Guideline 9.4.5 - Envenomation - Jellyfish Stings

Introduction

The mechanism of jellyfish envenomation.[1,2,3]

Stinging by jellyfish is caused by the simultaneous discharge of many thousands of microscopic stinging capsules called nematocysts. These are located on the surface of tentacles and in some species on the body of a jellyfish. Nematocysts contain coiled threads (tubules) loaded with venom. Upon contact, the nematocysts 'discharge' their tubules into the victim's skin like mini-harpoons. The more tentacles which make skin contact, the more venom is injected.

Stings cause immediate, sharp pain and an acute inflammatory skin reaction at the sting site consisting of redness, wheal and swelling which may progress to local skin destruction. Some stings cause rapid collapse. In Australia, life-threatening stings generally occur in tropical areas, with few in southern regions. Because of their smaller body size, children are greater risk of the effects of envemonation.

Most stings are not serious and over-treatment of minor stings should be avoided. Wearing a full-body Lycra suit or equivalent provides good protection from stings.[4]

Tropical envenomations

Potentially fatal envenomation is caused by two jellyfish types in Australian waters.

1. **Box Jellyfish**.

The Australian Box jellyfish, *Chironex fleckeri*, has a large (box-like) bell up to 20 x 30 cm and multiple tentacles. It inhabits estuarine and on-shore coastal waters. Contact with tentacles causes severe immediate pain and whip-like marks on the skin. A sting with several metres of tentacles can cause respiratory and cardiac arrest within a few minutes. Approximately 80 deaths have been recorded.

1. **Jellyfish causing Irukandji syndrome**

Approximately 10 small to medium-sized offshore and onshore jellyfish [including *Carukia barnes and species of the Carybdea, Malo* , *Alatina* , *Gerongia* and *Morbakka* genera] are known or suspected to produce an "Irukandji syndrome". [5-8] These jellyfish have only 4 tentacles and some are too small to be seen by the victim.

A minor sting on the skin with no tentacle visible, is followed in 5-40 (typically 20-30) minutes by severe generalised pain (often cramping in nature), nausea and vomiting, difficulty breathing, sweating, restlessness and a feeling of “impending doom”. Victims may develop heart failure, pulmonary oedema and hypertensive stroke.

Prevention of further stinging by nematocyst inhibition

When a sting occurs, pieces of tentacles and non-discharged nematocysts may be left on the victim’s skin. In large or life-threatening stings it is important to inhibit non-discharged nematocysts so that subsequent handling or treatment does not cause further envenomation.

Nematocysts from different species of jellyfish are either inhibited or stimulated to discharge by different substances used for first-aid. [1,2,3,9]

Vinegar

- Vinegar (4-6% acetic acid) inhibits nematocyst discharge of Box jellyfish [10] but does not provide pain relief from the venom already injected.
- Although not proven to inhibit nematocyst discharge of all jellyfish causing Irukandji syndrome, its use is considered good first-aid practice. [1,2,3,7]
- Vinegar causes nematocyst discharge of some other jellyfish, including *Physalia* (“Bluebottle”) [5] and is therefore recommended only for tropical areas where Box jellyfish and Irukandji stings occur.

Recognition

Since it is usually difficult to recognise which species of jellyfish has caused a sting, management is based on the risk of serious stings in the known geographical distribution of dangerous species. Jellyfish able to cause life- threatening stings primarily occur along the tropical coastline of Australia i.e. from Bundaberg (Queensland) northwards, across the northern coastline and down to Geraldton (Western Australia).[1,2,3]

Tentacles on the skin

- Long lengths of easily-visible large tentacles on the skin in association with severe pain should be regarded as Box jellyfish tentacles.
- In the setting of large numbers of blue jellyfish washed up on the beach or floating on the surface of the water, tentacles are probably from a *Physalia* species (“Bluebottle”).
- Tentacles from hundreds of other species of jellyfish in Australian waters are difficult to identify. Often no tentacles remain.

Skin markings

A variety of skin markings are associated with the stings of various jellyfish species and could include the following:

- an inconspicuous mark which may develop a red flare
- an inconspicuous mark with goose pimples or an orange-peel appearance
- an inconspicuous mark with profuse sweating only at the sting site
- an irregularly shaped blotchy wheal

- white wheals with a surrounding red flare
- multiple whip-like wheals on the skin or a “frosted ladder pattern” suggest a sting by a box jellyfish
- later blistering or darkening of the sting pattern.

Pain

- skin pain is generally immediate and varies in intensity from mild irritation to very severe sharp or burning pain
- generalised muscle aches
- severe muscle cramps in the limbs, chest and abdomen.

Symptoms and signs of severe stings

- difficulty or cessation of breathing
- cardiac arrest
- severe pain
- restlessness and irrational behaviour
- nausea and vomiting, headache
- physical collapse
- profuse sweating, sometimes only in the sting area.

First Aid Management

- **No one nationwide recommendation for first-aid can be made because of differences between jellyfish species around Australia.**
- **In most cases, first-aid providers are unlikely to be able to identify the jellyfish.**
- **In the tropics, because of the risk (even if small) that the victim has been stung by a potentially lethal jellyfish, the priority must be to preserve life. If the species causing the sting cannot clearly be identified as harmless, or due to a “Bluebottle”, it is safer to treat the victim with vinegar.**
- **Outside the tropics, where huge numbers of non-life-threatening stings occur, the primary objective is pain relief with heat or cold.**

Tropical Australia

- Remove the victim from the water and restrain if necessary.
- If victim has more than a localised single sting, or who looks/feels unwell, call an Ambulance (Dial Triple Zero - 000) and seek assistance from a lifesaver/lifeguard if available.
- Assess victim and commence resuscitation as necessary following the ANZCOR BLS flow chart (ANZCOR Guideline 8).
- Liberally douse/spray the stung area with vinegar for 30 seconds to neutralise invisible stinging cells, [4] then pick off remaining tentacles.
- If the victim has **clearly** been stung by a “Bluebottle” (see above) and is assessed as having a localised sting, is stable and not requiring ambulance, vinegar should **not** be applied [9] and victim managed as per stings in non-tropical Australia.
- If vinegar is unavailable, pick off any tentacles (this is not harmful to the rescuer) and rinse

the sting well with seawater.
- Apply a cold pack or ice in a dry plastic bag for analgesia.[12] Do not allow or apply fresh water directly onto the sting because it may cause discharge of undischarged nematocysts.
- Antivenom is available for *Chironex fleckeri* and other multi-tentacled box jellyfish stings. In tropical coastal areas, hospitals keep and ambulances carry antivenom.
- Patients who initially appear stable but experience severe symptoms in the following 30 minutes may be suffering Irukandji syndrome and need urgent medical care.

Non-Tropical Australia

- Keep the victim at rest, reassure and keep under constant observation.
- Do not allow rubbing of the sting area.
- Pick off any tentacles (this is not dangerous to the rescuer) and rinse sting area well with seawater to remove invisible nematocysts.
- Place the victim's stung area in hot water (no hotter than the rescuer can comfortably tolerate) for 20 minutes.[11]
- If local pain is unrelieved by heat, or if hot water is not available, apply a cold pack or ice in a dry plastic bag. [13]
- If pain persists or is generalised, if the sting area is large (half of a limb or more), or involves sensitive areas (eg the eye) call an ambulance (Dial Triple Zero – 000) and seek assistance from a lifesaver/lifeguard if available.

For advice concerning any marine envenomation contact

Australian Venom Research Unit 1300 760 451

or

Australian Poisons Information Centre

13 11 26

New Zealand National Poisons Centre

0800 764 766

Level of Evidence

Level II (Hot water for non tropical blue bottle stings) and Level IV

Class of Recommendation

References

1. 1. Williamson JA, Callanan VI, Hartwick RF. (1980). Serious envenomation by the Northern Australian Box Jellyfish (*Chironex fleckeri*) Med J Aust 1 :13-15.
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4. Fenner P (1991). Cubozoan jellyfish envenomation syndromes and their medical treatment in northern Australia. Hydrobiologia 216/217: 637-640.
5. Flecker H. (1952). Irukandji stings to North Queensland bathers without symptoms of wheals but with severe general symptoms. Med J Aust 2: 89-91.
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9. Birsa LM, Verity PG, Lee RF. (2010). Evaluation of the effects of various chemicals on discharge of and pain caused by jellyfish nematocysts. Comp Biochem Physiol, Part C: 151: 426-430.
10. Hartwick RF, Callanan VI, Williamson JA (1980). Disarming the box jellyfish. Nematocyst inhibition in *Chironex fleckeri*. Med J Aust 1: 15-20.
11. Loten C, Stokes B, Worsley D, Seymour JE, Simon Jiang S, Isbister GK. (2006). A randomised controlled trial of hot water (45° C) immersion versus ice packs for pain relief in bluebottle stings. Med J Aust 184: 329-333.
12. Currie BJ, Jacups SP. (2005). Prospective study of *Chironex fleckeri* and other box jellyfish stings in the “Top End” of Australia’s Northyern Territory. Med J Aust 183: 631-636.
13. Exton DR, Fenner PJ, Williamson JA. (1989). Cold packs: effective topical analgesia in the treatment of painful stings by *Physalia* and other jellyfish. Med J Aust 151: 625-626.

Further Reading

Guideline 8 - Cardiopulmonary Resuscitation

Guideline 9.4.6 Envenomation - Blue-ringed Octopus and Cone Shell

Guideline 9.4.7 Envenomation - Fish Stings

Guideline 9.4.8 Envenomation - Pressure Immobilisation Technique

About this Guideline

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Other consultation	
Worksheet	Not available
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Referencing this guideline

When citing the ANZCOR Guidelines we recommend:

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