Scorpion stings

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Objectives

1) Know some information about the types of scorpions that may threaten human life.

2) Be familiar with the diverse clinical presentations.

3) Know how to deal with a victim at a field & the casualty unit with & give a special attention to life threatening features.

4) Know some measures of prevention.
Introduction:
Scorpions are shy, nocturnal creatures that resist stinging unless provoked or attacked. They can control the amount of venom they release (depending on how threatened they feel) so some stings may be almost entirely venomless (dry).
A scorpion has a flattened elongated body and can easily hide in cracks. It has 4 pairs of legs, a pair of claws, and a segmented tail that has a poisonous spike at the end. Scorpions vary in size from 1-20 cm in length.
Around 2000 species of scorpions present worldwide

Only 2 of the Indian species – Mesobuthus or red scorpion and Palamanaeus (black) are poisonous

Venom is present in glands in the last tail segment and passes by a duct to a stinger at the end of the tail
Sometimes, the animal can deliver a dry sting and the victim, due to **hysteria**, can show false signs and symptoms. The **depth** of the sting will also determine the severity of the envenomation as will the **health** and **size** of the victim. The effects of a sting can be reduced if delivered into a bony area or even thick clothing can prevent venom entering soft tissue below the skin. A deep sting into a fleshy area will result in more severe symptoms.
Pathophysiology

The venom is carried in a gland on the back of the tail, and when on the attack, a scorpion can flick its stinger over its head with lightning speed.

**Scorpionism:** is the medical term used to describe the syndrome of scorpion stings.

* The striated muscles in the stinger allow regulation of the amount of venom ejected, which is usually 0.1-0.6 mg.
The venom is composed of varying concentrations of neurotoxin, cardiotoxin, nephrotoxin, hemolytic toxin, phosphodiesterases, phospholipases, hyaluronidases, glycosaminoglycans, histamine, serotonin, tryptophan, and cytokine releasers. The most important clinical effects of envenomation are neuromuscular, neuroautonomic, or local tissue effects.
Mortality:

- Scorpion stings — although painful — are mostly harmless. As many as 2000 species of scorpions have been described worldwide, but only about 2 of these are considered dangerous.

- Scorpion stings are most serious in young children & elderly.

- Healthy young adults usually don't need treatment for scorpion stings, but if a child is stung, always get immediate medical care.
Scorpion stings are a major public health problem in many underdeveloped tropical countries, especially Sahelian Africa, South India, the Middle East, Mexico, and South Latin America. The estimated annual number of scorpion stings is 1.2 million leading to 3250 deaths (0.27%).[1] For every person killed by a poisonous snake, 10 are killed by a poisonous scorpion.
**SCORPION ENVENOMATION**

- Local irritant effect
- Massive catecholamine release
- Insulin secretion suppression
- Elevated plasma angiotensin II
- Myocardial dysfunction
- Most dramatic manifestations related to catecholamine release
Clinical presentations:

* Commoner in summer.
* Red scorpion ranks 2\textsuperscript{nd} to snake bites as a cause of fatal envenomation.

1) Local manifestations:
Intense inflammation, local pain, parasthesia & ecchymoses.

2) Autonomic, Cranial nerves & Somatic disturbances:
A) **Autonomic:** (Autonomic storm) Early and most prominent, related to increased activity of Catecholamine or Acetylcholine or both & **include:**

**Sympathetic overdrive symptoms** predominate, causing tachycardia, hypertension, hyperthermia, and pulmonary edema.

**Parasympathetic symptoms** include: hypotension, bradycardia, salivation, lacrimation, urination, defecation, and gastric emptying.

B) **Cranial nerve effects include the following:**

rotary eye movements, blurred vision, tongue fasciculations, and loss of pharyngeal muscle control may be observed. Difficulty swallowing combined with excessive salivary secretions may lead to respiratory difficulty.
C) Somatic effects include the following:
Restlessness and involuntary muscle jerking that can be mistaken for seizures have been described.

Other Rare manifestations & complications:
Myocarditis, arrhythmias, Anaphylactic shock, ARDS, pulmonary edema, ARF, hematuria, DIC, GI bleed, pancreatitis.

Encephalopathy, convulsions, focal neurological deficits.
GRADING OF SEVERITY:

Grade I:
isolated pain. *

Grade II:
Systemic manifestations: fever, sweating, hypertension, * priapism.

Grade III:
Summary of clinical features:

- Autonomic Storm.
- Myocardial Depression.
- Central Nervous System dysfunction.
- Endocrine Dysfunction (Hyperglycaemia).
The toxicity, variation, and duration of the symptoms depends on the following factors:

- Scorpion species
- Scorpion age, size, and nutritional status
- Healthiness of the scorpion's stinging apparatus (telson)
- Number of stings and quantity of venom injected
- Depth of the sting penetration
- Composition of the venom
- Site of envenomation: Closer proximity of the sting to the head and torso results in quicker venom absorption into the central circulation and a quicker onset of symptoms.
- Age of the victim
- Health of the victim
- Weight of the victim relative to amount of venom
- Presence of comorbidities
- Treatment effectiveness
Generally, intrathecal and intravenous routes have immediate effects, while subcutaneous and intramuscular routes take effect several minutes to hours later.

Nonlethal scorpion species tend to produce local reactions similar to a hymenopteran sting, while lethal scorpion species tend to produce systemic symptoms. The duration to progress to systemic symptoms ranges from 5 minutes to 4 hours after the sting. The symptoms generally persist for 10-48 hours.
Lab. Investigations:

- Obtain a CBC count for leukocytosis and hemolysis.
- Electrolyte evaluation
- Blood sugar may be elevated.
- Coagulation parameters should be measured for venom-induced defibrination because, at high concentrations, the venom is an anticoagulant
- Obtain amylase/lipase values to assess for pancreatitis.
• Patients may have increased aspartate aminotransferase and alanine aminotransferase levels from venom-induced liver cell destruction.

• Interleukin (IL)–1 levels are elevated in all envenomations.

• Radiolabeled antibodies or immunoenzymatic assays help quantify the serum venom level because an association exists between the clinical signs of envenomation and this level.

• Obtain arterial blood gas (ABG) measurements as indicated for respiratory distress or to determine acid/base status, show a decrease in arterial oxygenation tension and an increase in PCO₂ within 15 minutes of the envenomation, findings consistent with mild metabolic acidosis.
* Imaging Studies

* Obtain a chest radiograph in cases of respiratory difficulty. Unilateral pulmonary edema may be seen on chest x-ray films because of the venom effect on pulmonary vascular permeability.

* ECG: changes of myocarditis, arrhythmias and blocks.

* Echocardiography:
  * Echocardiography is more sensitive than electrocardiography and creatine kinase assays for assessing myocardial compromise after a scorpion sting.
  * Findings show a diffuse global biventricular hypokinesis with a decreased left and right ventricular ejection fraction of approximately 0.14-0.38. This dysfunction can appear just a few hours after the sting and usually normalizes within 4-8 days.
Differential diagnosis:

The following possibilities must be considered when making a diagnosis:

- Drug overdose,
- Guillain-Barré syndrome,
- Hysteria,
- Myasthenia gravis,
- Organophosphate poisoning,
- Tetanus.
Treatment:

**First aid measures: (ABC 1st)**

Keep the person calm, reassuring him that bites can be effectively treated in an ER. Restrict movement, and keep the affected area below heart level to reduce the flow of venom & to decrease it’s absorption.

* wash with water, cool with ice if possible.
* Do not cut into the wound or apply suction by mouth & don’t apply tourniquet.
* Pain relief: local anesthetic, NSAID.
* Sedation: diazepam.
Fluid management: esp. for vomiting, sweating.
Monitor cardiac and respiratory functions and treat as required.

(Prazosin): It is a cardioprotective agent can decreases both preload & afterload and decrease BP.

Dobutamine +/- sodium nitroprusside if myocardial dysfunction persists.

Antivenom: composed of fragments of immunoglobulin G (IgG) that bind and neutralize venom toxins, facilitating redistribution away from target tissues and elimination from the body; must only be administered in the case of severe systemic envenomation.

Antihistamines
Prevent the histamine response in sensory nerve endings and blood vessels. They are more effective in preventing histamine response than in reversing it.
**PROGNOSIS**

- Case fatality rate may be as high as 25% in some areas
- Significant decrease noted if early prazosin is given (< 1%)
- Some children may have prolonged pain at site of sting
How to Prevent

- Use traps indoors.
- Wear gloves or heavy clothing around areas where scorpions may be.
- Inspect and shake outdoor clothing and shoes before putting them on.
قال عليه الصلاة والسلام:

(إِذَا أَوَى أَحَدُكُمْ إِلَى فِرَاشِهِ فَلْيَأْخُذْ دَاخِلَةَ إِزارِهِ فَلْيُنْفُضْ بِهَا فِرَاشَهُ ، وَلَيُسَمِّ الَّذِي
فَإِنَّهُ لا يَعْلَمُ مَا خَلَفَهُ بَعْدَهُ عَلَى فِرَاشَهِهِ). رواه مسلم.