Irukandji syndrome, catecholamines, and mid-ventricular stress cardiomyopathy

Keith Tiong*

Department of Medicine, Cairns Base Hospital, The Esplanade, Queensland 4870, Australia

Received 22 May 2008; accepted after revision 31 August 2008; online publish-ahead-of-print 17 September 2008

We present here the first reported case of mid-ventricular stress cardiomyopathy secondary to 'Irukandji syndrome', following envenomisation from a jellyfish, Carukia barnesi, a small transparent jellyfish found in Far North Queensland, Australia prevalent during the warmer months of the year. It has been associated with 'Irukandji syndrome' as characterized by a sympathetic overdrive secondary to an excess of endogenous catecholamines release. There have been previous cases of sudden onset of left ventricular dysfunction and jellyfish. The author believes that this case is important because it highlights the possible association between the sudden release in catecholamines and stress cardiomyopathy.

KEYWORDS
Mid-ventricular; Stress cardiomyopathy; Irukandji syndrome; Carukia barnesi; Catecholamines

Case report

A 26-year-old man was admitted to a local hospital in Far North Queensland, 2 h following a sting on his body trunk from a jellyfish similar in description to Carukia barnesi, a small transparent jellyfish. The subject remembers contact, while diving, with a small transparent jellyfish, similar in size and character to Carukia barnesi. This occurs near the waters of Cooktown, a seaside resort in Far North Queensland in December, during summer, a peak period for Carukia barnesi.

On admission to hospital, the subject developed symptoms consistent with 'Irukandji syndrome' which included pain, restlessness, agitation, and palpitations. His serial ECGs at 4.5 h and 19 h following envenomisation revealed a persistent generalized hyperacute T waves. His physical examination was consistent with a sudden catecholamines release with persistent tachycardia and hypertension (Figure 1). There were minimal effects from the sting itself with no detectable envenomisation rash which is consistent with Carukia barnesi. There were minimal abrasions on his body trunk which were not attributed to envenomisation. A rise in troponin was detected with a peak troponin I of 5.5 μg, 14 h later. His chest X-ray and cardiovascular examination at this stage were consistent with a mild degree of transient pulmonary oedema which responded to 20 mg of iv frusemide and glyceryl trinitrate infusion. The differential white cell counts were normal with an isolated thrombocytopenia. For Irukandji syndrome, the subject was initially treated with high flow oxygen, repeated doses of morphine, and 10 mmol of intravenous magnesium sulfate. Magnesium decreases the release of catecholamines and attenuates the receptor sensitivities. His telemetry recordings revealed heart rate variabilities which could be stigmata of sympathetic overdrive secondary to catecholamines release. He was also previously well with no past medical history. He was subsequently discharged from hospital 3 days after admission.

Serial transthoracic echocardiograms were performed on admission which confirms mid-ballooning stress cardiomyopathy with poor mid-regional wall motions. His systolic and diastolic cardiac functions were assessed by B mode, M mode, and the Simpson’s method which confirm the diagnosis of mid-ventricular stress cardiomyopathy with apical sparing. No invasive cardiac investigations were performed (Figures 2–7).

I believe that this case is important because it highlights the possible mechanism behind the stress cardiomyopathy. This is a transient event with an acute compromise in cardiac function secondary to sympathetic overdrive. Previous in vivo studies have confirmed the rise in catecholamines level with envenomisation from Carukia barnesi. This is the first documented case of mid-ventricular stress cardiomyopathy secondary to contact with venom from a jellyfish. Although no skin scrapping was performed to determine the presence of nematocytes, the author and his colleagues believe the description and the presentation was consistent with envenomisation from Carukia barnesi.

* Corresponding author. Tel: +61 740506118; fax: +61 40506113.
E-mail address: keithtiong@aol.com

Published on behalf of the European Society of Cardiology. All rights reserved. © The Author 2008.
For permissions please email: journals.permissions@oxfordjournals.org.
Discussion

Irukandji syndrome derives its name from the indigenous population who resided in the region between Cairns and Port Douglas in Far North Queensland. Carukia barnesi is a transparent small box-like jellyfish with its bell up to 2 cm in size with four tentacles, each measuring up to 1 cm. It utilizes its nematocysts (stinging organelles) for capturing prey and defence. The release of its venom or contact with its tentacle’s extract is associated with ‘Irukandji syndrome’, characterized by a sympathetic overdrive. In vitro and in vivo animal studies have confirmed its cardiovascular association with sympathetic overdrive with direct pressor effects and tachycardia secondary to the sudden release of endogenous noradrenaline and adrenaline. In animal models, catecholamines have direct toxic effect on cardiac muscles by the activation of α- and β-receptors. Similar phenomenon has been confirmed in case reports involving human subjects with this syndrome characterized by clinical findings similar to sympathetic overdrive with diaphoresis, persistent tachycardia, and hypertension. There has been association between jellyfish and deaths secondary to intracranial haemorrhage presumed secondary to the sudden rise in blood pressure. Currently, there is no unequivocal data...
to confirm the hypothesis of a direct toxic effect from the venom released as a direct cause of cardiomyopathy. Mid-ventricular ballooning syndrome is a variant form of stress cardiomyopathy with transient mid-ventricular weakening with apical sparing. Mid-ventricular stress cardiomyopathy may also present a continuum in the evolvement of stress cardiomyopathy. Recently, the Queensland Irukandji Taskforce has recently published their guidelines in the management of this condition which includes the use of vasodilator agents such as magnesium and phentolamines. Magnesium also directly inhibits the action catecholamines in the peripheral circulation, and phentolamine is an alpha adrenergic receptor blocker.

References