



**AN UNUSUAL PRESENTATION OF SCORPION STING CAUSING
BRADYCARDIA, HYPOTENSION AND PULMONARY EDEMA**

Virendra C. Patil¹ and Harsha V. Patil²

¹Associate Professor Department of Medicine, Krishna Institute of Medical Sciences Karad.

²Assistant Professor Department of Microbiology, Krishna Institute of Medical Sciences
Karad.

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***Correspondence for
Author**

Dr. Virendra C. Patil

Associate Professor
Department of Medicine,
Krishna Institute of Medical
Sciences Karad.

ABSTRACT

Scorpion envenomation is common in tropical and subtropical regions. Although the yellow scorpion is considered the most dangerous of the species since it causes cardiac toxicity, several case reports have described temporary electrocardiographic changes following envenomation by the black and red scorpion. The most common changes were ST changes, sinus tachycardia, atrial ectopic beat,

bradycardia, and ventricular ectopic beat. A direct effect of scorpion venom on the myocardial has also been shown in several studies. Cardiac dysfunction might be due to myocardial ischemia, whether related to massive catecholamine outpouring or coronary abnormality. The present case report highlight the bradycardia, hypotension, electrocardiographic changes in the form of tall tented hyper-acute 'T' waves and acute cardiogenic pulmonary edema in patients with envenoming following a scorpion sting.

Keywords: Scorpion envenomation, Cardiac dysfunction, pulmonary edema, scorpion sting.

INTRODUCTION

Scorpion bites are common in rural India. Most of them are harmless, but some present with neurotoxic or cardiotoxic manifestations. Among 86 species of scorpions present in India, *Mesobuthus tumulus* (Indian red scorpion) and *Heterometrus swammerdami* are of medical importance. Local symptoms including severe pain and burning sensation at the site of sting are the most common manifestations. Cardiovascular manifestations are particularly prominent following stings by Indian red scorpion. Such bites infrequently have serious

clinical sequelae, including myocardial infarction, acute pulmonary edema, arrhythmia, cardiogenic shock and even death.^[1, 2] The major components of scorpion venom are short-chain peptides, which affect sodium and potassium channels in excitable tissues. Alfa-toxins block voltage-dependent inactivation of sodium channels, resulting in persistent depolarization and β -toxins shift the voltage-dependent activation of these channels to a more negative membrane potential, making tissues more excitable. Blockade of potassium channels slows repolarization and prolongs the action potential in neurons and myocytes. The resultant intense persistent depolarization of autonomic nerves with massive release of neurotransmitters from the adrenal medulla and parasympathetic and sympathetic nerve endings, is largely responsible for the toxic cardiovascular manifestations. The toxin may also directly affect myocardial contractility and excitability. Central nervous system effects include irritability, muscle rigidity, altered consciousness and convulsions.^[3, 4] Here we are presenting a case report scorpion sting envenomation presented with uncommon features like, bradycardia, hypotension and electrocardiographic changes in and acute cardiogenic pulmonary edema.

CASE REPORT

A 27-year-old male presented to Emergency Department with history of scorpion stings by red scorpion on right middle finger, followed by complaints of pain at local site, breathlessness at rest and chest pain associated sweating since one hour after being. There was no significant past medical and co-morbidities. On examination, her blood pressure was 70/40 mmHg, heart rate 48/ min, regular and respiratory rate 33/min. Heart sounds were soft with bilateral diffuse inspiratory basal rales in the lung field with raised Jugular venous pressure. Patient was admitted in intensive care unit with cardiorespiratory and SpO₂ monitoring with inotrop infusion. After stabilising blood pressure patient received diuretic for pulmonary edema. Local pain at the site of sting was managed symptomatically by tramadol and local anesthetic spray. The cardiac biomarkers, creatine phosphokinase (CPK)-MB was 78 U/l and troponin-I was positive. Electrocardiogram [Figure no. 1] showed sinus bradycardia with 'T' wave inversion in V2 and V3. Chest radiogram revealed pulmonary edema [Figure no. 3]. However, subsequent ECG on the next day [Figure no. 3] revealed normal sinus rhythm with persistent hyper-acute tall "T"-waves in leads I, aVL, V3₁ and V5. Transthoracic 2- dimensional Echocardiogram demonstrated hypokinesia of interventricular septum and LV apex with moderate pulmonary hypertension with PAP by TR jet was 45 mmHg. After four hours patients heart rate became 102 with blood pressure of 160/100 mm Hg and s3 gallop,

for which patient received prazosin 5 miligram and diuretics. Repeat chest radiogram revealed resolution of pulmonary edema [Figure no. 4]. The left ventricular ejection fraction (LVEF) was 25%. Coronary angiogram was performed to rule out coronary artery disease, which revealed normal coronary vessels. The patient was treated with prazosin, diuretics, antiplatelet and inotropes as and when required. Patient was stabilised hemodynamically within initial 24 hours. The various classes of scorpion stings were described [Class I : Local manifestations; Class II : Systemic involvement; Class III : Cardiogenic failure, hypotension, ventricular arrhythmia, bradycardia, cardiovascular collapse, Respiratory failure- cyanosis, dyspnoea, pulmonary edema]. Patient in present case report had local extricating, lancinating pain (class I) with bradycardia and hypotension with pulmonary edema followed by hypertension and tachycardia (class II and III). After five days of conservative treatment electrocardiogram shows normal with improvement in LVEF up to 50% with no resting RWMA. Patient was discharged with normal hemodynamic status on seventh day.



Figure no. 1: Sinus bradycardia with tented tall hyper-acute 'T' waves with prolonged QTc

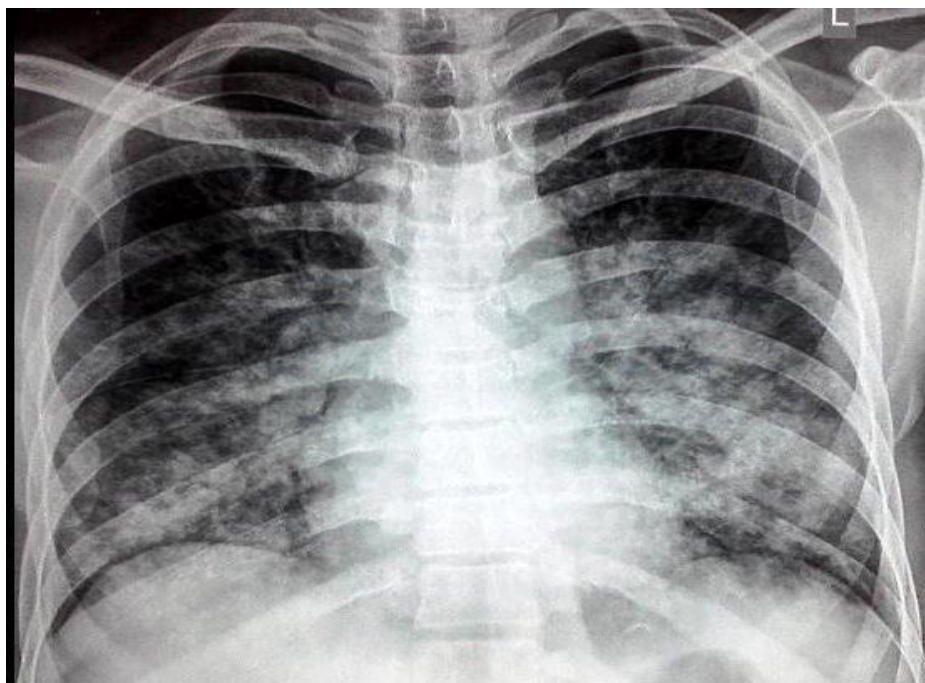


Figure no.2: Chest radiogram showing pulmonary edema and cardiomegaly



Figure no. 3: Electrocardiogram showing arrowhead 'T' wave

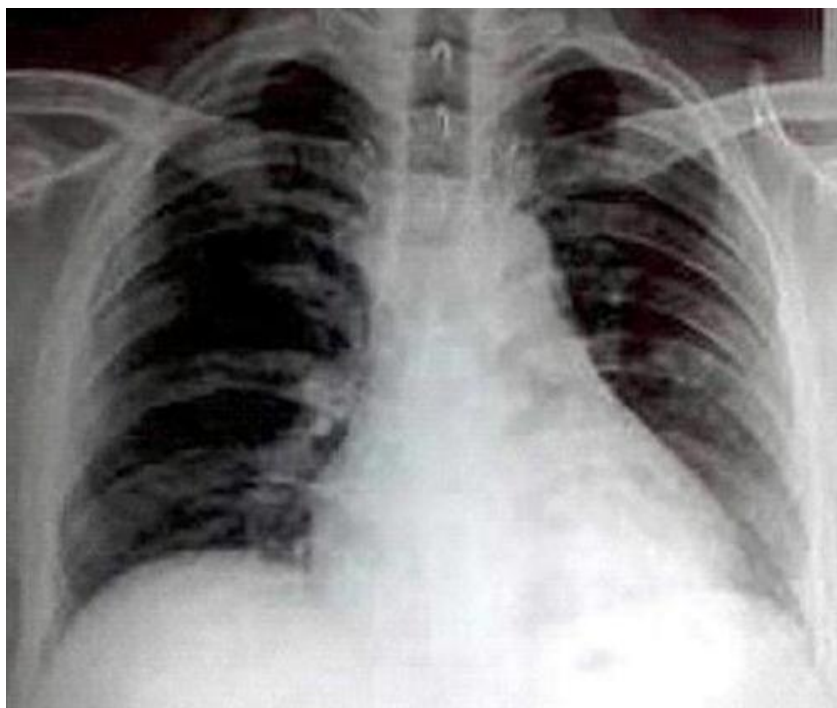


Figure no.4: Chest radiogram showing resolution of pulmonary edema and cardiomegaly after treatment

DISCUSSION

Envenomation by scorpions can result in a wide range of clinical effects, including, cardiotoxicity, neurotoxicity and respiratory dysfunction. Scorpion envenomation is an important public health hazard in our country. About 30 are of medical importance. Although a variety of different scorpion species exist, majority of them produce similar cardiovascular effects. Regimen including scorpion antivenom, vasodilators, intensive care management have been tried to alleviate the systemic effects of envenoming. In spite of advances in pathophysiology and therapy the mortality remains high in rural areas. Since the advent of scorpion Antivenom, vasodilators, dobutamine, prazosin and intensive care facilities, the fatality due to severe scorpion sting has been significantly reduced in areas where these treatment modalities are available. The severity of scorpion sting is classified in four grades on the basis of clinical manifestations at the time of arrival to hospital [Grade 1: severe excruciating local pain at the sting site radiating along with corresponding dermatomes, mild local edema with seating at the sting site, without systemic involvement. Grade 2: signs and symptoms of autonomic storm characterized by acetyl choline excess or parasympathetic stimulation and sympathetic stimulation Grade 3: cold extremities, tachycardia, hypotension or hypertension with pulmonary edema (Respiratory rate > 24 per minute, basal rales or crackles in lungs). Grade 4: tachycardia, hypotension with or without pulmonary edema with warm extremities

(warm shock).^[3] The etiology of the cardiovascular manifestations in severe scorpion sting is related to the venom effects on the sympathetic nervous system and the adrenal secretion of catecholamines as well as to the toxic effects of the venom on the myocardium.^[1, 2, 3] Raza M. Soomro et al quoted about one fifth of scorpion stings had cardiovascular complications. Electrocardiographic (ECG) abnormalities were most frequent (72%) and included sinus tachycardia (56%), tented T-waves (29%), non-Q infarct pattern (17%), Q-infarct pattern (3%); supraventricular tachycardia; atrial fibrillation; and second-degree AV block and nodal tachycardia in one patient each. Echocardiography showed abnormal left ventricular systolic function in 52%, including all 12 patients with pulmonary edema. All cardiovascular changes including ECG and echocardiographic, congestive heart failure and pulmonary edema were reversible in survived.^[5] Similar to their findings our patient had tall tented hyper-acute 'T' waves with LV systolic dysfunction and pulmonary edema with reversibility on conservative treatment. Behçet Al et al Studied the electrocardiographic features of patient stung by scorpions in 76 patients. Sinus tachycardia was recorded in the majority and sinus bradycardia was present in 24%. Bizarre, broad notched, biphasic T wave changes with additional ST elevation or depression in the limb and precordial leads are recorded, consistent with acute myocardial infarction like pattern. The QTc was prolonged in the majority of patients.^[6] These findings are comparable with our study. Monika Maheshwari et al present a case report of scorpion bite mimicking acute myocardial infarction. A patient with electrocardiographic abnormalities after scorpion sting, with tachycardia and hypertension simulating early myocardial infarction with pulmonary edema and congestive heart failure. Similarly patient in present case report had hyper-acute tall 'T' waves with "T" wave inversion in V2 and V3 leads with bradycardia, pulmonary edema and hypotension. In contrast to common presentation of hypertension and tachycardia our patient had hypotension and bradycardia.^[1] Garg A K et al reported a case of scorpion bite with evidence of myocardial injury due to acute myocarditis and pulmonary edema clinically in the form of marked sinus tachycardia and a loud S3 gallop with electrocardiographic changes in leads I, aVL, V4-V6. Similarly our patient presented with bradycardia, hypotension, raised JVP and pulmonary edema with cardiogenic shock which later on developed tachycardia, hypertension with S3 gallop.^[2] H S Bawaskar et al stated that, the victim of scorpion bite with no systemic involvement shows normal ECG. rST segment and T waves are most frequently affected. Arrowhead tented T wave look like Ashoka tree indicates acute injury, while tent shaped look like Christmas's tree indicated recovery. Similarly our patient had bradycardia with tented tall 'T' waves like Christmas's tree pattern and tachycardia with arrowhead 'T' wave like

Ashoka tree pattern.^[3] H S Bawaskar et al reported early myocardial infarction like pattern prolonged QTc and 'T' wave inversion with unilateral, bilateral, diffuse Pulmonary edema and recovery with oral prazosin. Similarly in our case patient had prolonged QTc and 'T' wave inversion in V3 and V4 with pulmonary edema which responded to prazosin and diuretics.^[3] A Krishnan et al in their retrospective analysis 38 patients scorpion bite with cardiovascular manifestations, six had tachycardia alone and 8 had hypertension. Pulmonary oedema with normal blood pressure and high central venous pressure (CVP) was seen in 10 patients. Five patients had hypotension, low CVP but no pulmonary oedema. Nine patients had cardiogenic shock with high mortality.^[4] Similarly our patient presented with bradycardia, hypotension and pulmonary edema with cardiogenic shock. Preventive measures for scorpion sting are of vital important and their timely medical management life threatening complications are life saving as in present case report.

CONCLUSIONS

The myocardial injury and pulmonary edema, are being increasingly recognised in Indian reports. Electrocardiographic changes with no evidence of coronary vascular, insufficiency, in present case, this was most probably due to a direct toxic effect of the scorpion venom on the myocardium or secondary to venom-induced catecholamine release from the adrenals or sympathetic nerve endings. The pulmonary edema in present report was most likely due to myocardial dysfunction, supported by the fact that diuretics caused its disappearance and additionally by neurovegetative effect by increased circulating pressor amines on the pulmonary capillary permeability. Commonly hypertension and tachycardia are presenting features but unusually bradycardia and hypotension after scorpion envenomation as in present case should not be overlooked in clinical practice.

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