Case Report

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Acute Myocarditis Due to Scorpion Sting in a 9-Year-Old Girl

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Citation: Khalilian MR, Tavallai Zavareh SA, Norouzi AR, Ghazavi M, Goudarzi AA. Acute Myocarditis Due to Scorpion Sting in a 9-Year-Old Girl. Case Reports in Clinical Practice. 2021; 6(3):86-89.

Running Title: Acute Myocarditis After Scorpion Sting

ABSTRACT

A 9-year-old girl with signs and symptoms of acute toxic myocarditis and cardiogenic shock with elevated cardiac enzymes was admitted to the Critical Care Unit (CCU) of our hospital with an ejection fraction of 25%. The patient was managed with supportive care and the administration of polyvalent antivenom and inotropes, and after 8 days, she was discharged without any complication with normal ejection fraction. Toxic myocarditis can be a result of scorpion envenomation. After two months of follow-up, the patient recovered completely and medications were discontinued.

Article info:
Received: 29 May 2021
Revised: 14 Jun 2021
Accepted: 23 Jun 2021

Keywords:
Myocarditis; Sting; Scorpion

Introduction

About one million cases of scorpion stings are yearly reported in the world even from the South Pole. As Iran is mostly located in the tropical region, it has too many arthropods species, especially scorpions [1]. After Mexico and Colombia, Iran has a high prevalence of scorpion stings in the world. Scorpion venom contains a neurotoxin, hemotoxin, and cardiotoxin. Due to these various types of toxins, there are different clinical symptoms. In this case, we report myocarditis due to scorpion venom [2, 3].

Case Presentation

A 9-year-old female from the central region of Iran was injured by a scorpion sting on her left great toe on a hot summer night. The type of scorpion was a black emperor (androctonus crassicauda). After 4-5 hours, she felt cold sweating, thirst, and also chest pain. Her parents called the emergency services, and soon after the emergency ambulance arrived, they detected systolic blood pressure of

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about 80 mmHg, and serum normal saline was started for her in the ambulance.

In the hospital emergency room, she complained of pain at the site of the sting, shortness of breath, dizziness, cough, and profound sweating. She had no history of significant diseases and also had no predisposing cardiac risk factors. On examination, her blood pressure was 84/44 mmHg, heart rate was 135 beats/min, and respiratory rate was 30/min. Heart auscultation showed S1, S2, and S3 at the apex with a systolic murmur and no pericardial rub. There were basal to mid crackles in both lungs. Jugular venous pressure was high about 9 cm in a semi-sitting position.

We immediately started the dopamine drip (10 µg/kg/min). She also received scorpion polyvalent antivenom. Electrocardiogram (ECG) showed sinus tachycardia with diffuse ST-segment depression. A portable chest X-ray was performed, which showed increased cardiothoracic ratio and also increased pulmonary vascular markings. Routine biochemistry tests, including BUN/Cr and liver function tests, were within normal limits. Urine analysis showed trace hematuria. Retic count was within the normal range and there was no coagulopathy. Serum-specific cardiac enzymes were at high levels, Creatine Kinase-MB (CK-MB) was 164 U/l, and troponin-I was 194 ng/ml and at a high level.

Figure 1. Electrocardiogram shows sinus tachycardia in our patient

The scorpion biting the patient was brought to our center by the relatives that belonged to black emperor scorpions (androctonus crassicauda). Electrocardiography showed sinus tachycardia (Figure 1) and chest radiography showed a normal cardiothoracic ratio and a mild increase in pulmonary blood flow (Figure 2). Echocardiography in the emergency department discovered severe left ventricular and also interventricular hypokinesia and reduced ejection fraction of 25% (using biplane Simpsons method) with mild mitral regurgitation (Figure 3).

Then, she was transferred to the Critical Care Unit (CCU) for better monitoring and care. Her first diagnostic impression was cardiogenic shock due to scorpion bite myocarditis. We started low-dose inotropes and she experienced hemodynamic stability and then, an ACE inhibitor was started after few days because she needed preload and also afterload reduction and increased chronotropic effect. With gradual clinical improvement, left ventricle function returned to the normal level. Day after day she was able to walk and felt lesser pain. Also, inotrope doses reduced and after 8 days, she was fully recovered without any complication and discharged. Education for the prevention of bites was given to her and her family. Discharge echocardiography showed normal LV function and no mitral regurgitation. All previously mentioned cardiac enzymes, including CK-MB and troponin were within normal limits at discharge. After two months of follow-up, the patient recovered completely and medications were discontinued.

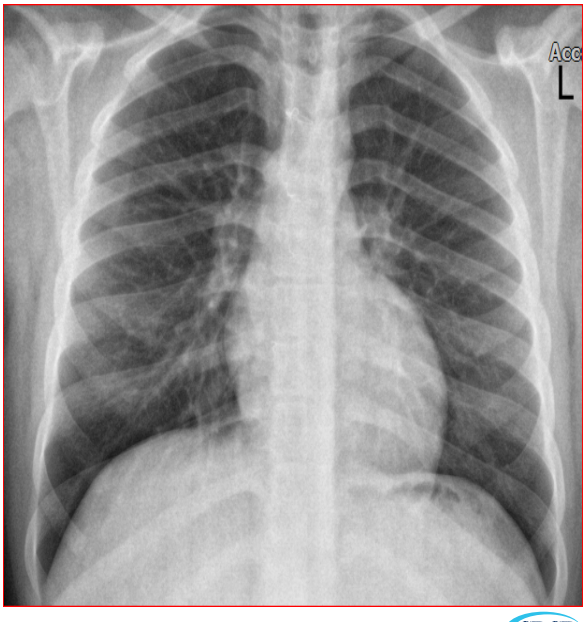

Figure 2. Chest x-ray of our patient showing normal cardiothoracic ratio and a mild increase in pulmonary blood flow

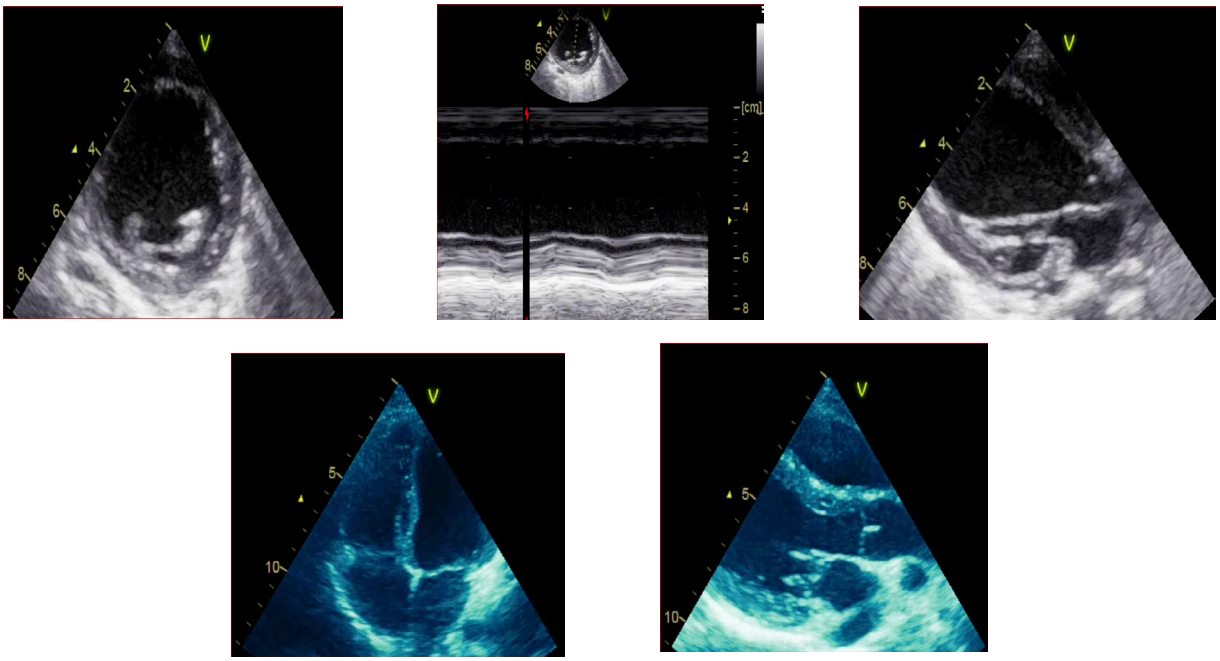

Figure 3. Echocardiogram of the patient with acute myocarditis

The upper planes (Left plane: ventricles short axis, middle plane: M-mode of the ventricle, right plane: long axis of the ventricle), which all demonstrating dilated Left Ventricular (LV) and also reduced Left Ventricular Ejection Fraction (LVEF). The lower plane (Left plane: 4-chamber view, right plane: long-axis view), which was done two months after discharge, shows good LV size.

Discussion

The remarkable point in our patient was heart involvement without other organs failure. Scorpion envenomation is a common health problem in tropical regions with relatively high morbidity and mortality rate, especially in children. Based on the type of scorpion, we face different types of clinical symptoms starting with pain in the sting location and even cardiac shock [4]. Also, cardiac, respiratory, neurologic, and kidney involvement is observed [5].

Most bites are reported on summer nights in the lower extremity and at home. Thus, it is recommended to block holes in the walls of houses and use an appropriate bed while sleeping to avoid scorpion stings [6].

Our patient showed shortness of breath and cough, it could be due to changes in cardiac function, including diastolic dysfunction and mitral regurgitation but could also be as a result of direct pulmonary damage following envenomation as a direct effect of venom on endothelial cells of lung vessels [7]. The most plausible theory on secondary cardiac involvement after scorpion envenomation is the stimulatory effect of scorpion venom on the adrenal glands and also sympathetic nerves of the heart that induces an adrenergic response [8-10]. Ahmadnoor Abdi found that 100% of patients with severe scorpion bite have abnormalities in their ECG and they must be evaluated for these abnormalities but none of them showed echocardiographic abnormalities and they suggested that echocardiography for all patients is not economically recommended but electrocardiography is cost-effective and must be done. However, our case showed mild abnormal changes in the electrocardiogram. Several changes can occur after scorpion bite, of which sinus tachycardia, ST-T changes, and prolonged QTc are the most common. Other changes include bradycardia, myocardial infarction, conduction abnormalities, and arrhythmias [11]. Therefore, our team suggests that if we encountered severe symptoms, shock, and pulmonary edema it is a good idea to consult with a cardiologist to perform a cardiac echo test.

Management of scorpion envenomation includes supportive care and monitoring and administration of antivenom. Supportive care must include the admission of the patient to the Intensive Care Unit (ICU) and adequate hydration. Mechanical ventilation and respiratory support in cases of respiratory failure and the use of inotropic drugs, steroids, and antibiotics should also be considered. The effectiveness of inotropic drugs is questionable and the effectiveness of hemodynamic support on mortality rate has not been documented [12].

Conclusion

Myocarditis is one the most important and rare features of scorpion envenomation. It must be treated using drugs and also supportive care.

Ethical Considerations

Compliance with ethical guidelines

All ethical principles were considered in this article.

Funding

This research did not receive any grant from funding agencies in the public, commercial, or non-profit sectors.

Authors' contributions

All authors equally contributed in preparing this article.

Conflict of interest

The authors declared no conflict of interest.

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