Cardiac dysfunction in scorpion sting

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Abstract
Scorpion sting often occurs in tropical areas. Annually, 1.2 million scorpion stings occur. In
some case dysfunction of cardiovascular system and death occurs. Scorpion venom affects left
ventricle systolic function and causes heart failure. These effects can be determined using
electrocardiogram, cardiac enzymes and echocardiography. Therefore, it is very important to
determine patients with cardiac dysfunction following scorpion stings and do important
treatments for them.

Keywords: Echocardiography, scorpion sting, cardiac dysfunction

1. Introduction
Scorpion bites often occur in tropical and subtropical regions (1) Annually, 1.2 million
people are suffering from scorpion stings and children suffer the highest number of deaths
(2). Patients are divided into three categories based on their clinical symptoms: The first
group visit the hospital with only pain, the second group with systemic symptoms, and the third group with Cardio-respiratory and severe neurological symptoms. Basically, scorpion venom has neuromuscular and cardiovascular effects (1, 3). Myocardial ischemia resulting from the scorpion sting causes acute cardiac dysfunction and left ventricular dysfunction which has been shown by clinical manifestations, increased levels of lactate dehydrogenase enzyme, creatinine phosphatase, aspartate aminotransferase, cardiac troponin I (cTnI) and changes in ECG and echocardiography (4-8). Therefore, it is very important for clinicians to differentiate between the patients who visit hospitals with symptoms of heart failure and others so that they can receive important treatments immediately.

2. Cardiovascular dysfunction after scorpion stings
Some researchers have shown the ability of scorpion venoms to cause cardiovascular dysfunction (9-12). These dysfunctions can be determined using echocardiography, cardiac enzymes, and electrocardiography. Also, it's shown that these dysfunctions are often temporary and will resolve spontaneously (13).

3. Mechanisms of cardiovascular injuries after scorpion stings
Mechanisms of myocardial injury and cardiac dysfunction after scorpion stings are poorly understood (14, 15). Common etiologies of death after scorpion stings are cardiac shock and pulmonary edema. Exact mechanism of pulmonary edema is unclear and the results of studies are controversial. However, some researchers have reported that pulmonary edema in these patients is the result of left ventricular dysfunction. Catecholamine release, and myocardial injury due to toxin effect or ischemia can result in heart failure. Factors such as young age, tachypnea, sweeting, restlessness, and high concentration of serum protein is related to pulmonary edema. In heart failure with systolic dysfunction
and normal resistance of vascular system after scorpion stings dobutamine is indicated. Dobutamine should be used when evidences of scorpion sting exist in presence of left ventricular dysfunction after scorpion sting (16).

In a study by Abroug et al. left ventricular dysfunction after severe scorpion envenomation is assessed. Hemodynamic and echocardiographic findings are assessed in this study. Result of this study have shown that pulmonary edema after scorpion envenomation is the result of left ventricular dysfunction (17).

4. Importance of diagnosis of cardiovascular complications in scorpion stings

Diagnosis of cardiovascular complications of scorpion stings is important because some treatments are available for these conditions and can improve cardiovascular system complications (18, 5). For example, prazosin is shown to be effective in patients with pulmonary edema and cardiovascular complications after scorpion stings (19). Captopril is among other medications used for management of cardiovascular complications of scorpion envenomation (20).

5. Diagnostic methods

Cardiac troponin I can be determined as the diagnostic test for diagnosis of myocardial infarction in scorpion envenomation (4). Also, IL-8 may have a role in pathogenesis of myocardial injury. IL-8 and cTnI are helpful in prediction of mortality of scorpion envenomation (7). Echocardiography is important for the evaluation of the cardiac dysfunction caused by scorpion stings. Also, normal examination can reject cardiac dysfunction (8). In all patients with symptoms of cardiac dysfunction due to scorpion venom, a reduction in the percentage of ejection fraction can be seen by M-mode echocardiography (6). Doppler tissue echocardiography calculates myocardial velocity by change in the frequency of ultrasound waves. This method is similar to the doppler
ultrasound that evaluates blood flow, but it focuses on low frequency changes. The tissue doppler echocardiography can show mild cardiac dysfunction or cardiac wall movement dysfunction. The tissue doppler echocardiography determines left ventricular systolic function by myocardial evaluation. The tissue doppler echocardiography is used for evaluation of the left ventricular diastolic function, estimation of the left ventricular filling and differentiation of various cardiovascular diseases (21-22).

6. Conclusion
Due to the very high risks involved in heart failures caused by scorpion venom, it is vital to check the patients with the possibility of these complications as soon as possible.

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Conflict of interest
There is no conflict of interest to be declared.

References


