

JELLYFISH ENVENOMATION - IRUKANDJI SYNDROME



Carukia Barnesi

Introduction

In Australia there are 3 principal venomous Jellyfish:

- **Chironex fleckeri (the Box Jellyfish).**
- **Physalia Physalis (the Portuguese Mar of War)**
- **Carukia Barnesi (cause of the Irukandji Syndrome)**

Children in general are at greater risk of significant envenomation because of their smaller body sizes.

Important aspects of reducing the risk of jellyfish stings include:

- Observing any local warning signs of the seasonal and/or geographical risk of the presence of dangerous species
- The wearing of full body lycra swimsuits (or equivalent) in regions where danger is present.

The **Carukia Barnesi** is a small jellyfish that inhabits the northern tropical waters of Australia from **Geraldton (Western Australia)** to **Mackay (Queensland)**

Stings can be extremely painful, and result in “**Irukandji syndrome**”.

The term **Irukandji** is an Australian Indigenous term, which is often loosely applied to the **Carukia Barnesi and related species**, however it more correctly relates to the clinical envenoming syndrome.

Deaths have been recorded in association with this jellyfish but these were possibly due to the secondary cardiovascular effects of an induced hyper-catecholamine state rather than any direct effect of the venom.

A number of related species can also cause this syndrome.

History

In 1961 **Dr Jack Barnes** identified two small carybdeid specimens as the cause of Irukandji syndrome.⁹

Southcott named the species *Carukia barnesi* in acknowledgment of Dr Barnes' work.¹⁰

Biology

Taxonomy:

Kingdom:	Animalia
Phylum:	Cnidaria
Class:	Cubozoa
Order:	Carybdeida
Family:	Carukiidae
Genus:	Carukia

Species: Carukia Barnesi (Southcott, 1967)

Morphology:

Features of the **Carukia Barnesi** include:

- It is a small animal with a bell of only around 2.5 cm.
- It has 4 tentacles, which may reach up to 50 cm.
- It is virtually **invisible** in sea water.

Habitat

The **Carukia Barnesi** is a small jellyfish that inhabits the northern tropical waters of Australia from **Geraldton (Western Australia)** to **Mackay (Queensland)**, though with **global warming** some jellyfish species are being reported at progressively more southern latitudes.

On a global scale related species have also been reported around Hawaii, South Asia, the New Guinea and the Caribbean.

Pathophysiology

The nature of the toxin has not been fully elucidated.

Its major effect appears to be a stimulation of **massive catecholamine release**.

Deaths have been recorded in association with this jellyfish but these were possibly due to the secondary cardiovascular effects of an induced hyper-catecholamine state rather than any direct effect of the venom.

Cardiac toxicity is relatively common and is indicated by elevations in serum troponin levels.

Pulmonary edema is probably the result of cardiac dysfunction.

Clinical Features

These include:

1. Pain:
 - The initial sting is often not perceived.
 - Severe local pain, develops within 5 - 40 minutes, (most commonly within 20 - 30 minutes).
 - This usually resolves within 6 - 12 hours.

2. An erythematous papular rash may occur, however local skin signs, such as welts or other dermal markings, are usually minimal or absent.
3. Development of “**irukandji syndrome**”, usually within 30 minutes to 2 hours of being stung

Severe symptoms manifest within 4 hours.

Features include:

- Nausea and vomiting.
- Severe muscular pains
- Hyper-adrenergic response:
 - ♥ Anxiety/ restlessness.
 - ♥ Dysphoria.
 - ♥ Hypertension
 - ♥ Tachycardia
 - ♥ Sweating

This state may induce secondary complications such as:

- ♥ ICH

Rarely more severe cardiac toxicity may occur:

- ♥ Myocardial depression
- ♥ ECG changes, (T wave inversion and ST segment depression have been described).
- ♥ Pulmonary edema

Severe envenoming manifests within **4 hours**

Symptoms generally resolve over **12 hours**, but sometimes up to several days.

Investigations

Blood tests:

In unwell patients check:

1. FBE

2. U&Es/ glucose.
3. Troponin I
4. CK

Serial measurements should be done.

ECG:

Look for arrhythmias or evidence is ACS

Non-specific ST wave changes can also occur.

CXR:

CXR in those with respiratory symptoms.

Echocardiography:

Echocardiography in those patients showing elevations in troponin levels.

Skin scrapings:

Nematocysts can be identified on microscopy of skin scrapings or sticky tape samples, though these are not routinely done.

Management

1. Pressure bandage & immobilization is **not** recommended.
2. There is no specific antivenom for Irukandji stings.
3. Vinegar:
 - This is currently used although its efficacy is not as well established as for Box Jellyfish envenomation.

Some recent work suggests that vinegar may in fact result in increased venom discharge from partially discharged nematocysts, and so the current status of vinegar as a treatment for Irukandji syndrome is uncertain. ⁶
4. **Analgesia:**
 - Large doses of IV titrated opioid analgesia may be required.
5. Hypertension:
 - Refractory hypertension, unresponsive to adequate analgesia may require specific antihypertensive therapy.

GTN infusion is a good option.

6. Benzodiazepines:

- Diazepam is also useful in treating symptoms. Benzodiazepines probably act to attenuate sympathetic hyper-stimulation.

7. MgSO₄:

- This has been advocated on the basis of a small number of case reports, in addition to a theoretical proposal that it reduces adrenergic responses.

A 2012 double-blind randomised controlled clinical trial, however showed **no** benefit in the use of magnesium in Irukandji syndrome.⁵

An extensive 2017 literature review was unable to find any clear evidence to either support or refute the efficacy of MgSO₄.¹¹

8. Clonidine:⁸

- An interesting case report has described a dramatic reduction of symptoms in a patient with severe Irukandji syndrome, who had had no relief from high doses of opioids.

Clonidine from a theoretical point of view should provide at least some relief of symptoms due to its effects of sedation, analgesia, and reduction in sympathetic output.

Disposition:

Patients may be medically cleared if they have no features of systemic envenomation at **2 hours**.

Those who required opioid analgesia may be cleared following a period of **6 hours** without symptoms.

Those with cardiac involvement should be admitted to an ECG monitored ward.

Specialist Advice

For further specialist advice:

- **National Poisons Information network 13 11 26**

References

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