Low atrial rhythm as a complication of *buthotus judaicus* ("black" scorpion) evenomation

Fuad Basis, MD[1], Michael Kapeliovich MD, PhD [2], Yedidia Bentur, MD[3]

[1]*The Emergency Department,* [2]*Department of Cardiology and*
[3] *The Israel Poison Information Center, Rambam Medical Center, Faculty of Medicine, Technion-Israel Institute of Technology, Haifa, Israel*

Abstract:

Scorpion stings are a common event in tropical and subtropical regions. Among the 20 species of scorpions in Israel, the most venomous are *Leiurus quinquestriatus hebraeus* ("yellow" scorpion), *Androctonus crassicauda* and *Androctonus bicolor* (both "black" scorpions) (1). Systemic toxicity is determined by the type of scorpion, its age and size, the amount of venom injected and the victim's age -children being more susceptible (1,2).

Systemic intoxication is the result of overstimulation of the central nervous system and the sympathetic and parasympathetic systems. Clinical manifestations range from local pain to severe cardiotoxicity or encephalopathy (1,2).

Most reported cases of severe toxicity have been attributed to evenomation by *Leiurus quinquestriatus* (1,2). In the case presented here, a rare previously unreported cardiac arrhythmia was inflicted by the relatively non-venomous "black" scorpion *Buthotus judaicus.*

MeSH Words: scorpion, *Buthotus judaicus*, conduction, cardiotoxicity

Case report

A 32-year old previously healthy male presented to the emergency department 12 hours after he was stung by a black scorpion. He complained of mild pain, dizziness, weakness and nausea. On admission, he was in good general condition, blood pressure 130/80, heart rate 72/min regular, respiratory rate 18/min, temperature 36.8°C. The site of the sting on his toe was red and tender. The rest of the physical examination was unremarkable.

The ECG revealed regular rhythm, 73 bpm, inverted P wave in leads II, III, AVF, V_{1-6}, normal PR, QRS and QT intervals and slightly

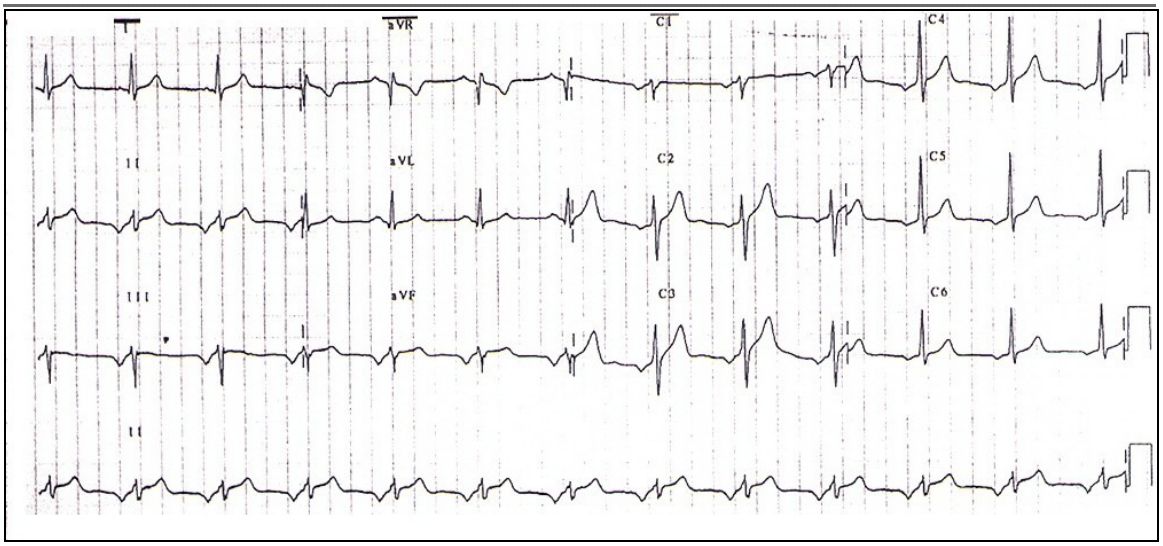

Figure 1: Patient's ECG showing low atrial rhythm

elevated concave ST-segment in V_{2-4}. The ECG was interpreted as low atrial rhythm and early repolarization (Figure 1). Laboratory tests, which included CBC, glucose, Na, K, BUN and CK, were all normal. After several hours, ECG spontaneously reverted to normal and remained so for the next 24 hours. Continuous cardiac monitoring done over 24 hours after the disappearance of the low atrial rhythm did not reveal any abnormality. During that period, all complaints subsided and the patient was discharged. An echocardiogram done several weeks later was within normal limits. A 24 hour Holter monitor done 3 months after discharge showed few episodes of nodal rhythm which were not accompanied by any symptoms.
The scorpion was later identified by a zoologist as *Buthotus judaicus*.

Discussion

We present a case of systemic (including cardiotoxic) manifestations caused by one of the least venomous scorpions, the "black" scorpion, *Buthotus judaicus*.

The first detailed description of myocardial injury caused by scorpion evenomation was a review of 82 patients by Gueron et al. in 1970. (3). Subsequent studies have looked at the cardiovascular effects of scorpion venom, both clinically and pharmacologically. Despite the zoological differences between scorpions, it seems that there are some similarities in venom composition and a common mechanism of action (1). Scorpion venom is a complex mixture of mucopolysaccharides, hyaluronidase, serotonin, histamine, protease inhibitors, histamine releasers and neurotoxins (1). It activates neuronal sodium channels and blocks calcium activated potassium channels resulting in excessive firing of neurons (1,2,4). There is a general agreement that the cardiac effects of the venom are mediated via stimulation of both parts of the autonomic nervous system, with a predominance of the sympathetic part, and excessive discharge of tissue catecholamines (4). Gueron and Ovsyshcher classified the cardiovascular and respiratory manifestations of severe scorpion evenomation into five syndromes, including hypertension, pulmonary edema with hypertension, hypotension, pulmonary edema with hypotension and rhythm disturbances. The latter includes sinus bradycardia or tachycardia, premature atrial and ventricular beats, supraventricular tachycardia and ventricular fibrillation (5). Conduction defects are rarely reported and include bundle branch block and various degrees of heart block (4). To the best of our knowledge, there has been no report of low atrial rhythm after scorpion stings, including the most venomous species *Leiurus quinquestriatus*.

Buthotus judaicus is perceived as a non-venomous "black" scorpion. There is only one report describing its toxicity and that includes convulsions in a 10-month old infant who was

stung 3 times (6). Our patient is the first reported case of cardiotoxicity from *Buthotus judaicus*. It

is also noteworthy that the cardiac rhythm disturbance occurred in a young and healthy adult rather, than in a potentially more susceptible child.

Low atrial rhythm can be a normal variant in healthy subjects. However, this dose not seem to be the case here, as the patient also had non-cardiac manifestations and the arrhythmia did not recur in a 24-hour continuous cardiac monitoring. An ambulatory 24 hour Holter monitor showed few episodes of asymptomatic nodal rhythm. An association between the nodal rhythm and the low atrial rhythm can not be excluded, but it seems unlikely as the latter was temporally related to the sting, accompanied by other systemic manifestations and was not evident in the Holter monitoring.

Bradyarrhythmias are proposed to be partly caused by cholinergic stimulation. However, frequent failure to respond to atropine treatment, may support another mechanism involving electrolyte disturbances (4). In this case, the appearance of low atrial rhythm could be explained by venom-induced sinus arrest and ectopic pacemaker coming into action with escape low atrial rhythm.

We conclude that species of "black scorpions" - previously regarded as harmless - are possibly capable of inducing cardiotoxicity. It is recommended that any symptomatic victim of scorpion sting should be admitted and observed for possible cardiovascular manifestations and for repeated ECGs.

References

1. Amitai Y. Clinical manifestations and management of scorpion evenomation. Public Health Rev 26:257-263, 1998.
2. Sofer S, Shahak E, Gueron M. Scorpion evenomation and antivenin therapy. J Pediatr 127:973-978, 1994.
3. Gueron M, Yarom R. Cardiovascular manifestations of severe scorpion sting. Chest 57:156-162, 1970.
4. Ismael M. The scorpion evenomation syndrome. Toxicon 33:825-858, 1995.
5. Gueron M, Ovsyshcher I. What is the treatment for the cardiovascular manifestations of scorpion evenomation? Toxicon 25:121-124, 1987.
6. Amitai I, Katzer Z, Man G, Amitai P. Convulsion following a black scorpion (Buthotus judaicus) sting. Israel J Med Sci 17:1083, 1981.

Competing Interests: None Declared

Funding: None Declared.

This article has been peer reviewed.

Correspondence to:

Yedidia Bentur, MD
Director, Israel Poison Information Center
Rambam Medical Center
P.O. Box 9602
Haifa 31096 Israel
Tel: +972-4-854 2725
Fax: +972-4-854 2092

Email: d_bentur@rambam.health.gov.il