Snake Bite First Aid

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Above and left:
Eastern Browns

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SNAKE BITE FIRST AID

It was in the 1970s that Professor Struan Sutherland first proposed a dramatic change in snakebite First Aid management. Prof. Sutherland's research showed that snake venom travelled initially through the lymphatic system rather than the venous or arterial system. Therefore, it needed a different approach to its management. It was his guidance that gave us the modern pressure and immobilisation treatment. Note the two terms;**pressure** and **immobilisation**. This will be important to understand later in this text.

MEASURE OF RISK

Death by snake bite in Australia is extremely low. According to ABS statistics, thirty-four people died from snakebite between 2011 and 2020. During the same period, one hundred and two people drowned in their own bathtubs.

PHYSIOLOGY

Prof. Sutherland's research showed that snake venom travelled through the lymphatic system rather than the venous /arterial system and as such it needed a different approach to management. It required a two part approach — 1) Pressure and 2) Immobilisation. Note the two, Pressure **and** Immobilisation. Both parts are equally important to attend to. I cannot stress enough the importance shown in Prof. Sutherland's research that snake bite management requires both pressure **AND** immobilisation to be effective. It is critical that you understand the need for both actions if you are to have the best chance of preventing the venom from moving from the bite site.

Humans have a closed circulatory system. In very basic terms we refer to it as the vascular system. It has several sub-sections but for the management of snake bite envenomation, our treatment is focused on the lymphatic system. The purpose of the lymphatic system is to drain waste products from our tissues into the venous system. The *pressure and immobilisation* technique aims to keep the venom within the lymphatic system and prevent it from entering the venous system which would then take it to our vital organs.

The *pressure-immobilisation* technique is recommended by the Australian Resuscitation Council, The Royal Australian College of Surgeons and the Australian and New Zealand College of Anesthetists.

Above: Death Adder
Below: Tiger

SNAKE BEHAVIOUR

All snakes have predicable behaviors which makes it possible for snake handlers to know how they will respond to specific circumstances. Contrary to popular myth, snakes do not seek out humans to attack. Their first response is to flee and hide, then stand and bluff, lastly to strike. Snakes are defensive by nature, not aggressive. In the snake world if you don't defend yourself you get eaten. Some snakes, such as the Eastern Brown show more scary defensive behavior than other types which is often mistaken as them being more aggressive. They are just better at the scary part — and it is predictable. Although a number of people are bitten by snakes in a year, relatively few are envenomated (venom delivered with the bite). One large study showed that the Brown snake is most likely to envenomate with each bite. It probably goes with the attitude. Australian venomous snakes also have relatively short fangs when compared to other snakes making successful envenomation more difficult through clothing. However, for the purpose of First Aid, **ALL** snake bites are to be considered envenomating until proven otherwise at the hospital.

CHOICE OF BANDAGE

Using the right type of bandage is very important. Research has shown that Crepe bandages are unlikely to provide adequate pressure (Canale et al, 2009). Use either elastic or compression therapy bandages.

BANDAGE APPLICATION

Just about every text or reference shows bandaging with the bite located at the ankle. However, very little clear direction is given to the procedure for bandaging a bite located on the upper leg or arm. This text aims to give guidance for managing a snake bite on any part of the body.

DON'T PANIC!!

1. Check for danger to yourself, bystanders and the casualty.
2. Rest and Reassure the casualty. **Act calm and confident. DO NOT** try to kill or capture the snake. Identification of the snake for the antivenom is not required.
3. Sit the casualty down, legs out straight, back supported, sitting up-right. Quickly remove finger/toe rings, watches and other jewelry if worn (if swelling in the limb occurs these may not be able to be removed and they may impede blood flow). Quickly remove footwear and socks. (This enables you to check circulation once the bandage has been applied).

Red-bellied Black underfoot

Red-bellied Black looking for escape

STEP ONE — PRESSURE

Most references contain four common elements relating to the pressure bandage.

1. It starts directly over the bite site then proceeds up the limb.
2. It covers the entire limb.
3. Only the finger/toe nails are uncovered so that circulation can be assessed.
4. It must be firmly applied to stop lymphatic flow but not stop blood flow.

This is straightforward if the bite is on the foot or hand but needs more clarification for bites on other locations.

SCENARIO A

If the bite is close to the fingers or toes (eg. hand/wrist or foot/ankle)
As quickly as possible apply the bandage over the bite site, then wrap the hand or foot to the fingers/toes just leaving the finger/toe nails visible. Apply as firmly as you would for a sprained ankle. Then firmly apply this bandage in an overlapping manner up the leg or arm as far as it will go. You will be going over the bite site for a second time but the surface area with double bandage should be minimal.

The idea is to close down the lymphatic system in the entire limb, not just the bite site. If your first bandage is not long enough use another bandage and continue up to the groin or arm pit. Do this as calmly as possible. Apply this directly over clothing. The aim is to lock the venom at the bite site as quickly as possible. Time and movement taken to remove clothing allows the venom time to travel through the lymph system to the venous system. Mark the bite site on the outside of the bandage with a pen and the time the bandage is applied.

Check that there is still circulation occurring by squeezing the fingernails or toenails. They should blanch (whiten) under pressure and then re-colour.

SCENARIO B

If the bite is some way up the arm or leg (eg. knee/elbow or thigh/bicep)
Apply the elastic bandage over the bite site and then move up the arm or leg to the armpit or groin. Now take a second bandage and apply it from just above the toe/finger nails to join up to the first bandage higher up the limb. In both scenario A and B the whole limb is encased in the pressure bandage with even, firm pressure over the entire limb.

SCENARIO C

What if you only have one bandage and the bite site is high up the arm/leg?
Apply the bandage over the bite site, then move up to the groin or armpit.
If your bandage is long enough then from here move back down the limb, over the existing bandage with **light pressure** in big overlaps (to avoid over compression), then once below the bite site reapply with firm pressure right down to the finger/toe nails if the bandage is long enough.

Again, like scenario A and B the whole limb is completely bandaged with even pressure over the entire limb. Check circulation by pressing the finger/toe nails.

Again, like scenario A and B the whole limb is completely bandaged with even pressure over the entire limb. Check circulation by pressing the finger/toe nails.

In all of the scenarios the aim is to completely bandage the entire limb. If you cannot remember the best way to go for a particular situation just bandage the entire limb from fingers/toes to armpit/groin and make it look like you know what you are doing. Remember, your confidence builds reassurance in the mind of the casualty.

How firm should the bandage be? Tight but not too tight. Technically the pressure should be enough to shut down the lymphatic system but not enough to cut off the circulation. The pressure in mm of mercury needed is between 55–70 (Howarth, et al., Med.J.Aust, 1994). There are special lymphatic bandages designed just for this purpose with special markings on them to let you know when the correct pressure is applied. (Setopress/Surepress are two examples).
f you are regularly in snake areas then it makes sense to have at least two of these bandages at hand and have experience in using them. However, these bandages are not suitable for a sprained ankle. For bushwalkers the elastic bandage covers both scenarios.

STEP TWO — IMMOBILISATION

This second step is just as important as the first. **Do not underestimate how valuable this step is in keeping the venom locked within the lymphatic system**.

In the study done by Howarth et al 1994 they showed that even if the bandaging is done perfectly the venom will move away from the bandaged area if the casualty walks around for ten minutes.

Your casualty should still be sitting up but kept as calm and reassured as possible. Now splint the bitten limb just as if it was fractured. In the case of the legs, they can be tied together with triangular bandages. Don't forget to pad between them first.

Every bit you do to make the pressure/ immobilisation technique more effective helps the casualty. If you cannot splint the limbs together then just make sure the casualty remains very still. Immobilisation means just that. **Do not** let the casualty move around.

RESCUE

If you have a vehicle close by then you can transport the casualty to hospital. If you are remote without a vehicle then transport has to come to the casualty. Send off your runners, pick up the phone or set off your PLB/EPIRB. As soon as you move the casualty without a stretcher or a vehicle you are breaking the golden rule of immobilisation. Monitor your casualty until help arrives and administer First Aid such as expired air resuscitation and external cardiac compression as required. If you are by yourself way out bush with no bandage or PLB then just sit very still, immobilization is critical, be calm and reflect on your life and keep your fingers crossed.

BITES TO THE TORSO, BUTTOCKS, NECK AND HEAD

Clearly it is not possible to apply the traditional pressure bandage in this scenario. In this case immobilisation becomes critical. Current best practice is to apply pressure via a pad to a bite on the chest and torso without restricting breathing. This would probably be more reassuring than preventing envenomation movement through the lymphatic system but reassurance and immobilisation is very important. In the case of a bite to the head and neck just keep the casualty very still.

WHAT IF THE CASUALTY BECOMES UNCONSCIOUS BEFORE HELP ARRIVES?

D.R.S.A.B.C.D If you do not know what this stands for then you should be enrolling in a First Aid course as soon as possible.

MEDICAL CARE

Seek medical care as soon as possible. Never assume that the medical staff whom will treat the casualty have extensive experience in snake bite management. When you reach hospital **do not** let the bandage be removed until antivenom has been administered or the all clear is given. The hospital staff can cut a hole in the bandage at the bite site (remember you marked this on the bandage) to test the type of venom to determine the best antivenom to be administered. Trying to kill the snake to bring it in for identification is pointless and is likely to ensure that there willbe two snake bite casualties instead of just one. The bandage can be left on until the all clear is given (this may take many hours).

GOLDEN RULES

Do stay calm — remember, panic is infectious.
Do apply the pressure bandage over the entire limb only leaving the toes/fingers uncovered.
Do immobilise the casualty.
Do practice your bandaging/immobilisation technique **before** you need to use it in the field.
Do seek medical (hospital) aid as quickly as possible.
Do not try to kill/capture the snake.
Do not wash the bite area.

Classic Tiger snake threat display

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DISCLAIMER

The purpose of this document is to provide clear and comprehensive guidance in the management of snake bite First Aid. This document has been prepared by Allan Donnelly who is a qualified Wildcare snake handler. He is a Podiatrist, bushwalker and is a former St John Ambulance NSW Remote Area First Aid Instructor/Examiner.

This document has not been endorsed by any government or medical authority. It has been prepared by evaluating all currently available information and research relating to snake bite first aid and presenting this information in a usable format. Although their written endorsement has not been sought, the content of this document has been reviewed by colleagues who are members of the Royal Australian College of Anaesthetists, General Practitioners, Physicians and Wildcare.

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Eastern Brown