Case report

Pulmonary Edema in Scorpion Bite

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Abstract
A patient after 3 days of scorpion bite at the lateral aspect of right lower limb presented with a feature of pulmonary edema and cardiac arrhythmias and was treated at ICU set-up with diuretics and other supportive therapy. The patient recovered fully symptomatically, radiological finding and ECG came normal. Usually scorpion bites are not toxic but few species are toxic because of its massive release of catecholamine and direct toxic effect of the venom on cardiac fibers.

Key Words
Insulin, Pulmonary edema, Captopril, Scorpion bite

Introduction
Scorpions are crablike arachnids that feed on ground-dwelling arthropods and small lizards. Painful but relatively harmless scorpion stings need to be distinguished from the potentially lethal envenomations that are produced by about 30 of the ~1000 known species.

Scorpion bites are common in Terai (plains) region of eastern Nepal. They are mainly Indian red scorpion (Mesobuthus tamulus). It is one of the most toxic envenomation in animal kingdom. Scorpion venom is a species-specific complex mixture of short neurotoxin proteins, appreciable quantities of serotonin, hyaluronidase and various enzymes that act on trypsinogen. The toxins bind at cell membrane level to the voltage-dependent potassium channels, the calcium activated potassium channel, as well as sodium channels. Autonomic storm, presenting as hypertension, tachycardia and biventricular dysfunction with left ventricular predominance, pulmonary edema and cool extremities is thus initiated due to alpha receptor stimulation by the toxin. Terminal hypotension could represent catecholamine depletion syndrome or activation of kinin/prostaglandin pathway.

Mild envenomation causes severe vasoconstriction and hypertension. Severe envenomation produces predominant left ventricular dysfunction with normal systemic vascular resistance manifesting as pulmonary oedema or severe hypotension depending on the fluid balance. Shock due to biventricular dysfunction and vasodilatation occurs terminally.

Some calcium channel drug like nifedipine also has some benefit for the treatment but it alone did not prevent myocardial damage unless the peripheral action of venom was blocked by prazosin.

Severe envenomation produces predominant left ventricular dysfunction with normal systemic vascular resistance manifesting as pulmonary oedema improved with following afterload reduction with captopril. Captopril 12.5-25 mg thrice daily also has very good outcome in mortality during pulmonary edema.

Tityus serrulatus in Brazil cause massive release of endogenous catecholamine with hypertensive crises, arrhythmias, pulmonary edema, and myocardial damage. Acute pancreatitis occurs

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with stings of Tityus trinitatis in Trinidad, and central nervous toxicity complicates stings of Parabuthus and Buthotus scorpions of South Africa. Tissue necrosis and hemolysis may follow stings of the Iranian Hemiscorpius lepturus. It is one of the causes of reversible cardiomyopathy which is being proved by one study done in Brazil which is because of sting by Tityus serrulatus.¹

Case Reporting

Mr. TPA, 50 years gentleman from Sarlahi, farmer by profession, non-smoker and non-alcoholic, without any significant illness in the past, admitted in our hospital after four days of scorpion bites at the right lateral aspect of the foot while working in his farm.

At the time of admission, he was severely dyspneic with presence of othopnoea. He also complained about cough with pinkish frothy sputum but however there was no chest pain, no history of loss of consciousness, fever and abdominal pain. According to the patient, initially there was mild swelling at the bite site which gradually subsided.

On examination he was conscious, oriented but on respiratory distress with vitals maintained with BP 130/82 mm of Hg.

Oxygen Saturation was only 82% without oxygen, and he was having central cyanosis.

Cardiovascular, central nervous and abdominal examination revealed no gross abnormality.

Chest-vesicular breathing with bilateral diffuse fine inspiratory crackles upto to the level of middle part of interscapular region.

At time of admission, total count was 11,700 per cmm, with Neutrophil-55%, Lymphocyte-43% and Eoisinophil-02%.

Hb-12.8% ESR- 40 mm in first hour.

Random blood sugar was 141mg, Urea-37mg%, Creatinine-0.9mg%, Na- 140meq/l, and K- 5meq/l, Bilirubin total- 0.9mg%, conjugated-0.3mg%, SGPT- 34u/l, Alkaline phosphates- 186u/l, SGOT-44u/l.

Chest X-ray showed bilateral fluffy shadow at the middle and lower zone.

ECG with sinus rate of 100/min with multiple ectopics and few bigeminy.

Echocardiographic findings were as follows:
All chambers are normal,
MR Grade II
Fair LV systolic function

Patient was treated at ICU in the line of Pulmonary Edema for three days with Diuretics, captopril 12.5 mg 4 times (6 hrly) daily, insulin infusion and other symptomatic measurements. As he started to improve symptomatically along with radiological finding, he was shifted to ward. And there he was kept for another seven days with the same treatment and from where he was discharged and while on discharge , he was without any symptoms and all the investigation, even chest x-ray, ECG were normal.

Fig. 1: 1st x-ray at the arrival at emergency (21st 04.64)
reported that scorpion envenoming results in a severe autonomic storm with a massive release of catecholamine, increased angiotensin II and inhibition of insulin secretion. These hormonal alterations could be responsible for the pathogenesis of a variety of clinical manifestations. Under these conditions, Scorpion envenoming essentially undergo fuel-energy deficits and an inability to utilize the existing metabolic substrates by vital organs and consequence is multiple system failure and the death. Regular insulin was infused at the rate of 0.3U/ Gm of glucose and glucose at the rate of 0.1 gm/Kg/Hr and Potassium supplement was given accordingly. Based on animal experiments where insulin administration reversed the metabolic and ECG changes induced by scorpion envenoming and treating the poisonous scorpion sting victims with insulin, they consider that insulin has a primary metabolic role in preventing and reversing the cardiovascular, haemodynamic, and neurological manifestations and pulmonary oedema induced by scorpion envenoming. If patient present after 4-8 hours of bite, usually they present with complication and our patient presented after three days of bite. It 's been reported that 25-30% fatality due to acute pulmonary oedema in victims of Indian red scorpion (Mesobuthus tamulus) sting have been reported from Western Maharashtra, India. The advent of prazosin in recent years has revolutionized the management of severe scorpion sting cases. Prazocin prevents and cures the cardio-vascular complications. However one report showed majority of cases developed acute pulmonary oedema in 4-8 hours in a hospital setting irrespective of control of their arterial blood pressure with six hourly oral prazosin. After-load reduction with oral Captopril is safe and effective in Scorpion envenom CVS manifestations. Results are similar to those with other vasodilators.

In our patient, Antivenom therapy was not used due to non-availability. However, recent reports have disbavored its use in preventing
cardiovascular manifestations for Indian species of scorpion venom."

Our patient was referred from villages situated far away from the Katmandu and since majority of scorpion sting present with intense local pain and are non fatal, the victims get symptomatic treatment and usually get better after initial sting. But unfortunately our patient developed respiratory distress and was referred late to our center. But fortune enough, our patient recovered completely with injectable diuretics, insulin infusion, captopril and other supportive management.

References