

# First aid for snakebite in PNG

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## Introduction

Many victims of snakebite are not seen at an aid post or rural health centre until many hours after they were bitten by the snake. During this time the snake venom has been able to infiltrate their bodies and spread to reach many of the sites where the toxins exert their deadly effects. One of the factors that contribute to the poor outcomes, such as prolonged hospitalisation on expensive ventilators and high mortality rates that we see after snakebite in Papua New Guinea, is the fact that, by the time they present for treatment, many patients have already developed serious signs and symptoms of envenomation.

The majority of snakebite patients make no attempt at any form of first aid to slow the absorption and spread of the snake venom. Those who do often use potentially dangerous and/or completely ineffective first aid treatments that have no clinical benefits. The consequence is that, by the time the patient presents for treatment, they may already have developed irreversible neurotoxicity and other problems such as coagulopathy or myotoxicity. These are medical problems that challenge the abilities of even highly trained emergency physicians with the benefits of properly equipped high dependency and intensive care facilities at their disposal. In our rural PNG situations, where the resources and skills are far less developed, we face very serious difficulties in successfully treating such patients.

The use of correct first aid immediately after snakebite has the potential to significantly delay the development of systemic envenomation. This can improve the chances of survival a great deal. Unfortunately, very few snakebite patients arrive at an aid post, health centre or hospital with appropriately applied, correct first aid having been applied, although this is starting to change in some districts thanks to public education work by some health workers and snakebite researchers.

We as health workers must be proactive in the teaching of safe, efficacious snakebite first aid to the people in the communities that we serve if we want to reduce the burden that this very serious problem places on our medical and health resources, and more importantly, to save lives. Going out into our communities, into schools, marketplaces, and other places where people gather to teach them how to apply proper first aid after a snakebite, and how they should care for the patient before arrival at the health facility, should be an important part of our village and community health promotion efforts.

This chapter of the Handbook discusses some of the very different types of first aid that Papuan New Guinean people use to treat snakebites and explains why most of them are ineffective, unsafe or just plain dangerous. It will also explain the rationale and reasoning behind the current medically endorsed snakebite first aid technique; the use of simple compression bandages and immobilisation of the patient.

## Important principles of first aid for snakebite

The most important things to remember about first aid are that the method used must be able to be applied with **SPEED**:

- **SAFE** It must not be harmful or cause injury to the patient.
- **PRACTICAL** It should be practical and appropriate to the situations in which it is most likely to be needed, and the materials should be easily accessible.
- **EFFECTIVE** It should be effective in reducing the risks of long term illness or death after snakebite.
- **EASY** The method should be easy to teach to unskilled users and should be easy to apply to the patient by unskilled users.
- **DISTINCTIVE** The method should be easily associated with the treatment of snakebite so that it is remembered by the people who may need to use it.

Unfortunately, many of the first aid methods that are commonly used to treat snakebites in Papua New Guinea do not meet all five of these important criteria. Some of the first aid ‘treatments’ administered by well-meaning friends and family members are actually more dangerous to the patient than the snakebite itself, while others based on local traditional beliefs, or the beliefs of outsiders, simply do not work at all.

## Different types of first aid for snakebite

Many different types of first aid have been proposed for either delaying or preventing the activity of the injected snake venom. First aid treatments tend to be traditional and to have been handed down as a part of a local pharmacopeia over many generations. Many Papua New Guinean communities have their own local treatments for snakebite, and with the arrival in the country of outsiders of European, Asian and African descent, several new treatments, in the traditions of these newcomers, have been introduced.

Most Papua New Guinean snakebite treatments are offered as cures rather than as first aid, and these may include:

- The use of natural substances such as plants, fungi and animal materials.
- Reversing the effects of sorcery, witchcraft and curses placed on the victim by a living enemy or the spirit of a relative or other being.
- Bleeding the victim using a sharpened stick or blade, or cauterising with a heated knife.

In traditional Papua New Guinean culture, snakebite is often due to the spirits of dead ancestors who may have been angered by some wrongdoing of the victim, or it may be caused by an evil spirit or mythological entity such as the *ove-hahu* of the Elema people in Gulf province. The treatment of snakebites caused in these ways is often very spiritually based.

Colonial European settlers brought with them their own traditions for the treatment of snakebite which, while based more on the principles of medicine, also sometimes had their own elements of spiritual or supernatural involvement, often gained from colonial experience elsewhere in the world, such as in Africa or India. The ‘black stone’ brought to Papua New Guinea by early missionaries for instance, has been used widely in African cultures as a witchdoctors treatment for snakebites, but gained acceptance by religious workers who spread its use to other parts of the world. Other exotic treatments for snakebite have also been brought to PNG by immigrants and expatriate workers from Asia, India and Africa.

‘Imported’ first aid methods and treatments for snakebite include:

- Wound scarification (incising or excising the bite site) to remove venom by bleeding.
- Tourniquet and rope ligature use to delay systemic absorption of venom.
- Suction of venom from a wound either by mouth, vacuum pump, suction device or by ‘cupping’ with a heated glass container.
- The application of electrical current to the bitten area in the attempt to inactivate venom.
- Injecting the bite with potassium permanganate (Condy’s crystals).
- Application of the Belgian ‘black stone’ to attempt to absorb venom from the bite site.
- The use of traditional ‘Chinese’ herbal remedies or ‘snakebite pills’.
- Pressure immobilisation bandaging to delay venom uptake.

The actual efficacy of many of these techniques is extremely questionable. While some simply do not work, others are actually dangerous to the health and welfare of the snakebite patient.

### **Forms of first aid that are potentially dangerous**

While any attempt at first aid that does not work, or which delays access to appropriate medical care, should be considered potentially harmful rather than helpful, there are some methods of first aid treatment that are commonly used which are potentially very dangerous to the health and safety of the patient:

#### **Wound scarification**

Up until the late 1970’s it was commonly believed that wound scarification could be helpful in removing venom from the body of a victim of snakebite. It was believed that by bleeding the patient venom would be removed and the effects of the snakebite reduced.

Two basic techniques of scarification were in wide use in Australia, and were subsequently taught in PNG. These were the use of incision (cutting through the bite marks to promote bleeding) or excision (the pinching up of the skin around the bite and completely cutting out the piece of flesh). Although sterile scalpels or razor blades were the commonly suggested tools, the reality is that under actual field conditions people tend to be very ingenious and everything from broken glass, rusty pieces of tin cans, knives, wood-working chisels and gardening clippers have been used.

Incising or excising snakebite injuries is contraindicated by the following arguments:

- Many of the snakebites reported in PNG and elsewhere are caused by non-venomous snakes, and more harm is done by scarification than was caused by the actual snakebite.
- Venom is rarely injected directly into the bloodstream. In most cases it is injected into fat or muscle tissue and is taken up and spread by the lymphatic system. It is highly unlikely that venomous is effectively removed as a result of scarification.
- The powerful procoagulants in Papuan taipan (*Oxyuranus scutellatus canni*) and other PNG snake venoms produce severe consumption coagulopathy that can result in life-threatening haemorrhage. Cutting the bite site can result in serious blood loss that may be rapidly fatal.
- Serious local trauma to tendons, ligaments, blood vessels and musculature; people bitten by non-venomous snakes have suffered serious disfiguring injuries by having tendons cut during first aid. There is also a very high risk of secondary infection, including tetanus.

### **Tourniquet and ligature use**

The use of tourniquets or improvised ligatures in the treatment of snakebite remains common throughout the world, despite overwhelming evidence that indicates that these techniques are both ineffective for practical use, and potentially dangerous.

In Papua New Guinea the use of tourniquets was often advocated in conjunction with wound scarification by the colonial Australian population who were accustomed to this technique at home. In rural PNG, tourniquets are still used quite commonly and are often fashioned from a variety of materials including string/rope, wire, strong grass strands, bicycle inner tubes and packing straps. Many are incorrectly applied to lower limbs where they have even less clinical benefit than correctly applied upper limb tourniquets.

Tourniquets and ligatures can play an important role in the control of blood loss, and are used in situations such as accidental amputation where catastrophic haemorrhage may lead to sudden death. Their use in the treatment of snakebite employs a different strategy; rather than attempting to control haemorrhage the principle has been to prevent or delay the return of presumably venom-containing venous blood from the periphery to the heart.

Using a tourniquet or rope ligature to severely restrict venous return is potentially dangerous and has limited efficacy in the treatment of snakebite. The major factors contraindicating the use of tourniquets are:

- Limited efficacy; correctly applied, a tourniquet is placed on a single-boned part of a limb (thigh or upper arm) but must be released briefly every 20-30 minutes in order to relieve the venous pressure differential – the problem of course is that once released any venom that has been taken up in the blood by diffusion from tissue will be rapidly delivered to the systemic circulation.
- Local tissue injury can result from the failure to release a tourniquet or ligature. Harmful metabolites and waste gases that would normally be removed by kidney filtration or gas exchange in the lungs become localised and in conjunction with tissue hypoxia can lead to ischemic necrosis, gangrene and the loss of limbs through subsequent amputation.
- Prolonged tourniquet use is extremely uncomfortable and can be very painful.

### **Injection with potassium permanganate solutions**

Potassium permanganate (also called Condyl's crystals) was a common inclusion in many snakebite treatment kits during the 20<sup>th</sup> century. The injection of a weak solution of the chemical directly into the snakebite wounds was believed to inactivate the venom based on laboratory *in vitro* experiments that suggested this to be the case.

Contraindications to potassium permanganate use include:

- Absence of clinical evidence to demonstrate effective *in vivo* snake venom inactivation.
- The caustic nature of potassium permanganate and evidence that indicates that it may have harmful necrotic effects on tissue.

### **Treatment with electrical current**

Although the use of electricity to inactivate snake venom has been widely advocated in the Americas, its use in Papua New Guinea is uncommon. This is extremely fortunate, as in addition to strong medical and experimental evidence that shows electricity to have absolutely no effect on the toxicity of snake venoms, there is considerable danger of actual electrocution and death through the use of excessive electrical current.

### **Direct suction or the use of suction devices**

Anyone who has ever seen an old Western movie on the television will have seen the hero who comes to the rescue of the pretty girl bitten by a rattlesnake by quickly cutting open the wound with his trusty Bowie knife and then proceeding to use his mouth to suck away the venom...

We can only hope that our hero has no small abrasions, ulcers or gingival injuries inside his mouth, because if this were to be the case the chances are that he himself would probably be the snake's second victim! He might also doom the young lady to potential sepsis by introducing oral bacteria into the blood stream while he is sucking away at her lacerated arm.

In addition to these potential risks, suction has been shown to remove very little of the injected venom, even when specially designed suction devices and 'venom extractors' are used. During the Australian administration of PNG it was common to use heated glass containers that were placed over the bite site to create a vacuum that was believed to draw venom out of the body. In reality, all that was usually removed was a little blood or serum.

In general, suction is contraindicated because:

- Venom absorption in the oral cavity of the first aid provider may result in there being two snakebite victims instead of just one.
- Oral bacteria can be transferred into the wound and may cause secondary infection.
- Suction is ineffective at removing all of the injected venom, and the local stimulation caused by the application of suction may actually enhance the absorption of venom into the systemic circulation.
- Local burns can be caused by applying very hot glass containers to bite sites without first cooling the mouth of the bottle or glass.

### **Forms of first aid that are clinically ineffective**

The majority of other first aid techniques commonly used in PNG, while not directly dangerous to the patient, lack clinical efficacy and are likely to delay more appropriate treatment.

#### **'Chinese snakebite pills' and other Asian medicines**

Traditional Chinese medicine dates back many thousands of years, and there are many remedies based on natural Chinese pharmaceuticals that have been proven to have clinical benefit. This does not apply to all of the treatments offered by Chinese Herbalists and Pharmacists, and there is scant evidence to justify the use of Chinese snakebite cures. Many of the Chinese road construction workers who built the Bereina-Malalaua road in southern PNG were well supplied with these preparations and often gave them to local wantoks.

Among the substances that occasionally find their way into these 'medicines' are parts of certain snakes themselves, arthropods such as the *Wugong* (centipede), and various types of tree bark and other plants. Some of the plant materials in these medicines may themselves be potent toxins. Lobelia which is used in some Asian medicines to treat complaints such as asthma, kidney disease, cancer and snakebite is also very toxic and even quite small amounts can cause fatal overdoses. Preparations containing Echinacea, yellow dock, comfrey, white oak, valerian, senega snakeroot, garlic and many other herbal materials are often sold as 'snakebite pills'. Other than costing lots of money most of these 'medicines' are probably quite harmless; the real danger lies in the risk that the user may take them and remain at home, rather than taking steps to seek urgent medical attention at an aid post or health centre.

## The Belgian ‘black stone’

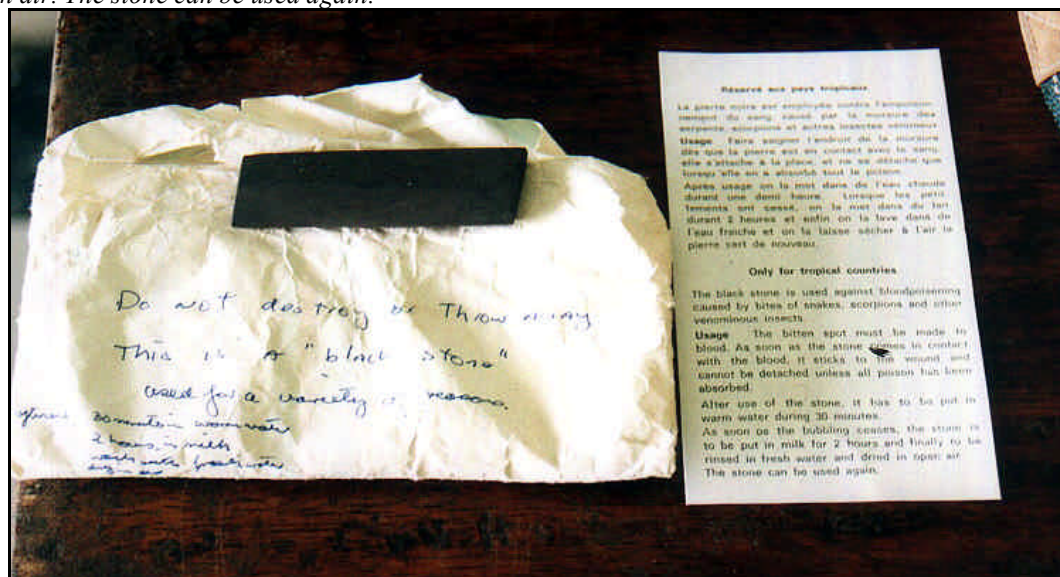
The ‘black stone’ is promoted more as a treatment for snakebite than a means of first aid. However, because it is often applied by non-medical personnel before actual medical care is sought or obtained, it is appropriate to discuss its use here.

It is generally accepted that the ‘black stone’ originated in parts of Africa where it was used widely by local healers and witchdoctors as a traditional cure for venomous snakebite. European (particularly Belgian) missionaries were the first to encounter its use, and, impressed by its apparent efficacy, they embraced its use and returned home convinced that the ‘black stone’ was the answer to all of their colonial snakebite problems.

‘Black stones’ tend to appear everywhere in the world that European missionaries established colonial Christian outposts. As well as their native Africa, they are common in South America, the Caribbean Islands and in parts of Asia and the South Pacific. In north-eastern Peru the use of the *Piedra negra* (‘Blackstone’) is even promoted in local medical treatment books, and instructions on its manufacture are provided to health workers. ‘Stones’ are actually nothing more than small rectangular pieces of fire-charred and blackened cow bone that are filed into the right shape and smoothed by rubbing.

Despite the fact that the ‘black stone’ can have very profound placebo effects in true believers, the reality is that it is little more than a cheap magic trick designed originally by African witchdoctors to part the snakebite victim from his or her riches in return for its use. The porous ‘stone’ sticks easily to drying clot (as most things do), and when immersed in water afterwards produces bubbles as air escapes from the small pores in the bone – giving the patient an impression that the ‘stone’ has special properties. The reality is that the ‘black stone’ has absolutely no ability whatsoever to cure the bite of a venomous snake (although it cures many people bitten by non-venomous snakes!) and it should not be used in preference to more appropriate first aid or obtaining medical treatment.

**FIGURE 1:** A traditional ‘black stone’ used in the treatment of snakebites in Papua New Guinea and many other parts of the developing world. The instructions for use read: *“The black stone is used against bloodpoisoning caused by bites of snakes, scorpions and other venomous (sic) insects. Usage – The bitten spot must be made to bleed. As soon as the stone comes in contact with the blood, it sticks to the wound and cannot be detached unless all poison has been absorbed. After use of the stone, it has to be put in warm water during 30 minutes. As soon as the bubbling ceases, the stone is to be put in milk for 2 hours and finally to be rinsed in fresh water and dried in open air. The stone can be used again.”*



### Traditional PNG herbal treatments for snakebite

There are many different herbal and plant treatments for snakebite in use throughout Papua New Guinea and in many other traditional communities elsewhere in the world. Surprisingly, little is known about the efficacy and safety of preparations used in traditional treatments of snakebite, and without demonstrable clinical and experimental data, it is not appropriate to endorse the use of these compounds and substances as alternatives to the treatments that have been shown to work, such as antivenom.

As with the use of the 'black stone', the strong local beliefs in the curative effects of plant or herbal preparations may result in people delaying attempts to obtain proper medical treatment after snakebite, and such delays can prove fatal in the case of bites by highly venomous snakes if the traditional remedy is ineffectual.

Only time and careful scientific study will demonstrate whether any of the traditional snakebite treatments actually prove to be effective. In other parts of the world research has found that many of the plants used to treat snakebites do actually contain chemicals with potentially therapeutic value. The drug atropine which comes from the deadly nightshade (*Atropa belladonna*) plant is a widely used medical treatment for poisoning that can be used in conjunction with anticholinesterase drugs (i.e.: neostigmine or edrophonium) in the treatment of postsynaptic neurotoxicity. Atropine helps to control the excessive oral secretions that can complicate bites by death adders (*Acanthophis* spp.) and Papuan taipans (*Oxyuranus scutellatus canni*), but does not provide an actual cure to snakebite. Several different species of plants such as false daisy (*Eclipta prostrata*) and the African plant *Schumannia phyton magnificum* have been shown to inhibit the activity of phospholipases A<sub>2</sub> (present in many snake venoms) and can also protect mitochondrial membranes in cells. A PLA<sub>2</sub> toxin from African saw scaled viper (*Echis carinatus*) venom was shown to react immunologically with an extract from the seeds of the velvet bean plant (*Mucuna pruriens*). In Brazil a chemical in *Harpalyce brasiliensis* a leguminous plant is used to treat snakebite by traditional healers and has been proven to have a combination of activities against myotoxic and proteolytic toxins through PLA<sub>2</sub> inhibition.

Not all plant or herb treatments have potential. In northern PNG materials from six different plant species that were being used locally as either topical or ingested treatments of snakebite were tested for specific activity but were found to contain no secondary metabolites that might offer medicinal benefits. A further problem that can arise is that, while some of these extracts may be able to produce a positive effect when used experimentally, the reality is that they may themselves be potent toxins that can have serious adverse effects if taken internally. This has been the case with at least one South American traditional cure, which, while neutralizing the haemorrhagic effects of snake venom, also inhibited the proliferation and activity of human lymphocytes.



Velvet bean (*Mucuna pruriens*) – occurs in PNG



Deadly nightshade (*Atropa belladonna*)



## Correct first aid treatment for snakebite in PNG

The most appropriate and effective method for the treatment of snakebites by both terrestrial and marine species in Papua New Guinea is the **PRESSURE IMMOBILISATION BANDAGING (PIB)** technique, developed to treat Australian snakebites more than 25 years ago.

### History of development

It is well known that many substances, including hormones and immune system proteins are transported around the body in the lymphatic system. Snake venom toxins are also transported from the periphery to the rest of the body via the lymphatic system, and a number of experiments have shown that venom proteins reach high concentrations in the regional lymph nodes (lymphadenopathy is a common early sign of envenomation).

Australian toxinologist and immunologist Professor Struan Sutherland conducted several important experiments at the Commonwealth Serum Laboratories during the late 1970's and was able to demonstrate that snake venom moved from the bite site to the systemic circulation by lymphatic transport.

Sutherland subsequently proposed that by applying direct compression to a bitten limb the low-pressure lymphatic vessels become occluded. In combination with immobilisation of the limb to prevent movement and remove the 'muscle pump' effect, it was shown that snake venom could be effectively sequestered at or near the site of the bite, effectively preventing the development of systemic envenomation. In 1978 Professor Sutherland published the results of his research in the British medical journal 'The Lancet'. The technique described was subsequently endorsed by several Australian medical bodies and is now the only officially approved first aid for Australian snakebites.

### Safety and Efficacy

Pressure immobilisation bandaging (PIB) satisfies all of the **SPEED** criteria for the appropriate treatment of snake:

- **SAFE** The use of a broad elastic bandage to compress lymphatic vessels is safe to use for even extended periods of time without causing pain, discomfort, pain or the risk of ischemic injury. There have been cases in which correctly applied PIB has been left *in situ* for many hours on patients who were evacuated from remote areas without doing harm.
- **PRACTICAL** PIB is practical and appropriate to all situations in which it may need to be used. Bandages can be improvised from clothing, bedding or other easily obtained materials if commercially made elastic bandages are not available.
- **EFFECTIVE** There is significant clinical and experimental evidence to show that correctly applied PIB effectively reduces the risks of long term illness or death after snakebite, by restricting venom transport and delaying the development of systemic envenomation.
- **EASY** PIB has been successfully taught to millions of Australian men, women and even young children, and non-medical users can learn to apply PIB correctly with minimal training.
- **DISTINCTIVE** Through public education and training, PIB has become synonymous with the treatment of snakebite in Australia. Health workers should use health promotion to achieve the same result in PNG.



## Immediate care of a snakebite patient

There are a number of important things to do when a person is bitten by a snake:

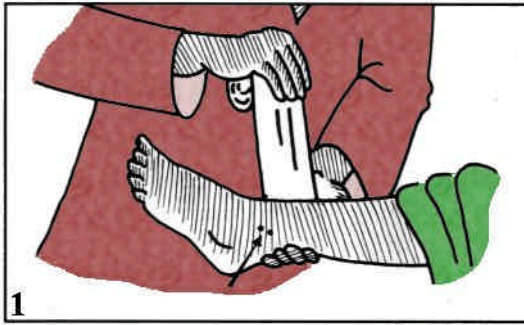
- Ö **RETREAT** to a safe distance from the snake.
- Ö **CALM** the patient, sit or lay them down and keep them still – given the reputation that Papua New Guinean snakes have, anxiety is to be expected, but panic must be avoided.
- Ö **REMOVE** rings, bracelets or other constrictive objects from the bitten limb – if swelling of the limb should occur these can cause serious injury by constriction.
- Ö **APPLY** a broad pressure bandage to the bitten limb as quickly as possible (see next page for illustrations) – if proper medical bandages are not available then any sort of flexible material can be used including clothing, towels or other material.
- Ö **SPLINT** the bitten limb with a stick, long bush knife, axe, shovel or broom handle, and be sure to bind the splint to the limb thoroughly so that no bending of the joint is possible.
- Ö **GET HELP** from friends, family or colleagues as quickly as possible.
- Ö **TREAT** all snakebites as potential medical emergencies, even if you think the snake might not be venomous – it is far better to be safe than sorry.
- Ö **BE AWARE** of the potential for sudden collapse and loss of consciousness – if the patient does become unconscious lay them over on the side of their body so that they do not choke or inhale vomit if they become sick.
- Ö **GIVE** only water if the person becomes thirsty.
- Ö **TRANSPORT** the patient to an aid post, health centre or hospital without delay – people who are treated for snakebite with antivenom within four hours of being bitten have the best chances of survival.
- Ö **RESPECT** traditional belief within reason – remember the priority is to get the patient to proper medical care as soon as possible. Be cautious about allowing anyone to give a patient any herbal medicine or other unknown drug; other practices such as applying ‘black stones’ (which do not work, but may help to calm an anxious patient and their relatives/friends) may be permissible after medical treatment has been commenced.

## Things you should not do after snakebite

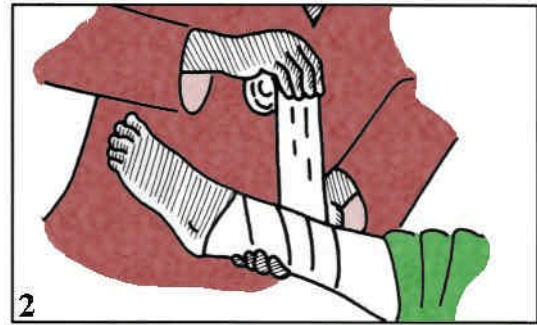
There are also things that should not be done after snakebite has occurred, and this includes the following:

- ˆ **DO NOT** attempt to catch, chase or kill the snake – this may result in another bite.
- ˆ **DO NOT** give the patient alcohol, tea, coffee or food.
- ˆ **DO NOT** give the patient any medicines except with the permission of a health worker or doctor – this includes traditional medicines.
- ˆ **DO NOT** elevate the bitten limb higher than the rest of the body.
- ˆ **DO NOT** wash the wound.
- ˆ **DO NOT** cut the wound by either incising or excising the bite site.
- ˆ **DO NOT** apply a tourniquet or rope ligature.
- ˆ **DO NOT** attempt to either suck the wound or use suction from any device.
- ˆ **DO NOT** apply ice to the bite site.
- ˆ **DO NOT** allow the snakebite patient to move at all – if they have to be taken to a place where transport can be arranged, make a stretcher from bush materials and carry them.

### **Application of Pressure Immobilisation Bandaging (PIB)**



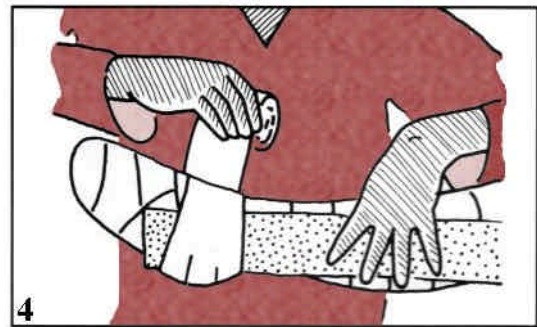
A broad elastic bandage is firmly applied directly over the site of the snakebite. Bandages can be improvised from any type of flexible material such as clothing or towels that have been torn into wide strips.



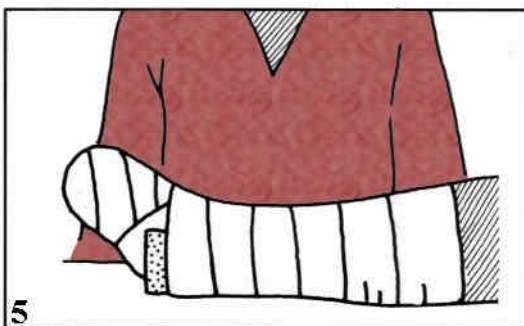
The bandage should be the same tightness as would be used to support a sprained wrist or ankle. Keep the patient calm and still. Do not remove clothing from the limb as the movement involved helps spread the venom.



Initially bandage from the site of the bite down to just before the toes or fingertips and then bandage as high up the limb as possible. This ensures that the bandage stays comfortable and can be left in place.



Use a rigid object such as part of a shovel handle, thick stick, rolled up newspaper or bush knife to make a split that can be bound to the sides of the limb in order to completely immobilise it.



Be sure to bind the split to the full length of the limb so that movement is completely restricted. If the patient is still able to bend the knee the split is not properly bound and the bandages will become ineffective due to the 'muscle pump' effect when the leg is bent or moved.



For bites to the hand or arm it is sufficient to splint the limb from the tips of the fingers to the elbow, and to then place the arm in a sling across the body in order to achieve immobilisation. This is more comfortable than splinting the whole arm, and means the patient is less likely to try to move the arm.

## **What to do if the bite is on the body, neck or head**

Bites to the torso or to the head and neck are rare. The majority (about 70%) of snakebites occur on a lower limb, and most other bites (>25%) are on the hands or arms. This means that the method of pressure immobilisation bandaging (PIB) shown on the preceding page will be suitable for more than 95% of all snakebite cases.

If a person is unfortunate enough to be bitten on the body, or on the head or the neck, it is not practical to wrap them in a pressure bandage.

A firm pad of cloth should be used as a substitute for PIB to apply direct pressure over the site of the snakebite, and this pressure must be maintained until the person reaches medical care.

## **Is there any value in applying pressure immobilisation to a snakebite patient who was bitten several hours previously?**

This is a potentially contentious issue.

There are strong reasons to believe that applying PIB to a person who presents at an aid post or health centres long after the actual bite occurred may have very little value, especially if the person has already walked a long distance and has definite signs and symptoms of envenomation. More value time may be wasted applying PIB instead of proceeding with the assessment, diagnosis and treatment of the patient.

The other side of the argument is that very little is known about the rate of absorption of snake venom in different types of body tissue. The thick calluses on the feet may delay absorption of some snake venom, and even a delayed pressure bandage might help sequester this venom until treatment has been commenced. In small rural aid posts or health centres that do not have antivenom stocks, the application of PIB, even after a considerable time has elapsed, may have some benefit, and if it does not delay the seeking of further treatment, then there may be no reason not to apply first aid.

Certainly, in the situation where antivenom treatment is not available locally and a medical transfer to another facility is needed, and where the patient is accompanied by anxious, frustrated or fearful friends and family, the application of a pressure bandage means that the health worker is being seen to be doing something positive for the patient. This can diffuse possibly difficult situations.

## **Removal of pressure immobilisation bandaging (PIB)**

As a general rule it is not advisable to remove PIB from a snakebite patient until after they have arrived at a health centre or hospital which has supplies of appropriate antivenom, and they have been assessed and a plan of treatment commenced.

In a patient who has clear signs and symptoms of envenomation, or who has been tested using the 20WBCT or CSL venom detection kit and found to have been bitten by a venomous species, the ideal time to remove PIB is after the commencement of the antivenom infusion.

Removing the bandages quickly, and especially before antivenom therapy is commenced, may result in sudden deterioration. Bandages should be removed gradually over a 30-60 minute time frame and if a sudden worsening of the patient's condition does occur during this process then it may be advisable to stop removing the bandage any further until the patient has been reassessed.

## **The importance of teaching pressure immobilisation bandaging (PIB) and snakebite education to our communities**

Snakebite is a very serious problem in many of our rural communities and even the people living in urban areas are not safe, because many snakes including the Papuan taipan (*Oxyuranus scutellatus canni*) are very good at learning to live close to humans.

The most important thing to remember about the use of pressure immobilisation bandaging is that if it is not applied until after the snakebite patient has walked for three hours to reach a health centre, it is most likely to be ineffective!

With this in mind one of the best things we can do in our communities is to conduct positive health promotion programs and to teach the correct use of pressure immobilisation bandaging (PIB) to as many people as possible. Such programs can involve visits to schools and vocational centres, timber camps and mining sites, village markets and other places where people congregate. Health centres can stock supplies of elastic bandages and sell them to the members of the public at a small overhead to cover freight costs.

Public education and health promotion programs about snakebite should not only address the proper use of pressure immobilisation (PIB), but can also be used to teach people about practical common sense ways to reduce their risks of snakebite, including:

- Ö Keeping long grass away from their homes and the places where children play.
- Ö Storing building materials like corrugated iron or timber up off the ground because snakes like to hide underneath objects on the ground, especially if they are overgrown by weeds and long grass.
- Ö If possible, wearing shoes or gumboots in the bush or when working in the garden.
- Ö Teaching their children not to go near snakes, and not to try and catch, chase or kill them.
- Ö Using a torch, kerosene light or candle light when walking around at night.
- Ö Learning to look down when walking and to watch for snakes on pathways and beside roads or on trails near water.
- Ö Learning to look carefully at where they put their hands when pulling vegetables out of the garden, when reaching in grass, or when collecting firewood.

We should also teach people that it is not safe to do things such as:

- ˆ Delaying seeking medical treatment after snakebite in favour of traditional medicine or other ‘cures’ that have no scientific basis.
- ˆ Put their hands into animal burrows or hollow logs without checking to be sure no snakes are inside first.
- ˆ Run through long grass or along bush paths and roads – most snakes will quickly crawl away at the approach of a person if they have enough time; a person running often treads on the snake before it has time to crawl away.

If we as health workers invest the time in providing this vital education to the people in the communities that we serve, the results will not come overnight. But, if we are consistent and persist in teaching as many people as possible how to be proactive and avoid snakebite, as well as how to use proper first aid when bites occur, then we will see change over time.

Papua New Guineans are keen and eager to learn about snakebite and it is our responsibility to teach them what they need to know to save their lives.

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