Lionfish envenomation - a sea bathers' nightmare: A case study at Teaching Hospital Karapitiya

Ruben J¹, Tilakaratne S², Ekanayake ST², Bandara UW², Yahathugoda TC³

^{1,3}Department of Parasitology, Faculty of Medicine, University of Ruhuna, Galle, Sri Lanka.

²Teaching Hospital Karapitiya, Galle, Sri Lanka.

Correspondence: Dr. Janaka Ruben
e-mail: janakaruben@med.ruh.ac.lk
<https://orcid.org/0000-0001-6391-8255>

Introduction

Sri Lanka has coral reefs of high biodiversity. Both Synanceiidae (stonefish - the most venomous reef fish on the globe) and Scorpaenidae (lionfish and scorpionfish - which may cause significant envenomation) families are present in it. The risk of envenomation by them are on the rise due to increased leisure activities at sea following cessation of the long stood terrorist problem in the country. However, there is paucity of scientific reports on such envenomation at Sri Lankan coasts due to poor awareness and knowledge on this envenomation and masking effects of drowning and near drowning. It is important that the medical officers, especially those who are working at the coastal hospitals, should have adequate knowledge on clinical presentation, first-aid, management and prevention of marine envenomation. We are reporting here a detailed analysis of a case of lionfish envenomation.

Case presentation

A 16 year-old otherwise healthy boy has been admitted to the Emergency Treatment Unit, Teaching Hospital Karapitiya (ETU-THK) with a complaint of his right middle finger being stung (Figure 1) by a moving reddish fish. The incident happened when he tried to catch the fish by putting his hand under a coral rock in the sea near Galle Fort.

His immediate complain was intense pain at the site of the sting with a radiating ache towards the axilla. Next, he observed swelling of the ring finger within 15 minutes. The patient was admitted to ETU-THK within 30 minutes of the incident.

On admission, a bleeding tendency assessment test - 20 minutes, whole blood clotting time - recorded negative results and right middle finger pulse was detected by the onsite ultrasonography. Swelling has extended beyond the wrist within four hours of the sting (Figure 2) and he was transferred to a General Surgical unit at THK for further care.

Figure 1: The sting site on right ring finger caused by the lionfish

Summary of investigation results are given in the table 1.

Table 1: Summary of the investigation results

Investigations	Result Day 1	Result Day 2	Reference range	Comment
WBC	$14.78 \times 10^3/\mu\text{L}$	-	$4.5 \text{ to } 11.0 \times 11^3/\mu\text{L}$	Marginal elevation
Neutrophil	$8.61 \times 10^3/\mu\text{L}$	-	$1.5 \text{ to } 8.0 \times 10^3/\mu\text{L}$	Marginal elevation
Lymphocytes	$4.63 \times 10^3/\mu\text{L}$	-	$1.0 - 4.8 \times 10^3/\mu\text{L}$	Normal
Platelets	$345 \times 10^3/\mu\text{L}$	-	$1.50 - 4.50 \times 10^3/\mu\text{L}$	Normal
Blood urea	22 mg/dL	23 mg/dL	19 - 43 mg/dL	Normal
Creatinine	82 $\mu\text{mol/L}$	55 $\mu\text{mol/L}$	60 - 110 $\mu\text{mol/L}$	Normal
PT	12.8 s	-	< 13.0 s	Normal
INR	1.13	1.23	< 1.5	Normal

Figure 2: Swelling of the right hand after four hours of the injury **Figure 3:** Healed sting site after six weeks of injury

The initial pain was managed using an antipyretic (paracetamol) and anti-inflammatory (NSAID) oral medications. Chlorpheniramine was given to reduce the inflammation. Co-amoxycylav and Metronidazole infusions were started and a parenteral antihistamine was continued. Symptoms and most of the swelling of the hand improved within the course of three days. Surgical interventions were not required. Patient was discharged after 5 days of in-ward care. He was given same antibiotics orally for five more days. Patient was reviewed after six weeks in the outpatient department (Figure 3).

Discussion

Patient gave a vague description of the fish which allowed doctors to suspect that it could be a lionfish sting. An immediate exploration by the first author at the vicinity where the incident occurred allowed him to detect and photograph a pair of lionfish and to identify them as *Pterois antennata* (Figure 4).

Lionfish belongs to family Scorpaenidae and consider in class Actinopterygii under order Scorpaeniformes. They are native to Indo-Pacific Ocean, thus found in Sri Lanka as well. *Pterois antennata* (Bloch 1787), *Pterois miles* (Bennett 1828) and *Pterois radiata* (Cuvier 1829) species live in Sri Lankan coral reefs and popular among exotic fish trading.

The lionfish have 18 venomous fins (Figure 5) along the pelvic, anal and dorsal areas primarily for their self-defense. Marine scientists have noticed that they do not use them to catch the prey. Adult lionfish show territorial behaviour and the offspring usually swim slowly around the vicinity searching for new territories and foods. The victims get stung by these fish when the lionfish has not enough time to move away or when swimmers try to touch them. When a spine enters the victim's tissue, the sheath of the spines pressed down and the venom released from the ridges situated along the spines (Figures 6 and 7). Lionfish venom is not usually fatal unless the affected person is drowned due to the pain and paralysis. However, the venom causes severe reactions and may lead to infections if not managed properly.

Figure 4: The Lionfish *Pterois antennata* (Bloch, 1787) at Fort Galle coral reef.

Figure 5: Venomous and non-venomous parts of the lionfish

Figure 6: The anatomy and the mechanism of envenomation

Upon entering the tissues, the venom quickly shows its effects. Initial complaint of severe pain is mainly due to stimulation of non-peptidergic nociceptors along with weakness and numbness of the affected limb (1).

Systemic symptoms are not very common in lionfish envenomation. However, it can cause some cardiac symptoms such as hypo / hypertension, tachy / bradycardia and very rarely, fever, cold sweating, syncope, nausea, vomiting, dyspnoea, convulsions and even cardiac failure. Hypersensitivity to the venom may cause anaphylactic reactions, which is seen in repeated envenomation (2). Theoretically, lionfish possesses fatal toxins, however deaths due to its sting has not being reported yet (3).

Lionfish venom induces haemolytic activity and weak cytotoxicity in endothelial cells and myoblasts (4). *In vivo* lionfish venom induces a lesion in the skin probably as the result of a thrombotic effect. Lionfish venom is considered neither haemorrhagic nor myotoxic, but can cause oedema and vascular congestion. Gelatinolytic activity is decreased by EDTA, indicating the presence of metallo-proteinases, both in crude venom and mucus (4).

Although lionfish are venomous and the venom of the fish remains potent for up to 48 hours after the death of the fish, cooked fish is not poisonous due to the vulnerability of venom to heat when cooking (3). Sometimes they can be found in the local fish market after removal of fins to prevent accidental envenomation (Figure 8). However, the lionfish is not a traditional food in our country, and they only come to the market when accidentally caught into the fishing nets.

As saltwater aquariums are not popular in Sri Lanka, lionfish stings not common among local aquarium keepers, which is perhaps more common in the West including USA, Mexico, Brazil etc. (2). In Sri Lanka, the usual community who are at risk includes sea bathers, snorkelers and fishermen. At present the biggest threat is that lionfish has become an invasive species in non-native oceans like Mexican gulf areas where there are no natural predators. Thus hunting lionfish and consuming them as a food is permitted in those countries (2).

Figure 7: Venomous dorsal spines of a lionfish (dead specimen collected from the fish market)

Treatment of lionfish sting includes removal of visible spines and immerses or sponge the affected area with non-scaling water (45°C). This will relieve the pain by deactivating the venom, however delayed cases need NSAIDs and opioids for effective pain management. Regional anaesthesia is another method of pain relief. However, it should not be combined with hot water immersion due to the risk of burn injuries. Antibiotics can be given to prevent the infections. Tetanus toxoid should be given as a prophylactic measure. An antihistamine is given to prevent allergic reactions. Further, the multiple

exposures to the toxin may cause anaphylaxis therefore, patient should be brought to a place where anaphylaxis can be managed effectively.

In the case reported here, the surgical team was planning to do a wound toilet due to the bluish necrotic skin. However, upon observing the satisfactory progression of the site of sting, decided not to do tissue removal at the fingertip. Tissue removal at the fingertip is challenging as it can lead to disfigurement and functional impairment. Though patient's injury has healed by six weeks, remarkable changes in the texture of the skin like thinning and bulging was observed at the affected site.

Figure 8: Lionfish for sale (Fins removed) at a fish stall near Galle Fort

All photographs and drawings by Janaka Ruben except for the photograph in figure 3 which is by Ekanayaka ST.

References

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