CASE REPORT

Scorpion bite-induced unilateral pulmonary oedema

Nandakishore Bompelli,¹ Rakesh Reddy C,² Anirudda Deshpande³¹Internal Medicine, Aditya Hospital, Warangal, Telangana, India²Medicine, Aditya Hospital, Warangal, India³Neurology, Vinayaka Neuro Multispecialty Clinic, Warangal, India**Correspondence to**

Dr Anirudda Deshpande, dr.anirudda.deshpande@gmail.com

Accepted 19 March 2018

SUMMARY

A 24-year-old woman came to the emergency room of our hospital, 6 hours after a sting to the pulp of her middle finger of her left upper limb by an Indian red scorpion. On examination, she had tachycardia, tachypnoea, hypotension and low oxygen saturation at room temperature. On auscultation, there was poor air entry in all areas of the right lung along with crackles. The left lung field was normal on auscultation. Chest X-ray showed unilateral haziness of right lung field. Two-dimensional echocardiography showed clinical findings of myocarditis. Arterial blood gas showed metabolic acidosis with severe hypoxaemia, suggestive of type 1 respiratory failure. After intubation and initiating ventilatory support, the patient was given intravenous analgesics, antihistaminic and infiltrated site of bite with 2% xylocaine. The patient was started on inotropes, alpha receptor blocker, intravenous steroids, bronchodilators and diuretics support. The patient clinically improved over the course of treatment and was subsequently discharged.

BACKGROUND

Scorpion envenomation is an important public health hazard in tropical and subtropical regions of the world, especially some parts of Asia, South America and Africa. Bilateral pulmonary oedema is relatively common finding in such cases. However, unilateral pulmonary oedema is unusual and has been rarely documented. The mechanism of acute pulmonary oedema induced by scorpion venom is not completely understood and may occur due to both cardiogenic and non-cardiogenic causes, respectively.

CASE PRESENTATION

A 24-year-old female patient presented to the emergency room (ER) 6 hours after a scorpion bite to the tip of digit 3 of her left hand while she was cleaning the house at roughly 9 am in the morning (figure 1). She immediately noticed that the sting was by an Indian red scorpion and was shifted to the tertiary care hospital.

On examination in ER, the patient was conscious, alert but seemed to be in excruciating pain. She had severe shortness of breath, perspiration along with tachycardia (heart rate 166 bpm), tachypnoea (respiratory rate 30/min), hypotension (bp 60 systolic) and low spirometry, oxygen saturation by pulse oximetry (saturation of 70% on room air). On auscultation, there was decreased air entry in the entire right lung. There were crackles on the right lower zone but no wheeze. Examination of cardiovascular system showed S1S2S3 gallop, no murmur.

In the context of the history of a scorpion bite, the above-mentioned clinical findings raised strong suspicion of possible myocarditis with pulmonary oedema.

Arterial blood gas (ABG) showed metabolic acidosis with severe hypoxaemia, suggestive of type 1 respiratory failure. ECG showed severe tachycardia with ST segment depression in precordial and limb leads. Chest X-ray showed unilateral right-sided haziness of the entire lung field. The left lung field was unusually conspicuously spared. Two-dimensional echocardiography (2D echo) showed dilated hypocontractile left ventricle with significant systolic and diastolic dysfunction along with raised creatine kinase MB isoenzyme in blood. Both these findings were highly suggestive of myocarditis.

The patient was immediately shifted to the intensive care unit (ICU), intubated and put on ventilatory support. She was given intravenous analgesics, antihistaminic and the site of the bite was infiltrated with 2% xylocaine since mild pain can be abolished by application of ice packs over the site of sting; however, severe excruciating local pain can be transiently relieved by lignocaine (without epinephrine) using ring block.

Simultaneously, the patient was started on inotropic support in the form of dobutamine and noradrenaline intravenous infusion. Dose and rate of infusion was titrated to achieve mean arterial pressure (MAP) >65 mm of Hg and urine output >30 mL/hour once the target MAP was achieved. Since alpha 1 receptor blocker prazosin can be given irrespective of blood pressure provided there is no hypovolaemia, it was started at dose of 0.25 mg every six hourly interval. Injection of

Figure 1 Pulp of the tip of digit 3 of left upper limb as the site of scorpion bite.

To cite: Bompelli N, Reddy C R, Deshpande A. *BMJ Case Rep* Published Online First: [please include Day Month Year]. doi:10.1136/bcr-2018-224476

Figure 2 Chest X-ray posteroanterior view shows complete haziness/opacification of right lung field.

hydrocortisone 100mg intravenous was administered every four hourly interval for 5 days along with ipratropium bromide nebulisation 4 hourly interval. Diuretic (furosemide) infusion was initiated at the rate of 1 mg/hour. Scorpion antivenom could not be administered due to its unavailability at our centre.

Gradually, over the next few days, the patient improved clinically. Subsequently, radiographs of the chest showed progressive clearing of the right-sided oedema (figures 2 and 3). She was slowly weaned off ventilatory support and extubated over 5 days and shifted out of ICU on day 12 of admission. On complete resolution of symptoms and normal follow-up chest X-ray and 2D echo findings, the patient was discharged.

INVESTIGATIONS

Routine blood tests including complete blood picture showed mild leucocytosis with predominant neutrophils, the liver function test, renal function test, serum electrolytes, prothrombin time, bleeding time and clotting time were unremarkable.

Figure 3 (A) Day 4: (above) chest X-ray PA view shows partial clearing of haziness from the upper zones of right lung field. (B) Day 10: (below) chest X-ray PA view shows almost complete clearing of haziness from the upper and middle zones of the right lung field. PA, posteroanterior.

ABG showed metabolic acidosis with severe hypoxaemia, suggestive of type 1 respiratory failure. ECG showed severe tachycardia with ST-T changes.

Chest X-ray showed unilateral right-sided haziness of the entire lung field. The left lung field was unusually, conspicuously spared. 2D echo showed dilated hypocontractile left ventricle with significant systolic and diastolic dysfunction, raised creatine kinase MB isoenzyme in blood.

DIFFERENTIAL DIAGNOSIS

The possibility of alpha-adrenergic overstimulation causing a transient, reversible myocardial damage similar to that commonly seen in case of the 'secondary' forms of Takotsubo syndrome was thought of. However, the ECG of a stress cardiomyopathy usually shows, ST segment elevation in 30% to 50% of cases and precordial T wave inversions in most of others. Low QRS voltage, transient Q waves and prolonged QT interval may also be seen which were absent in this patient's ECG and hence supports the diagnosis of myocarditis over Takotsubo cardiomyopathy (TCM).

In addition, the typical echo features of TCM are left ventricular mid and apical hypokinesia during systole with hypercontractility of basal segment of the left ventricle. In contrast, the echocardiography findings in this case were global left ventricular hypokinesia, no apical ballooning and no hypercontractile segment.

TREATMENT

She was given intravenous analgesics, antihistaminic and the site of bite was infiltrated with 2% xylocaine since mild pain can be abolished by application of ice packs over the site of sting; however, severe excruciating local pain can be transiently relieved by lignocaine (without epinephrine) using ring block.

Simultaneously, patient was started on inotropic support in the form of dobutamine and noradrenaline intravenous infusion. Dose and rate of infusion was titrated to achieve mean arterial pressure (MAP) >65 mm of Hg and urine output >30 mL/hour. Once the target MAP was achieved. Since alpha 1 receptor blocker prazosin can be given irrespective of blood pressure provided there is no hypovolaemia, it was started at dose of 0.25 mg every six-hourly interval. Injection hydrocortisone 100mg intravenous was administered every four-hourly interval for 5 days along with ipratropium bromide nebulisation four-hourly interval. Diuretic (furosemide) infusion was initiated at the rate of 1 mg/hour.

OUTCOME AND FOLLOW-UP

On complete resolution of symptoms and normal follow-up chest X-ray and 2D echo findings, patient was discharged.

DISCUSSION

Scorpion bite is a major challenge to the public health in many tropical countries. Of the 1500 known species of scorpions, 50 species are potentially life threatening to humans.

Scorpion stings have been responsible for wide range of clinical manifestations. They could lead to something as innocuous as a local skin reaction, to catastrophic consequences such as cardiovascular, neurological and respiratory collapse.¹

Indian red scorpion (*Mesobuthus tumulus*) has lethal enzymes such as hyaluronidase and other proteins that act on trypsinogen. This scorpion species is more likely to cause cardiovascular complications.²

Among the venoms, scorpion venom is one of the most powerful stimulants of the autonomic nervous system. Both sympathetic and parasympathetic postganglionic stimulation is the proposed mechanism of action of scorpion venom. However, in most circumstances, the sympathetic response predominates, leading to a 'sympathetic storm'.³ Stimulation of alpha receptors by the scorpion toxins is responsible for the cool extremities, arterial hypertension, myocardial dysfunction, tachycardia and pulmonary oedema. A direct stimulant action of the scorpion venom on the heart has also been proposed.⁴

The reason for pulmonary oedema in such patients has been attributed to the decreased clearance of alveolar fluid because of downregulation of sodium, potassium-ATPase channels in the alveolar epithelium.⁵

Asymmetric and unilateral pulmonary oedema, though well documented in the medical literature, is an uncommon entity, but unfortunately has not been completely understood.⁶ Both non-cardiogenic as well as cardiogenic factors are involved in the pathogenesis of pulmonary oedema due to scorpion sting. Unilateral pulmonary oedema secondary to left-sided heart

failure occurs due to a simultaneous and localised increase in pulmonary vascular permeability caused by scorpion venom.⁷

Although the case fatality rate in cases with scorpion bite are between 3% and 22%,^{8–10} our patient recovered well and was discharged subsequently.

Contributors RRC and NB made substantial contributions to the conception and design of the work, acquisition, analysis and interpretation of the data. AD was involved in drafting the work and revising it critically for important intellectual content. AD approved the final version to be published.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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Learning points

- Indian red scorpion (*Mesobuthus tumulus*) is one of the most common causes of scorpion bite in the tropical countries.
- Scorpion bite may lead to variety of clinical manifestations leading to cardiovascular, respiratory & neurological involvement.
- Indian red scorpion most commonly causes cardiovascular dysfunction.
- Usually, scorpion bite leads to bilateral pulmonary oedema. However, rarely, pulmonary oedema may be unilateral.

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