

Case Report

White scorpion (*Hottentotta tamulus*) sting induced autonomic hyperactivity and myocardial ischemia in a child

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Abstract:

Scorpion bite is one of the common emerging toxicological problems in Jaffna peninsula of Northern Sri Lanka. Majority of the patients have an uncomplicated course, but some people may have severe systemic envenomation and life-threatening cardiovascular events. This case report is of a child admitted to Paediatric professorial unit, Teaching Hospital Jaffna following white scorpion (*Hottentotta tamulus*) bite. Subsequently he developed myocardial ischemia. There was no literature available in paediatric population with myocardial ischemia following sting of *Hottentotta tamulus*.

Key words:

White scorpion (*Hottentotta tamulus*), Jaffna, Sri Lanka, envenomation, myocardial ischemia

Introduction:

There are around 1750 species of scorpion globally identified. In Sri Lanka 18 species of scorpions are reported under three families (1). Whereas in India 86 species are noted. Amongst *Mesobuthus tamulus* (red scorpion) and *Heterometrus swammerdami* are clinical importance scorpions (2). *Heterometrus gravimanus* (Black scorpion) and *Hottentotta tumulus* (white scorpion) are two common species of scorpions reported in Jaffna. This white scorpion is deadly venomous (3). It is most prevalent in Maharashtra India. It is said, *Mesobuthus tamulus* (red scorpion) has been renamed as *H.tamulus* after taxonomic revision (4). It was not sighted in any part of Sri Lanka before 1990. It is thought to have migrated to Jaffna in 1987 with the luggage of Indian Peace Keeping Forces (IPKF) (5)


Pain and erythema at the site of sting, chest pain, palpitations, diaphoresis, excessive salivation, piloerection, tachycardia/bradycardia, hypertension/

hypotension, hyperthermia and priapism are the recognised clinical features of scorpion bite in adults. Serious life-threatening consequences such as acute pulmonary oedema, hypoxemia, myocardial ischemia and cardiogenic shock are also reported. Even though autonomic hyperactivity and pulmonary oedema observed in children, myocardial ischemia is not reported in literature by this mentioned species. Here, we report the first case of a child, who developed autonomic instability with myocardial ischemia.

Patient information:

A 10-year-old previously healthy child (weight 32kg, 25-50th centile) was brought with a history of an unknown sting on his left shoulder. He had severe pain, profuse sweating and high blood pressure and was transferred to Teaching Hospital Jaffna from the nearby divisional hospital. He was haemodynamically stable on arrival at Accident and Emergency unit of Jaffna hospital. Then he was transferred to paediatric ward after blood investigations. There was no history of allergy to any food or drugs. His developmental milestones were normal, immunizations were up to date. The antenatal, birth and postnatal were uncomplicated. They have recently built a cemented own house. All family members sleep on the floor.

On examination the pulse rate of 100/m and good volume, blood pressure 108/74mmHg in multipara monitor, precordial examination was normal, capillary refilling time <2sec but his body and extremities were cold and had profuse sweating. After 30 minutes of ward admission again he developed excessive sweating with shivering, headache, light headedness and eye pain. His pulse rate was 128/min with the blood pressure of 102/60mmHg. Next day morning (since 24 hours of bite) he developed more sweating and pulse rate went up to 152/m, blood pressure dropped to 88/54mmHg and respiratory rate was 32/m. But he did not complain

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palpitation, chest pain and shortness of breath or syncope. He didn't have ankle oedema, fine basal crepitation, nor other features of heart failure.

Unexplained tachycardia and lowering blood pressure determined for further evaluation of cardiac complications.

On investigation the Haemoglobin was 14.8g/dl, WCC 25.29x10⁹/l, Neutrophils and platelets were 457x10⁹/l. CRP was 3.4U/L, PT/INR were normal range and the renal functions and liver functions were normal.

Objective identification of white scorpion (Figure 1) was done and the clinical features matched autonomic over activity of white scorpion sting.



Figure 1: White Scorpion (*Hottentotta tamulus*)

The ECG changes are given in table 1.

Table 1: ECG changes

Investigation	ECG				
	Day 1	Day 1	Day 2	Day 4	Day 8
Date	Day 1	Day 1	Day 2	Day 4	Day 8
Time	11.20am	5.38pm	10.09am	9.02am	9.40am
Result	Sinus rhythm HR-120/m T inversion in Li & aVL	Sinus rhythm HR-140/m T waves returned to iso-electrical base line	HR-120/m No further dynamic changes	Sinus rhythm HR-120/m, ST elevation (>1mm) in Lii, Liii & aVF with deep T inversion and ST depression in Li, aVL & V4-V6	HR-96/m, ST elevation settled, reduced ST depression & deepening of T inversion

Table 2: Troponin I level

Test	Troponin I (0-0.15ng/ml)			
	Day 1	Day 1	Day 4	Day 8
Date	Day 1	Day 1	Day 4	Day 8
Time	11.20am	1.33pm	6.07am	9.20am
Result	0.029 (Negative)	0.694 (Positive)	0.648 (Positive)	0.385 (Positive)

2D Echo showed Ejection fraction 55%, No wall motion defect or pericardial effusion. Structurally and functionally normal heart.

The child was initially managed with Proazocin 0.25mg at the peripheral hospital. At the tertiary care hospital monitoring was done in HDU. We decided to give prazosin in case of BP rises more than 75th centile. Due to the persistent tachycardia ECG was performed which showed T inversion in lateral leads. Regular dose of Prazosin started 6 hourly. ECG on second day of admission showed inferior ST elevation with lateral leads reciprocal depression. It meant significant myocardial event. Frusemide 20mg oral given at a point he had extreme tachycardia (168/m). But no features of supra ventricular tachycardia observed in ECG. He was referred to paediatric cardiologist. The 2D Echo was normal and there were no wall motion defects identified. Cardiologist suggested to continue Prazosin with bed rest. Child was managed conservatively with close monitoring throughout the hospital stay. He recovered spontaneously from 4th day of admission. He was discharged on 8th day of admission. After 3 days 2D Echo was done with an ejection fraction of 60%.

Discussion:

Pathophysiology and mechanism of scorpion venom is poorly understood worldwide. It is said to be species specific from various clinical reports, study on biochemistry of venom, animal study and autopsy studies. This venom is a complex mixture of short neurotoxic proteins containing numerous amino acid sequences, histamine, serotonin, hyaluronidase, phospholipases and other various cardiotoxins, nephrotoxins, haemolytic toxins (6,7)

Cardiac toxic effect of white scorpion resembles the Indian red scorpion. There are two possible mechanisms explained. It mainly acts on the alpha receptors (Alpha

toxin) and also in Na-K-ATPase pump of cardiac muscle fibers and conduction system. It opens the Na channel, but inhibits the calcium dependent potassium channel. Thus autonomic storm, tachycardia, hypertension, increase myocardial demand, pulmonary oedema and cool extremities occur (8,9).

Clinical features of palpitation, tachycardia, hypertension and cold extremities lead to a high suspicion of autonomic over activity. Consequently, patients may develop hypertensive crisis, pulmonary oedema and myocardial infarction. Features of autonomic storm (Cholinergic hyper stimulation) such as vomiting, salivation, diaphoresis, priapism and bradycardia can be followed by respiratory compromise.

ECG and cardiac biomarkers are the easiest available tests in diagnosing acute coronary events and myocarditis. ECG has a high sensitivity to detect myocardial infarction but cardiac markers such as Troponin-I may be falsely positive. Arrhythmia induced myocardial ischemia and heart failure are the most common reasons for it. Where Troponin-I may be marginally positive. But there are around 10 cases reported in adult population where the patients underwent coronary angiogram following hornet and multiple wasp bites. Most of them had coronary artery thrombosis and underwent primary coronary interventions (10).

Causes for tachycardia following scorpion bite is multi factorial. It could be due to toxin, myocarditis/ myocardial ischemia, pulmonary oedema, pain, anxiety, anaphylaxis and dehydration after vomiting. All patients should undergo a 12 lead ECG and cardiac biomarkers. Recently emerging Point Of Care Ultra Sound (POCUS) scan in EDs weigh out the need of chest X ray. Presence of B profiles in lung ultra sound scan is the evidence of pulmonary oedema.

Morbidity and mortality markedly reduced after Prazosin was introduced as an antidote. Prazosin is a competitive antagonist of post synaptic alpha 1 receptor, suppress the sympathetic outflow and reactivate the

potassium channel. Further it prevents myocardial injury by reducing preload, afterload, blood pressure and also control the tachycardia. Awareness towards the *Hottentotta tumulus* is needed, since there is a practical risk of migration to other part of the country. In future we need further studies to evaluate coronary thrombosis following white scorpion bite.

Conclusion

White scorpion bite envenomation affecting cardiac dysfunction is a rare event and early administration and titration of prozocin helps to overcome the morbidity and mortality.

References:

1. Pirasath Selladurai, Prasanth A Sagayanathan, and Thirunavukarasu Kumanan, et al Blistering skin lesion: A new observation of *Hottentotta tamulus* (white scorpion) sting 2019 Feb 26. doi: [10.1177/2050313X19834187](https://doi.org/10.1177/2050313X19834187)
2. Erfati P. Epidemiology, symptomatology and treatment of buthinae stings. In: Bettini S, editor. *Arthropod Venoms: Hand Book of Experimental Pharmacology*. New York: Springer Verlag; 1978. pp. 312–5. [[Google Scholar](#)]
3. Kularatne SA, Dinamithra NP, Sivansuthan S, et al. Clinico-epidemiology of stings and envenoming of *Hottentotta tamulus* (Scorpions: Buthidae), the Indian red scorpion from Jaffna Peninsula in northern Sri Lanka. *Toxicon* 2015; 93: 85–89.
4. Kovarik, F., 2007. A revision of the genus *Hottentotta* Birula, 1908, with descriptions of four new species (Scorpiones, Buthidae). *Euscorpius* 58, 1e107
5. Ratnayake RM, Kumanan T and Selvaratnam G. Acute myocardial injury after scorpion (*Hottentotta tamulus*) sting. *Ceylon Med J* 2016; 61(2): 86–87
6. Zlotkin E, Miranda F, Lissitszky S. Proteins in scorpion venoms toxic to mammals and insects. *Toxicon* 1972; 10: 207-209.
7. Basu A, Gomes A, Dasgupta SC, Lahiri SC. Histamine, 5-HT and Hyaluronidase in the venom of scorpion *Lychas laevifrons* (Pock). *Indian J Med Res* 1990; 92: 371-373.

8. Zlotkin E, Shulov AS. Studies on the mode of scorpion neurotoxins—A review. *Toxicon* 1969; 7: 217-221.
9. Ellenhorn MJ, Schonwald S, Ordog G, Wasserberger J. Natural Toxins. *In: Ellenhorn's Medical Toxicology. Diagnosis and Treatment of Human Poisoning*. Ed. Ellenhorn MJ. Baltimore, Williams and Wilkins, 1997; p 1738.
10. Kaushal et al. Wasp bite related myocarditis: a rare manifestation Sri Lankan Journal of Anaesthesiology: 26(1):59-60(2018)
11. Kularatne SA, Dinamithra NP, Sivansuthan S, et al. Clinico-epidemiology of stings and envenoming of *Hottentotta tamulus* (Scorpions: Buthidae), the Indian red scorpion from Jaffna Peninsula in northern Sri Lanka. *Toxicon* 2015; 93: 85–89
12. Bawaskar HS, Bawaskar PH. Prazosin in the management of cardiovascular manifestations of scorpion sting. *Lancet* 1986; 1: 510-511