

# Wound Care in Reptiles

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Reptiles are often presented to wildlife carers with various types and grades of wounds. Reptile wound healing rates are comparatively slower when compared to healing rates in mammals and birds. With appropriate wound management we hope to significantly reduce wound healing rates. How we manage a reptile's wounds will impact on the healing rate and thus influence the reptile's required time in care. The principles of the wound healing process will be addressed. Some basic applications to reptile husbandry that can be influenced to promote wound healing will also be explored. Also, wound management techniques will be addressed by reviewing some examples of wound dressings and materials, wound hydrogels and other topical wound medications. Some other special wound considerations related to reptile rehabilitation will also be discussed.

## 1 The principles of wound healing

This discussion deals primarily with surface wounds associated with reptile skin. These wounds in reptiles may be caused by;

- trauma (road accident, animal attack etc)
- burns (via heat, cold or chemical burns)
- surgery

Regardless of the cause of the wound, the size of the area affected and the amount of contamination present will greatly influence the rate and quality of wound healing.

Wound healing is a multi-stepped process which begins with an inflammation stage (signalled by the presence of heat, redness, swelling and pain) and proceeds from there with the laying down and reorganisation of 'new' tissue. Through progressive remodelling and reformation, the new tissue formed (scar) is never exactly the same as the original tissue that is being replaced. In general, a small surface injury will usually heal with few complications and result in no scar, whereas large, open dirty wounds usually heal slowly and result in significant scarring. Interestingly, scars usually only ever attain about 80% of the strength of the original tissue. Wounds tend to heal from the edges and work their way inwards.

Wounds require several factors to allow the healing process to proceed.

These factors include;

1. moisture
2. oxygen (via a blood supply and air)
3. nourishment for the new cells (delivered from the local blood supply)
4. a clean/germ free environment

Furthermore, in reptiles we also need to look at ambient temperatures and the humidity that the reptile is kept at. It has been shown that a reptile's skin wounds will heal at a faster rate when the animal is kept at the upper end of their PBT (Preferred Body Temperature), Smith 1988

## 2 Basic applications of reptile husbandry that can be influenced to promote wound healing

As stated above, the temperature and humidity provided to a reptile experiencing wound healing will have an impact on the wound healing rate. Reptiles are ectothermic animals which means they primarily rely on their environment to thermoregulate (regulate their body temperature). In doing so, reptiles will actively absorb heat from their environment via the sun (by basking) and/or by positioning themselves onto warm areas. Conversely reptiles will also seek shade/cool areas if their body temperature becomes too high.

It is necessary to be familiar with a reptile species' PBT and provide the animal in care with a temperature range that meets these PBT requirements. When we house reptiles indoors we need to provide them with a reliable source of artificial heat and the option of seeking cooler areas. We need to supply them with a 'thermal gradient' within the enclosure that is within their PBT range. A thermal gradient can be created by placing the artificial heat source at one end of the enclosure, which will then create a 'hot' end and a 'cool' end of the cage. Reliable thermometers should be used to check temperatures and should be moved around or placed at either end of the cage to improve temperature monitoring. The use of thermostats with any artificial heat source is strongly recommended to help ensure that overheating does not occur.

Proper relative humidity conditions should also be met for each particular species. Compare the different requirements of say an 'arid' living species such as the Shingleback Lizard *Tiliqua rugosa* which requires a low humidity with that of a coastal or rainforest dweller such as the Diamond Python *Morelia spilota* which requires a more humid environment.

### **3 Wound management techniques**

One of the main objectives in managing wounds in any animal is to promote a rapid wound healing rate. This is especially so for reptiles. In general a reptile's wounds heal much slower when compared to mammals and birds.

The steps we take in treating wounds will either provide the necessary factors and thus enhance healing, or conversely deprive the wound of some of these factors and thus hinder healing.

If a skin wound is very fresh and clean, or has been created in a sterile surgical field, then its healing rate may be enhanced by closing the wounded skin edges (by suturing or stapling for example). This allows the wound to heal by the process referred to as 'primary intention'.

If the skin wound is not fresh and is dirty or contaminated, then closing the wounded skin edges is not indicated, as this may lead to the sealing in of infection and promote further complications. Instead the wound will have to be managed to allow it to heal by what is referred to as 'secondary intention'.

It is these wounds that we most commonly encounter and manage as reptile foster carers.

We will explore further two areas of wound management that we can influence to improve healing rates. These are wound flushing and wound dressing.

#### **Wound flushing**

We can help to promote the wound healing process by cleaning and flushing the wound to remove dirt and debris and reduce the potential pathogen (germ) load. Also, any suspect or dead tissue associated with the wound needs to be removed, as these 'dead' portions will not allow new tissue to grow over and in addition will harbour bacteria and thus reduce wound healing rates.

Flushing a wound is an important and often overlooked process. Flushing will help keep the wound moist and also help reduce contamination. Initial flushing can be achieved easily with tap water (especially if the wound is very dirty and contaminated). Once we have cleaned and debrided (removed any dead or infected tissue) the wound, it can then be classified as 'clean but contaminated'. It is necessary at this stage to follow up future wound flushings with saline or preferably a suitable antiseptic solution.

Recommended wound flush antiseptics are;

- Chlorhexidine (0.05% solution)
- Povidone iodine (0.1% solution)

Alternatively;

- Saline (Sodium Chloride) 0.9% (a 'salt water' solution can be made up at home by mixing a teaspoon of table salt with a cup of cooled boiled water)

Note: The concentrations of the above solutions are important. At these concentrations they have been shown to be 'antiseptic' (except saline) but not so concentrated that they would otherwise become toxic and damage delicate newly regenerating tissue in the wound. Flushing once a day may be carried out until the wound appears 'sealed' or 'newly skinned'.

### **Wound dressing/bandaging**

Dressing a wound will help maintain moisture in the wound space. A dressing will also serve to protect the wound from contamination and protect it from abrasions.

The required frequency of changing a dressing will depend on how 'clean' the wound is and at what stage of healing it is at. Generally, in the initial stages of wound care a dressing may need to be changed on a daily basis. Dressings can then be gradually left on for longer periods of time between changes.

There are many dressings and techniques available for dressing wounds. In other words there are many ways to achieve the same objective of good wound healing. Above all it is important to 'do no harm'.

Reptiles in general don't offer the simplest surfaces or body parts to apply bandages to, so for this reason it may often be easier to utilise 'adhesive' type wound coverings. A good example of this is "Opsite Flexigrid" or "Opsite Incise" (both from Smith & Nephew). These are 'bio-occlusive' adhesive dressings which once applied to a wound offer a waterproof dressing that is permeable (allows transfer of) to air. They are not so sticky that their removal is made difficult. Another example of this type of dressing is "Bioclusive" (Johnson & Johnson). "Opsite" is also available in a spray-on option which allows for more difficult areas, like limbs for example, to be effectively dressed.

Alternatively we can use saline soaked gauze swabs to place over the wound. A major drawback with this method in reptiles is the difficulty in being able to 'fix' the swabs in place. A simple bandage like "Vetrap" (a 3M product) or others can be used for this purpose; however, it may still require some form of 'sticky' bandage to keep it in place. A disadvantage of this is that many sticky bandages are often very difficult to remove without traumatizing or stressing the animal.

Apart from the 'bandage' dressing, there are other gels or substances we can apply to the wound. There are many commercial wound gels available. All of these wound gels offer some wound healing

promoting properties. Some examples of these are, “Duoderm” (a Convatec product), “Duoderm Gel” (Convatec), “SoloSite” (Smith & Nephew) and “Opsite gel” (Smith & Nephew).

A more accessible potential wound gel that can be employed is simple honey (try to find a ‘pure’ honey like “Manuka” or “Medi-Honey”). Honey provides an excellent alternative due to its ‘antiseptic’, hydroscopic (water absorbing) properties, furthermore it is inexpensive, non-toxic and easily accessible. A combination of any of these gels and an adhesive bio-occlusive dressing make a neat, simple and effective wound dressing system for reptiles.

Another commonly employed wound dressing for reptiles is ‘silver sulphadiazine’ (“Silvazine” Smith & Nephew) cream. “Silvazine” is particularly useful in managing burn wounds. It has both antibacterial and antifungal properties.

Some wounds and injuries present other problems in reptiles, especially the less accessible areas of reptiles or in the smaller reptiles. An example of this is injury associated with the loss of tails or limbs. These wounds often present with so little tissue or area to actually ‘bandage’. In these circumstances, ‘tissue glues’ such as “Vetbond” (3M product) might enhance wound closure and subsequent repair.

These principles of wound flushing and wound dressings can apply to all reptiles including snakes, lizards and turtles.

#### **4 Other considerations related to reptile rehabilitation**

It is also important to consider that in many cases the animal may require some assistance with keeping infection at bay. Antibiotics may be necessary in some cases. Also, in the early stages, many traumatic wounds in reptiles would also be expected to carry some degree of pain. We should seek to use analgesics (pain killers) and other supportive measures in these cases.

Some wounds in reptiles require particular attention with respect to the animal’s suitability for re-release back into the wild. Any wound repair must not hinder the animal’s ability to carry out its normal functions in the wild environment. In particular to the situation of reptile wounds is that the animal is able to shed its skin effectively. It is imperative to ensure that any old healed wounds haven’t impaired the shedding process. This may mean that a reptile in care with skin wounds will need to undergo at least one unassisted shed process before it can be assessed for re-release.

#### **Resources**

Most of the products described in this paper can be obtained from Pharmacies or Veterinary Surgeries.

#### **Key Words/Glossary**

<b>Chlorhexidine</b>	A commonly used antiseptic compound
<b>Ectotherm</b>	Relying on external temperatures to regulate body temperature
<b>Hydrogel</b>	A wound dressing that provides a moist environment for wound healing, they are non-toxic and non-adherent.
<b>Inflammation</b>	The body’s reaction to injury. Characterised by redness, swelling, heat and pain
<b>Pathogen</b>	An organism capable of producing disease

<b>Povidone iodine</b>	A commonly used skin antiseptic used in reptiles
<b>Preferred Body Temperature (PBT)</b>	Preferred temperature at which a reptile is best able to perform its bodily functions
<b>Saline</b>	Salt water solution containing sodium chloride
<b>WIRES</b>	Wildlife Information and Rescue Service

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