# MARINE ANIMAL INJURIES

*by Dr Frans J Cronjé , MBChB(Pret), Bsc(Hons) Aerosp Med*
*Executive & Medical Director - DAN Southern Africa*

*Marine animals injury makes out less than 2% of all diving injuries or illness and South Africa is fortunate to have relatively few hazardous or aggressive marine creatures. Nevertheless chances are that someone on the beach may happen upon a misplaced Blue Bottle and treatment will be required. Although the treatment of marine animal injury is not complicated and follows the same basic principles that apply to other traumatic and injuries sustained on land, the aquatic environment can complicate matters: Injuries may occur in remote areas or out at sea and the emotional impact of the gaping wounds from a shark attack, for instance, may interfere with the need for urgent haemostasis and stabilisation of the victim. This article is intended to supplement the information available to you from excellent resources, with some additional practical considerations and solutions. Where medical or paramedical therapy is suggested, this is obviously limited to those licenced and competent to do so.*

## INTRODUCTION

Hazardous marine life can be conveniently divided into five groups: *stingers; stickers; snappers; scrapers and; shockers*. The division is useful in describing not only the various mechanisms of injury but also the various relevant treatment considerations.

## GENERAL PRINCIPLES OF TREATMENT

The best general way to approach and remember the principles of treatment of marine animal injury is to apply three basic rules:

* **R**emove the cause
* **T**reat the effects
* **P**revent further complications

## DANGEROUS ANIMALS

1. <u>STINGERS</u> (Jelly fish; Blue bottles; etc.)

Stingers have specialized envenomation cells known as *nematocysts*. These cells, when stimulated by contact or endosmosis, discharge an inverted dart into the victim when the hydrostatic pressure within the cell has reached a certain threshold. The projectile introduces an irritating and damaging *protein venom* that is fortunately *destroyed rapidly by heat or contact with acidic or alkaline substances*. Certain people may develop a severe anaphylactic reaction to the venom - similar to that of a bee sting. Stings in the face should always be observed carefully due to danger to the airway. Nematocysts can remain viable (and dangerous) for several hours or even days after they have been washed up on the shore -- beach combers beware! Always wear two pairs of gloves when handling tentacles or treating the victim of a marine animal envenomation to prevent becoming a victim yourself. Never use hypo-osmolar fluids (e.g. fresh water) to rinse wounds caused by a stinger as any active nematocysts that are still in contact with the victim will immediately be discharged, making the injury worse. Even urine is better than fresh water. It is sterile – and is usually readily available!

**R**: Rinse or apply a gauze swab to the wound that has been *soaked in vinegar or*

*alcohol* (even 43% if nothing else is available) as soon as possible. Best results come from early applications. Vinegar and alcohol kill the nematocysts without discharging them and also neutralise the venom. *After the stinging cells have been destroyed*, any remaining tentacles can be removed with water, beach sand or scraped off with a blunt knife.

**T**: Application of local anaesthetic cream, e.g. Lignocaine / prilocaine (EMLA 5%) cream, has shown to be the most effective for pain relief. Antihistamines may be used for swelling or mild local allergic reactions. Some varieties such as the South African Sea Wasps, though less dangerous than their Australian counterparts, cause scarring and the addition of topical cortisone cream may minimise this. Parenteral administrations may be required for severe reactions, including anaphylaxis.

**P**: Allergy and localised pain are the most common manifestations of these injuries. Some patients may present with paraesthesia, mental disorientation, nausea, vomiting and malaise. Although these venoms are potent neurotoxins, very little is usually transferred to the victim and a depressed level of consciousness and death (due to cardiac or respiratory arrest) are the exception. Patients should be taken to hospital for observation if there are signs of facial swelling, hoarseness or neurological involvement.

2. **<u>STICKERS</u>** (Cone shells; Sea urchins; Devil-, Scorpion- & Stone fish; Sea barbel; Stingrays)

Stickers have venomous barbs or spines that are either covered with venomous mucous or have specialised glands and hollow spines that can inject venom into the victim. As with stingers, the venoms are also proteins and are denaturated rapidly by heat. As stingers can deliver extremely painful and even fatal envenomations (in the case of stone fish and certain stingrays), *hot water is the treatment of choice*. The water should be as hot as can be borne (40 - 50 EC) and immersion or continuous rinsing of the affected area should continue in 10-20 minute sessions until symptoms abate. Symptoms tend to fluctuate and the hot water may be discontinued when relief is achieved and continued when they recur. Hot water may not be sufficiently effective for very deep envenomation and the site of the injury may make immersion in hot water awkward or impractical and continuous rinsing or hot packs (or even heated sand in flexi-wrap or a plastic bag) may be an acceptable alternative. Intermittent use of heat is important to limit scalding. Pain is a very prominent feature with stone fish and sea barbel envenomation causing more than 24 hours of agony if left untreated. Mental disorientation due to pain may cause fainting or incoherent behaviour resulting in drowning, decompression sickness or even an arterial gas embolism due to a subsequent rapid ascent.

**R**: Immediately soak the wound in hot water (40 - 50 EC) until symptoms abate. Best results come from early interventions. Clean away any foreign material that can easily be removed. Deeply imbedded barbs and spines should not be removed in the pre-hospital setting as this may release more venom or cause bleeding. Be careful to avoid injuring yourself and always wear two pairs of gloves. If the patient starts developing cardio-pulmonary symptoms, be ready to assist.

**T**: Hot water is extremely effective in relieving the pain from envenomation. Local anaesthetic (without adrenaline) may be injected into the wound area for further relief. Stone fish injuries may also be treated by an injection of Buscopan (N-butyl-bromide-hyoscine) into the wound or intramuscularly. This seems to relieve

symptoms although the exact mechanism is unclear. Application of a venous pressure bandage (as for a snake bite) will delay the spread of the venom if immediate hot water treatment is unavailable. Never apply an arterial tourniquet.

**P**: Extreme localized pain radiating to the regional lymph glands, swelling, allergy and disorientation are the hallmarks of sticker envenomations. All patients (with the exception of mild sea urchin spine injuries) should be taken to a hospital as soon as possible. Symptoms may become progressively worse and seem disproportionate to the extent of the injury. Spine- and barb remnants frequently remain in the wound and may only be visible on x-ray. Pain usually persists until these are eventually removed surgically. Administration of Tettox is essential and antibiotics may be required.

## 3. SCRAPERS (Coral; Fire Coral)

All marine animals' surfaces are colonized by bacteria and any contact with marine animals resulting in disruption of the skin may therefore be complicated by an infection. Abrasions and lacerations sustained underwater should always be treated with suspicion and cleaned meticulously. Some types of coral and marine hydroids have stinging cells (see stingers). These stinging cells are readily transferred to gloves or hands causing severe skin reactions when they come in contact with delicate skin (e.g. when removing the mask or wiping the face following the dive).

**R**: Apply vinegar, meat tenderiser (made up as a paste with sea water) or sodium bicarbonate to neutralise any venom and destroy viable stinging cells. Clean the area with a mild antiseptic (Savlon or Dettol).

**T**: Antiseptic and local anaesthetic ointments are useful. Avoid further contact with sea water or sunlight until wounds are healed.

**P**: For any injuries other than superficial abrasions, Tettox is recommended. For puncture wounds and lacerations, prophylactic antibiotics may be indicated.

## 4. SHOCKERS (Electric ray & eel)

These animals generate electrochemical energy and can deliver electric shocks to stun prey or predators. The electric ray is a common resident in shallow temperate waters and may easily be disturbed by unsuspecting bathers, especially in rocky areas and under ledges. The electric ray has two kidney shaped organs on both sides of the spine than can generate the electric discharge of up to 220 volts. Treatment is not usually needed as the shock very rarely results in any serious disability unless the diver or swimmer aspirates water or loses consciousness.

## 5. SNAPPERS (Sharks; Game fish; Morays; etc.)

Although South Africa features with Australia as having the greatest number of shark attacks, this has changed somewhat in recent years due to the netting of beaches and fishing exploits. At present there are approximately two shark attacks per year. Only one SCUBA diver has ever been attacked and killed in South African waters. This occurred at Hartenbosch in the Southern Cape during 1992. If the initial attack is not fatal, the usual cause of death is acute haemorrhagic shock and control of blood loss is therefore the cornerstone of treatment. Shark attack instills a primaeval fear and emotion in bystanders

and even emergency personnel. However, the treatment of a shark attack should not differ from that of conventional trauma and one should not be distracted from the basic priorities.

**R**: Get the patient out of the water as soon as possible. Reassuring statistics indicate that less than 0,4% of rescuers are bitten during an in-water rescue attempt. If the shark does return, it almost invariably attacks the bleeding victim. It is important to get the victim out of the water quickly to achieve effective haemostasis and provide life support.

**T**: Stop the bleeding by direct pressure (on the wound) or indirect pressure (pressure points). Don't hesitate to use an effective tourniquet if bleeding cannot be controlled otherwise. Mark the patient's forehead with a "T" and note the time accurately. Where access to a boat or shore is delayed, further blood loss must be stopped in the water. Spear gun elastics (used as an improvised tourniquet) have saved the lives of at least two injured spear fishermen who actually succeeded in swimming to shore unaided following the attack after stopping the bleeding themselves. Never use a towel as a tourniquet as one cannot apply sufficient pressure to the artery and the towel disguises the continuing haemorrhage. It is important to try and keep the area clean and avoid complicating the wound.

**P**: Control haemorrhage. Start treatment for shock: shock position; ABC's; nil per mouth; rapid intravenous infusion of Ringer's Lactate and/or colloids via two large peripheral lines. Arrange transport to the nearest level one trauma facility if possible. If bleeding *can* be controlled and resuscitation commenced effectively, there is little to be gained by blindly rushing the patient off to a hospital (i.e. to scoop and scoot). First stabilize the person and stop the bleeding before transport. Don't allow pressure from bystanders to interfere with your medical judgement. Every case is unique, manage it accordingly.

Despite exaggerated fears, most marine activities are uneventful. If a casualty does occur due to a marine animal injury follow basic ABC's and deal with the problem rationally. Remove the cause, treat the effects and prevent further complications.