradictory and anecdotal with conclusions being drawn from animal experiments and uncontrolled clinical trials. Five such controversial issues likely to confront the rural doctor are explored.

1. Four types of tourniquet have been utilised to retard the absorption of venom with proponents both for and against their use. They have proved both beneficial and ineffectual after bites.
2. Controversy also exists regarding the use of snake anti-venom for cytotoxic snakebites. Those favouring pre-necrotic surgical excision believe that anti-venom is ineffective in preventing local tissue necrosis due to the limited local bio-availability of anti-venom.
3. The use of routine antibiotics in snakebite injuries is also obscure. Those advocating early antimicrobial therapy recommend antibiotics to cover the mixed oral flora of snakes.
4. Guidelines for the treatment of children are lacking. In addition, the dose of anti-venom to be administered to children is subject to controversy.
5. Finally, management of the gravid victim remains controversial and little is known about the effects of snake venom on the foetus and pregnancy. Research to resolve such controversies will positively contribute to a dramatic fall in mortality and morbidity from snakebites.

Tourniquets

Tourniquet use for snakebites is controversial¹. Various tourniquets have been utilised to retard the absorption of venom. While arterial ligatures have proved life-saving in cases of neurotoxic snakebite, ischaemic necrosis and gangrene are potential complications. Restoration of circulation when the tourniquet is released may produce post-ischaemic swelling and reperfusion injury with further distal limb injury.

The sudden release of neurotoxins into the circulation may also result in the rapid onset of neurotoxic effects and respiratory arrest. Venous tourniquets have unfortunately proved both beneficial and ineffectual in delaying neurotoxicity after snakebites. Pressure immobilisation (PI) has proven effective in limiting the absorption of venom. This is accomplished by applying a crepe bandage over the bite and extending it proximally over the limb, which is immobilised with a splint. The bandage, applied tightly (about 55mmHg), obstructs lymphatic and capillary flow at the bite site. PI is best avoided in cases of cytotoxic snakebite and doubt exists about its efficacy in mamba bites where venom is absorbed directly into the circulation.

Furthermore, immobilisation has to be absolute to prevent lymph flow. Therefore walking will reduce the effectiveness of PI after upper or lower limb envenomation. Also, if the bandages are too tight (over 70mmHg) lymph flow is promoted, a likely scenario with advancing oedema.

The so-called Monash tourniquet method, where a firm cloth pad applied over the bite site is held in place by bandages, provides greater local pressure to the bite site. This only devascularises the subcutaneous tissue directly under the pad. Compared to PI this method is far more effective in retarding the uptake of venom. Immobilisation of the affected part is also omitted.

Cytotoxic snakebite

Controversy exists regarding the use of anti-venom for cytotoxic snakebites². Those favouring anti-venom feel that surgical intervention is more deleterious than the bite itself. Advocates of elective pre-necrotic surgical excision believe that serotherapy is complicated by allergic reactions and that it is ineffective in preventing

Type of snake	Anti-venom given (ml)	Outcome	
		Maternal	Foetal
Viper	10	Good	Good
Unknown	40	Good	Abortion
Viper		Good	Died
Unknown	60	Good	Good
Unknown	60	Good	Good
Unknown	40	Died*	Died
Viper	2	Good	Good
Viper		Good	Died
Unknown	20	Good	Good
Unknown	50	Good	Good
Viper	80	Good	Good
Unknown	90	Good	Abortion
Viper	120	Good	Abortion
Pseudonaja		Died**	Died
Viper		Anaphylaxis	Died
Viper	300	Good	Good
Viper		Good	Abortion
Viper		Good	Abortion
Viper		Good	Abortion

* Maternal death attributed to the delayed onset of treatment

** Maternal death due to the supine hypotensive syndrome of pregnancy

Table 1. Cases of pregnant snakebite victims and their outcome⁵

local tissue necrosis. Viper venom causes oedema and local extravasation of blood. Along with vascular congestion and coagulation in damaged blood vessels, this results in local vascular impairment. The aggravated ischaemia results in further oedema and necrosis, establishing a cycle of ischaemic damage that compounds the direct effects of venom and limits the local bio-availability of anti-venom.

Many authors found that serotherapy does not limit local tissue damage following cytotoxic snakebite, probably due to the fact that serum was administered too late to be effective. Unfortunately, in a clinical setting delays in treatment are inevitable. Nevertheless, giving anti-venom late still has merit. Anti-venom for puff adder bites can be effective even when given 30 hours after the bite. Apart from limiting swelling and counteracting the direct nephrotoxic and cardiotoxic effects of viper venom, anti-venom will ameliorate the local coagulopathy. Circulating anti-venom will also neutralise residual venom when shock is corrected. The mainstay of treatment therefore appears to be the expeditious use of adequate amounts of anti-venom with surgery to follow when indicated.

Antibiotics

Secondary bacterial infection of snakebite wounds is an important complication. However, conflict exists regarding the indications for and usage of routine antibiotics in snakebite injuries³. There are proponents both for and against their routine use. Local effects of injected venom provide a favourable environment for bacterial growth, notably ensuing haematomas and necrotic wounds.

Indiscriminate or blind use of antibiotics is often discouraged because it may lead to superimposed infections with antibiotic-resistant organisms and undue hypersensitivity reactions. Where venom has been introduced into tissue, however, bacterial contamination is likely to have occurred already. Indeed, bacteria characteristic of the oral flora of snakes have been isolated from abscesses, necrotic wounds and blisters resulting from snakebite. Empiric antibiotic therapy should therefore reflect the mixed oral flora of snakes, covering aerobic and anaerobic gram-positives and negatives. A short course of parenteral antibiotics including a high

dose of penicillin (or cephalosporin), an aminoglycoside and metronidazole should suffice. Once abscess formation occurs, surgical drainage is warranted. Infection will also be minimised by avoiding inappropriate methods of treatment which introduce micro-organisms and enhance tissue necrosis.

On account of the few reports of tetanus complicating snakebite, tetanus toxoid should be given. Evidently, controlled trials documenting the efficacy of antibiotics in decreasing the infectious complications of snakebite injuries are needed.

Paediatrics

Guidelines for the treatment of children are lacking⁴. This is problematic since snakebite affects children in numerous different ways. Not only is the incidence of snakebite much higher in children, but so too is morbidity and mortality. The clinical course in children is also more precipitous and exaggerated. The reason for the seriousness of snakebite in children is probably related to the fact that venom concentration for mass on the average is higher. This implies that children require more intensive treatment and should be treated as an absolute emergency.

Discharging children with suspected snakebite directly from casualty without a period of observation is also not recommended. Controversy exists over the dose of snake anti-venom to be administered to children. Some authorities declare that the amount of anti-venom to be given depends on the size of the patient. Others suggest that the dose of anti-venom should be the same for adults and children, and not calculated on a body weight basis. This is because the anti-venom will neutralise a given quantity of venom whether in a child or adult. In other words they are treating the amount of venom and not the size of the patient. There are some who believe that children actually require more anti-venom to neutralise the higher venom concentrations. Clinical evaluation of the situation is perhaps the best guide to adequate dosage.

Pregnancy

Management of the gravid victim remains controversial and little is known about the effects of snake venom on the foetus and pregnancy⁵. Venomous snakebite during pregnancy increases foetal loss and premature labour. Abortion may be as high as 43% following a snakebite (see Table I). Foetal outcome usually carries a poorer prognosis if envenomation occurs earlier in gestation.

A hypercoagulable state with depression of the fibrinolytic system already exists during pregnancy making the mother particularly susceptible to a consumption coagulopathy. Abruption placentae may further compound this problem. Venom crossing the placenta can cause systemic poisoning of the foetus without evidence of envenomation in the mother. Snake venom is also teratogenic. It is unclear whether venom acts directly and/or indirectly on the foetus.

Disintegrins represent a new class of peptides from snake venoms. By integrating with integrins (cytoadhesive receptors) they may interfere with normal embryonic development. Care in this situation must be rendered simultaneously to mother and foetus. The object of management is to optimise maternal care and increase the chances of successful pregnancy. Priorities for initial evaluation and resuscitation therefore should not differ from those of the non-pregnant patient.

The correct treatment of confirmed envenomation involves the administration of adequate anti-venom. Specific anti-venom effectively neutralises venom, stops venom-induced uterine contractions and encourages recovery of foetal distress within 24 hours of its administration. ●

References

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BOOK REVIEW • BOOK REVIEW • BOOK REVIEW

HANDBOOK OF DERMATOLOGY FOR PRIMARY CARE

by Norma Saxe, Susan Jessop and Gail Todd

Published by Oxford,
Southern Africa, Cape Town, 1997

Reviewed by Dr Beverley Schweitzer

We have a ritual at the Community Health Centre where I work concerning puzzling rashes — we phone a colleague in the next room and say the code “D’wanna come see a rash?”. Translated, it means: “I’ve never seen anything like this and haven’t a clue! Help!” I think that this book may be the help that we have been wanting for.

It is written by three experienced South African dermatologists for people working in Primary Care in South Africa. Professor Saxe is the head of the Department of Dermatology at the University of Cape Town. Her slide presentations to general practitioner groups are always in demand and have developed quite legendary proportions in the Western Cape.

For those family physicians who are also avid bird watchers, the vast collection of colour photographs makes it the “Sinclaires” of Dermatology. The identification process actually follows a similar route to bird identification too.

The introduction gives a very practical approach to the diagnosis of skin conditions which the authors have been teaching for many years. When faced with a skin condition that one does not immediately recognise, they suggest that one describe the rash. Most common skin conditions fall into one of six basic morphological groups: eczema, scaly papules and plaques, erythematous and purple lesions, papules and nodules, blistering diseases and altered pigmentation. Chapter One shows photos of conditions under these headings to facilitate a diagnosis.

Alternatively, or in addition, one can make a diagnosis based on the area of the body affected. The photos in Chapter Two are listed according to areas: scalp, face, lip and mouth, trunk, body folds, limbs, hands, feet and nails.

Having made the diagnosis, one then turns to Chapter Three, where conditions appear in alphabetical order and are discussed in more detail.

Further information around drug management is given in the formulary at the end of the book. This covers principles of topical therapy (such as which bases to use for which conditions and what quantities one needs to prescribe), acne therapies, antihistamines, topical steroids and — especially important from a preventive point of view — sun protection. The formulary also gives useful telephone numbers such as psoriasis associations around the country and places where one can get specific supplies such as cotton gloves. This is one of the many advantages of having a South African book.

The authors have managed, by being concise and avoiding rare conditions, to keep this in the real sense a handbook. The very clear photos, collected over 25 years, enable the authors to prove the adage that a picture is worth a thousand words. The clear layout of the book, aided by colour-coding the pages, the quality binding and plasticised cover make the book very pleasant to use.

For a quick revision one can page through the book in two to three hours. I was pleased to recognise a condition which I had been unable to diagnose in a patient. Now, knowing he has keloid acne, I can save him a trip to the dermatologist. I believe that this book will improve the standard of dermatology practiced in primary care. It will be extremely useful to undergraduate students and practising doctors and nurses.

Thanks to sponsorship by Janssen-Cilag, the publishers are able to sell the book for far less than one would normally pay for a full colour illustrated textbook. The price of R129 makes it excellent value for money. ●