TOXICOLOGY
DEFINITIONS

• Toxin or Poison is a substance which when introduced into or absorbed by a living organism causes injury or death

• Toxicology refers to the study of the predictable, dose dependent effects that result from an over dose of a potentially harmful agent
COMMON POISONS IN CHILDREN

• Household poisons
• Medications
• Plant poison
• Organo phosphorous
• Animal bite Poisoning: snake/ scorpion
APPROACHING THE POISONED CHILD

• Accurate and brief history
• Name, ingredient & concentration of poison
• Quantity - vol. of liquid / no. of tab / seeds
• Time of ingestion
• Any pre-hospital management / underlying illness
• History may be UNRELIABLE or Misleading
APPROACHING A POISONED CHILD

• CNS : Level of consciousness
• ASSESS : VITAL SIGNS : TPR BP
• EYES : Pupil Size
• ORAL CAVITY : Remnants, smell / salivation / gag reflex
• BREATHING : Normal or acidotic
• LUNGS : Pulmonary edema or aspiration
• CVS : Tachy or brady arrhythmias
• ABD : Bowel sounds
• SKIN : Sweating, color
• ASSESS & ACT
INVESTIGATIONS

- Hemoglobin
- Coagulation profile – BT, CT, PTT, PT
- Blood sugar
- Electrolytes
- Renal parameters
- Liver function tests
- Chest x-ray
- ECG / Cardiac monitoring
- Blood gas analysis
GENERAL MANAGEMENT

• TREAT THE PATIENT, NOT THE POISON
• Remove poison or patient from source of poison
• Remove unabsorbed poison: emesis / gastric lavage
• Elimination of absorbed poison
  – Charcoal / cathartics / forced diuresis / dialysis
• Resuscitation & Stabilization
• ABC & Drugs
• Treat – Hypo or Hyper tension, Arrhythmia, convulsion
• Antidote if available
• Pre discharge Psychiatric Assessment
KEROSENE POISONING

• Easy availability and faulty storage

• Ingestion, inhalation & aspiration

• NO correlation between quantity ingested & clinical features

• GIT – NAD, Abdominal pain

• Chemical pneumonitis – Atelectasis, V-Q mismatch, Hypo perfusion

• Fatal Dose : 30 ml

• Fatal period : 24 hours
KEROSENE POISONING - MANAGEMENT

- Decontamination
- GASTRIC LAVAGE – CONTRA-INDICATED
- Maintain – ABCs
- Oxygen, bronchodilators
- Antibiotics – NOT routinely indicated
CORROSIVE INGESTION – ACIDS / ALKALI

Corrosive ingestion

Attention to ABC

X-rays neck (lateral), chest, abdomen

IV fluids, NBM, Ranitidine antibiotic, NO NG TUBE

Barium swallow & follow through

Upto DJ junction at 24 – 48 hrs..

No injury

Injury ++

Feeds well

discharge

Surgical consultation
PHENOL POISONING

- Antiseptic, Caustic, germicide
- Denatures & precipitates proteins
- Burning pain from mouth to stomach
- Hematemesis, bloody diarrhoea, coma, convulsions
- ACUTE TUBULAR NECROSIS – CARBOLURIA
- Fatal dose: 10 – 15 gm (20 ml of household phenyl)
- Fatal period: 3 – 4 hrs.
PHENOL POISONING – MANAGEMENT

• Wash skin / eyes with water
• Supportive care / ABC
• Gastric lavage with plain water
• Treat: Convulsion, Acidosis
• NO SPECIFIC ANTIDOTE
NAPHTHALENE POISONING

• Deodorant & pesticide

• C/ f : Vomiting, jaundice, cyanosis, coma convulsion,

• ACUTE HEMOLYTIC ANEMIA

• Fatal dose : 2 gm

• Fatal period : 2 – 3 days
NAPHTHALENE POISONING – MANAGEMENT

• Emesis
• Stomach wash with NS
• Activated charcoal / cathartics
• Avoid fatty foods for 2 – 3 hours
• Supportive care:
  • Blood transfusion
  • Anti convulsants
• Hydrocortisone
• Hemolysis
OTHER HOUSE HOLD POISONS

• Match stick head poison
  • Check for coagulation profile
• Cleansing agents
  • Supportive care
  • Decontamination
• Mosquito repellents
  • Supportive care
  • Stomach wash
CAMPHTOR POISONING

• Pooja item and a native medication
• Toxic only on ingestion
• Nausea, vomiting, headache
• Agitation, hyperactivity, seizures
• Seizure not dose related, 5 – 20 min post-ingestion
• Fatal dose : 50 – 150 mg / kg
• MANAGEMENT :
  • Activated Charcoal
  • NO ANTIDOTE
DAPSONE POISONING

• Methemoglobinemia
• Severe cyanosis NOT relieved by oxygen
• Management
  – Gastric lavage
  – Activated charcoal
  – 100 % oxygen
  – Exchange transfusion
• Antidote: Methylene blue, Ascorbic acid
PARACETAMOL POISONING

• Acute ingestion of >140 mg/kg, hepatotoxic
• Clinical phases
  • Phase 1 (0.5 to 24 hrs.) Initial symptoms
    • Nausea, vomiting, abdominal pain
  • Phase 2 (24 – 72 hrs.) Latency
    • Symptoms subside, LAB evidence of detiorating LFT
  • Phase 3 (72 – 96 hrs.) Hepatic failure
    • GI features reappear with features of hepatic failure
    • Death secondary to hepatic or renal failure
  • Phase 4 (4 days to 2 weeks) Recovery
    • If patient survives, complete recovery with regeneration of liver
PARACETAMOL POISONING

- Monitor Sr. paracetamol level at 4hrs
- Decontamination and elimination
  - Gastric lavage
  - Activated charcoal
  - Cathartic
- Specific antidote: N-acetyl cysteine
IRON POISONING – CLINICAL FEATURES

- Phase 1 (0 – 6 hrs.)
  - GI symptoms (NVD, hematemesis)
- Phase 2 (6 – 24 hrs.)
  - Latency (partial clinical improvement)
- Phase 3 (6 – 48 hrs.)
  - Systemic toxicity (lethargy, coma, convulsions, cyanosis, shock, metabolic acidosis, coagulopathy)
- Phase 4 (2 – 4 days)
  - Hepatic failure
- Phase 5 (2 – 8 weeks)
  - Late complications (GI strictures, scarring)
IRON POISONING – MANAGEMENT

- Stabilization and fluid resuscitation
- Decontamination and elimination
  - Charcoal **NOT** recommended
- Serum iron at 6 hrs. post ingestion
  - Gastric lavage
- IV Ranitidine
- Hemodialysis / Hemoperfusion
  - **NOT** useful for free iron
  - Removes iron desferoxamine complex in renal failure
- ANTIDOTE / CHELATION therapy
SALICYLATE POISONING

• Analgesic and antiplatelet

• Level of toxicity – dose dependent

• Clinical features
  • Pyrexia, Restlessness, lethargy, coma, seizures
  • Respiratory alkalosis, metabolic acidosis
  • Electrolyte disturbances
  • Tinnitus, Bronchospasm
  • Bleeding
SALICYLATE POISONING – MANAGEMENT

• Supportive measures
  • Dehydration / Fever
  • Maintain Acid - base balance
  • Vitamin K and blood products

• Decontamination and elimination
  • Gastric lavage
  • Activated charcoal
  • Forced Alkaline Diuresis
  • Hemodialysis
ORGANO PHOSPHOROUS POISONING

• Interferes with the degradation of Acetylcholine
• CNS – Agitation, slurred speech, ataxia, weakness, coma, seizures
• Nicotinic receptor stimulation
  • Muscle: Fasciculation, cramps, weakness, areflexia, paralysis
  • Sympathetic ganglia: Tachycardia, hypertension, arrhythmias
• Muscarine receptor stimulation (DUMBBELLS)
  • Diarrhea, Urine retention, Meiosis, Bradycardia, Bronchospasm, Emesis, Lacrimation, Salivation
ORGANO PHOSPHOROUS POISONING : MANAGEMENT

1) ABC’s
2) Decontamination
3) ATROPINE
   • No effect on neuromuscular Junction
   • 0.05mg / kg IV q 10 min until secretions dry.
   • frequency to Q 30 – 60 mins once atropinised.
   • Pupillary dilatation is not an end point!
   • Tachycardia is not a contraindication!!
4) Antidote : Pralidoxime (PAM)
OPIOID POISONING

• Classical Triad:
  • Respiratory depression, Depression of consciousness & miosis
• Other features: hallucinations, agitation, flaccid muscles, pruritus, urticaria, hypotension
• Treatment
  • Gastric lavage, activated charcoal
  • Supportive and symptomatic measures
  • Rehabilitation
PHENOTHIAZINES POISONING

• Antiemetic / antipsychotic drug
• Extrapyramidal symptoms, convulsions, coma
• Management:
  • Gastric lavage, activated charcoal
  • Supportive care
  • DIPHENHYDRAMINE for extrapyramidal symptoms
DATURA POISONING

PLANT POISON

- Anticholinergic
- Clinical Features:
  - Hot as Hare
  - Blind as bat
  - Dry as Bone
  - Red as Beet
  - Mad as Hen
  - Muttering, delirium
  - Tachycardia
  - Fatal dose: >100 seeds
  - Fatal period: 24 hrs.
DATURA POISONING – MANAGEMENT

• Gastric decontamination with NS upto 48 hrs.

• Activated charcoal till improvement occurs

• Supportive care

• Inj. Physostigmine 0.5mg
SNAKE BITE
POISONOUS SNAKES IN INDIA

• Elapids → Cobra, king cobra, krait, branded kraits, corals
• Vipers
  • Pit vipers → Bamboo snake
  • Pitless vipers → Russel’s & saw scaled
• Sea snakes
MANAGEMENT

- First aid treatment
- Transport to hospital
- Rapid clinical assessment & resuscitation
- Detailed clinical assessment & species diagnosis
- Investigations/laboratory test
- Antivenin treatment
- Supportive treatment
- Rehabilitation
- Treatment of chronic complications
FIRST AID

DO NO HARM
Reassure
Immobilize
Pressure immobilization

REMEMBER SNAKES CAN BITE UPTO ONE HOUR
AFTER BEING KILLED DUE TO INTACT
RAPID ASSESSMENT

1. Profound hypotension & shock
   – Direct CVS effect
   – Hypovolemic or haemorrhagic
2. Respiratory failure – neurotoxic envenomation
3. Sudden deterioration / rapid development release of tourniquet
4. Cardiac arrest – hyperkalemia – rhabdomyolysis
INVESTIGATIONS

1. CBC (RBC, WBC, PL.COUNT, HAEMATOCRIT)

2. Urinalysis

3. Electrolytes, BUN, Creat, ECG.

4. Creatinine kinase

5. 20 WBCT
### DOSE OF VENOM

<table>
<thead>
<tr>
<th>Degree of envenomation</th>
<th>Initial no of vials</th>
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<tbody>
<tr>
<td>Grade 0: No envenomation</td>
<td>0</td>
</tr>
<tr>
<td>Grade 1: Minimal envenomation (local swelling and pain without progression)</td>
<td>5</td>
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<tr>
<td>Grade 2: Moderate envenomation (swelling pain, or ecchymosis progressing beyond the site of injury; mild systemic or laboratory manifestation)</td>
<td>5 - 10</td>
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<tr>
<td>Grade 3: Severe envenomation (marked local response, severe systemic findings, and significant alteration in laboratory findings)</td>
<td>10 - 20</td>
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</tbody>
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SCORPION STING

- 99 species reported in India
- Only 2 are poisonous
- They are
  - *Mesobuthus Tamulus* (the common red scorpion)
  - *Palamnieus Swammerdami*
VENOM

<table>
<thead>
<tr>
<th>Is acidic-a mixture of polypeptides &amp; proteins</th>
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<tbody>
<tr>
<td>Serotonin</td>
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<tr>
<td>Phospholipases</td>
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<tr>
<td>Toxalbumin</td>
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<tr>
<td>Charybdotoxin</td>
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<tr>
<td>(Cardiotoxin)</td>
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<tr>
<td>☪ &amp; ☪ toxins</td>
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CLINICAL FEATURES

Autonomic storm
Massive release of catecholamines
Suppression of Insulin secretion
Stimulation of Renin - Angiotensin

Autonomic
Profuse sweating
Excess salivation
Vomiting
Excess lacrimation
Mydriasis
Priapism

CNS
Convulsions
Focal neurological deficit
Encephalopathy
Transient blindness
C/F : CVS

- Tachycardia & hypertension
- Hypotension & bradycardia
- Arrhythmias
- Varying degrees of AV block
- CCF
- Dilated cardiomyopathy as a sequela
C/F : other

RESPIRATORY
Dyspnoea
Cyanosis
Hemoptysis
Pul.oedema

METABOLIC
Acidosis
Hyperglycemia
Hyperkalemia
Increased FFA

GI
Hematemesis
Melena
Abd. Pain-pancreatitis

HEMATOLOGICAL
Increased fragility of RBC
DIVC
MANAGEMENT

Step 1. Confirmation of sting
Step 2. Differentiate between benign sting from potentially fatal envenomation
Step 3. Identification of the autonomic storm & management
PRAZOSIN

• Post synaptic α blocker
• Antagonizes the effect of catecholamines at a cellular level & also metabolic effects
• Prevents damage to the myocardium
• Reduces preload, afterload & BP
• Dose – 30 µg /kg/dose
• First dose phenomenon - postural hypotension
• Can be repeated 3 hourly till pulses become palpable & periphery becomes warm
• Thereafter 6 hourly till complete recovery
ANTI VENOM

• Not freely available
• Should be given within 30 min of sting for maximal benefit
• Indian experience limited
• Trials in USA, Mexico, Saudi Arabia, Brazil – favor its use
• Tunisian trials do not favor its use
<table>
<thead>
<tr>
<th>Group</th>
<th>Features</th>
<th>T/T</th>
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<tbody>
<tr>
<td>I</td>
<td>Local symptoms only</td>
<td>Analgesics</td>
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<tr>
<td>II</td>
<td>Systemic manifestations but hemodynamically stable</td>
<td>Prazosin &amp; oral fluids</td>
</tr>
<tr>
<td>III</td>
<td>Systemic manifestations – stable at admission - subsequent destabilisation</td>
<td>Prazosin + dobutamine ± SNP</td>
</tr>
<tr>
<td>IV</td>
<td>Life threatening complications with hemodynamic compromise</td>
<td>ICU protocol</td>
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Thank You