Animal Poison

Scorpion Envenomation

Animal Poison

Learning Objective

- The toxins of Animal origin.
- General introduction of certain animal toxins
- Forensic significance of animal poisoning

- Scorpions sting
- Clinical Manifestation
- Management
- PM findings and Medico-legal Aspects

Scorpion Sting

Scorpion envenomation is a major public health problem in tropical and sub-tropical countries, especially in India, Africa, Middle- East, Latin America.

The morbidity and fatality remains high in rural areas

Farmers are more prone to get stung by scorpion during handling debris and paddy husk in the months of April to early June and September to October as due to sudden rise in environmental temperature, scorpions come out of their hides.

Scorpion species

ALL VENOMUS SCORPIONS SPECIES BELONG TO LARGE FAMILY BETHIDAE.EXCEPT HEMISCORPIUS LEPTURUS.

MOST NOTORIUS ARE – GENERA

- **BUTHUS (MEDITTERRANEAN SPAIN TO MIDDLE EAST)**
- **HOTTENTOTTA (SOUTH AFRICA TO SOUTH EAST ASIA)**
- **PARABUTHUS(WESTERAN AND SOUTHERAN AFRICA)**
- **TITYUS(CENTRAL AMERICA ,SOUTH AMERICA AND THE CARIBBEAN)**
- **LEIURUS (NORTH AFRICA TO MIDDLE EAST)**
- **ANDROCTONUS (NORTHERAN AFRICA TO SOUTH EAST ASIA)**
- **CENTRURIODES (SOUTHERAN UNITED STATES ,MEXICO,CENTRAL AMERICA AND CARIBBEAN)**
- **MESOBUTHUS (THROUGHOUT ASIA)**

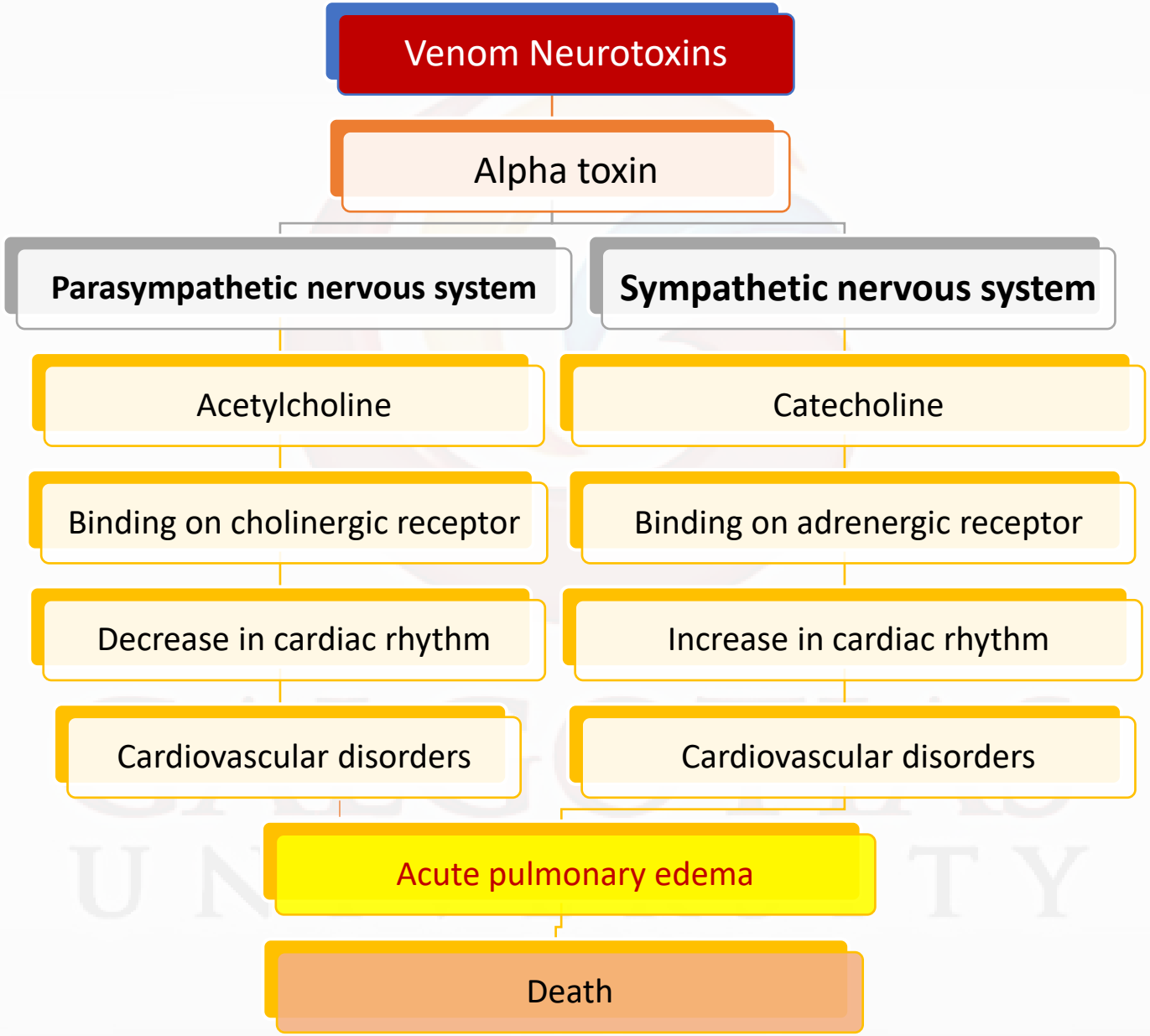
Around 89 species found in India

Indian red scorpion
Mesobuthus tamulus

Black scorpion .
Palmaneus gravimanus

Scorpion Venom

Neurotoxins	are the most important (consist of different small sized proteins with sodium and potassium cations, which interfere with neurotransmission).
Beta toxin	peptide neurotoxin that opens the sodium channels).
Alpha toxin	(depolarises the cell membrane; in addition, it also inhibits the deactivation of sodium channels).
Neurotoxins	cause delayed activation of sodium neuronal channels leading to massive release of endogenous catecholamines
Charybdotoxin)	(inhibits the calcium dependent potassium channels
Iberiotoxin	inhibits potassium channels.
Serotonin	(which may cause local pain at the site of the sting).
Kallikrein inhibitor	(causing raised bradykinin levels)- Tiyus Species.


Venom Neurotoxins
Alpha toxin
Parasympathetic nervous system
Sympathetic nervous system
Acetylcholine
Catecholine
Binding on cholinergic receptor
Binding on adrenergic receptor
Decrease in cardiac rhythm
Increase in cardiac rhythm
Cardiovascular disorders
Cardiovascular disorders
Acute pulmonary edema
Death

Clinical Manifestation

- Depends upon the species of scorpion and lethality and dose of venom injected at the time of sting.
- Severity of envenoming is related to age, size of scorpion and the season of the sting and time lapsed between sting and hospitalization.

Early / Premonitory Symptoms

- vomiting
- profuse sweating all over the body
- priapism
- cold extremities
- mild tolerable pain

Clinical Manifestation

Local Manifestations	Severe pain radiates along the corresponding dermatomes. Local oedema, urticaria, fasciculation and spasm of underlying muscles are seen at the site of sting due to persistent stimulation of pain conducting receptors and the liberated serotonin. Sudden tap at the site of sting induces severe pain and sudden withdrawal of the part called 'tap sign'.
Systemic Manifestations	Characterised by initial parasympathetic stimulation clinically detected in form of vomiting once or twice, profuse sweating all over the body(skin diarrhoea), ropy salivation, priapism, bradycardia, hypotension, transient premature ventricular beats. Prolonged Sympathetic stimulation is characterised by propped eyes, puffy and anxious facies, oculogyric crisis, chest discomfort, at times tingling and numbness all over body and cool extremities. Skin over hands, feet, palm and sole resemble washer-man hands as they appear finely wrinkled and cold.

Profuse Sweating

Ropy Salivation

Clinical Manifestation

The major manifestation includes hypertensive crisis and pulmonary oedema which may be fatal if not treated timely.

- Hypertension: Patient may present with agitated look, confusion, generalised convulsion, transient hemiplegia, oculogyric crisis, bilateral extensor plantar response, propped up eyes and a puffy face suggestive of hypertensive crisis. Transient initial hypotension is due to hypovolaemia secondary to acetylcholine excess, it is further aggravated by hot climatic conditions in summer months of the tropics.

- Pulmonary Edema: PE develops within 30 minutes to maximum 36 hours. Clinically PE can be suspected when respiratory rate is >24 per minute, orthopnoea, intractable cough, low volume fast thready pulse, narrow pulse pressure, summation gallops, systolic murmur and moist basal rales, central cyanosis.

- Acute renal failure due to scorpion sting is rare. However, ill-treated, delayed reporting of a case may result in death due to multi-system organ failure and acute respiratory distress syndrome.

- After 20 to 30 hours of recovery from autonomic storm, the victim develops asymptomatic warm extremities, accompanied with bradycardia, hypotension. He may look exhausted. Patient usually recovers within 72 to 96 hours without any intervention. This phenomenon does not occur if victim receives scorpion antivenom and prazosin simultaneously

Clinical grade of scorpion sting on arrival

Grade 1

- Severe, excruciating local pain at the sting site radiating along with corresponding dermatomes, mild local oedema with sweating at the sting site, without systemic involvement.

Grade 2

- Signs and symptoms of autonomic storm characterised by acetylcholine excess or parasympathetic stimulation (vomiting, profuse sweating from all over body, ropy salivation, bradycardia, premature ventricular contraction, hypotension, priapism in men) and sympathetic stimulation (hypertension with blood pressure >140/90, tachycardia with heart rate >120 per minute, cold extremities, transient systolic murmur).

Grade 3

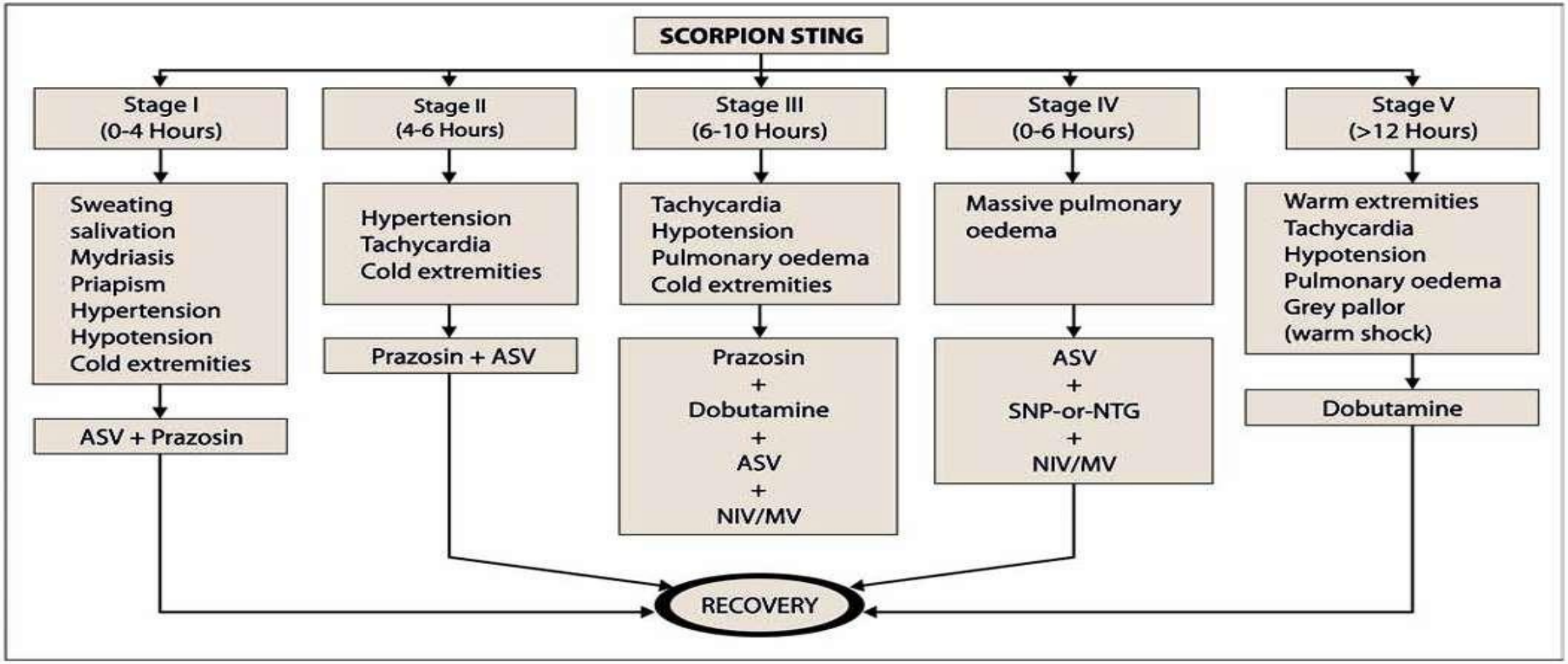
- Cold extremities, tachycardia, hypotension or hypertension with pulmonary oedema (respiratory rate >24 per minute, basal rales or crackles in lungs).

Grade 4

- Tachycardia, hypotension with or without pulmonary oedema with warm extremities (warm shock).

MANAGEMENT

Step-wise Management



Investigation

- Total leucocyte counts are raised to 11,000 to 26,000.
- Cardiac CPK MB is raised.
- Reduction in serum amylase and serum calcium levels may be observed.
- There is raised serum glucose, potassium and reduction in insulin level.
- Chest radiograph may reveal unilateral or bilateral batwing or patchy PE

ECG: Sinus bradycardia seen in early hypertensive cases with a heart rate of 42 to 60 per minute, usually persisted for 3 to 4 hours. Other common findings are ventricular premature contraction, couplets, transient nonsustained ventricular tachycardia and rarely fatal ventricular arrhythmias . The sinus tachycardia, injury to conducting system in the form of left anterior hemiblock, bundle branch block, complete heart block and marked tented T waves may be the other common findings. The tall T waves may mimic acute myocardial infarction.

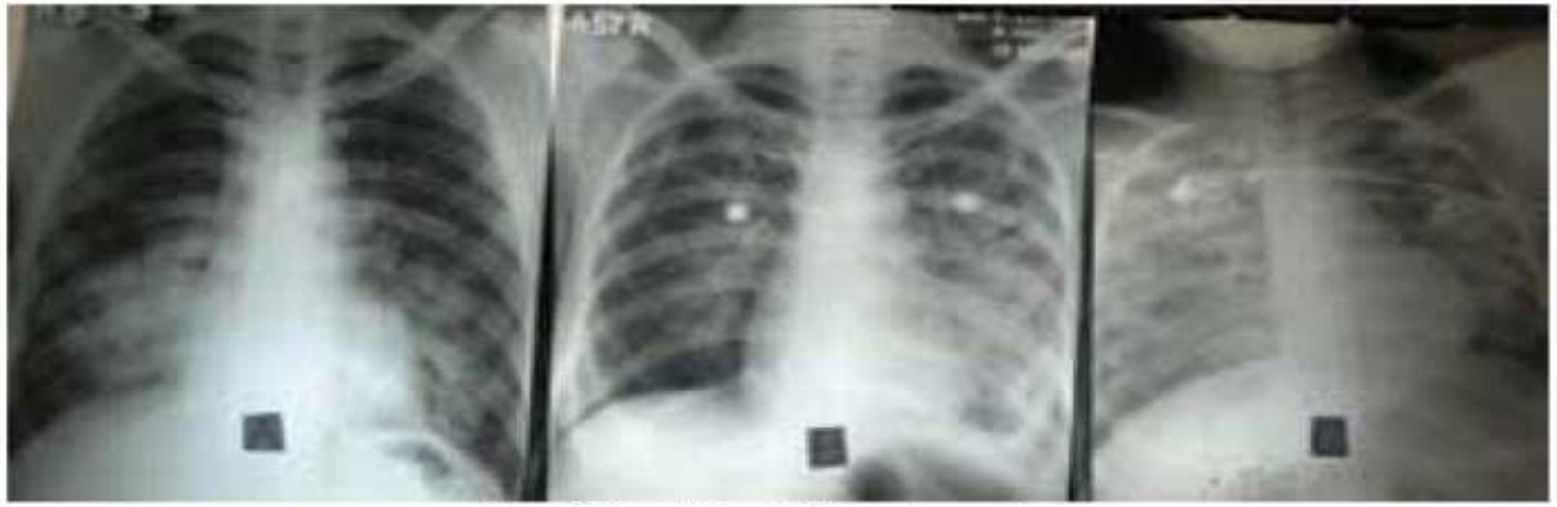


Fig. 11 : Unilateral, bilateral, diffuse pulmonary edema

Fig. 8 : Tented T waves

PM Findings

Affected site is swollen.

Sting may be found at the site.

The area may show eccymosis(*skin discoloration due to bleeding underneath the skin*).

Pulmonary edema and myocardial infraction may be seen.

Medico-legal Aspects

Accidental poisoning of Scorpion sting is found in most of the cases.

THANK YOU