

# Clinical Toxicology

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Lec:1

# Important Rule

- ❖ All poisoned patients should be managed as if they have a potentially-life –threatening intoxication
- ❖ The initial approach to the poisoned patients should be essentially similar in every case.
- ❖ This approach can be termed as (routine poison management).

# Introduction

- ▶ Poisoning can result from exposure to a variety of substances, ranging from household cleaning product to pesticides. However, prescription and over the counter medications account for nearly one half of poisoning exposures.
- ▶ **Evaluation:** involves recognition that poisoning has occurred, identification of agents involved, assessments of severity and prediction of toxicity.
- ▶ **Management:** is directed to the supportive care, prevention of poison absorption or enhancement of elimination, and appropriate the administration of antidote.

# Initial evaluation

- ▶ ABCDEs: Clinician who treat poisoned patients should have a systematic and consistent approach to evaluation and management.
- ▶ This should start with:
- ▶ The standard Airways, Breathing, Circulation, Disability and Exposure (ABCDE) approach:

# Airway

- ▶ Airways should be kept patent and any suspicion for obstructing material must be removed. The most common factor contributing to death from poisoning is loss of airway-protective reflexes with subsequent airway obstruction caused by: Flaccid tongue or pulmonary aspiration of gastric contents.
- ▶ **Breathing:**
- ▶ Evaluate respiratory rate and if available ,oxygen saturation. If there is no oxygen monitor available but the patient has an elevated respiratory rate, consider supplemental oxygen.

# Circulation:

- ▶ A prompt assessment of vital signs and hydration status is essential.
- ▶ A. Check blood pressure and pulse rate and rhythm.
- ▶ B. Begin continuous ECG monitoring.
- ▶ C. Secure venous access.
- ▶ D. Draw blood for routine studies.
- ▶ E. Begin intravenous infusion if the patients is hypotensive, normal saline or another isotonic solution is preferred.

# Disability(Neurological)

- ▶ A decrease level of consciousness is the most common serious complication of drug overdose or poisoning.
- ▶ In patients that are presented with seizures, it is important to check the blood sugar level.
- ▶ If the blood sugar level is  $<72\text{mg/dl}$ , then administer 50ml of 50% dextrose IV.
- ▶ Toxic seizures should be treated with IV benzodiazepine, Seizures refractory to benzodiazepine can be treated with barbiturates.

## Exposure(evaluation of temperature)

- ▶ Consider the possibility of toxic syndromes associated with hyperthermia (toxic levels of certain drugs can lead to significantly elevated body temperature).



# Definitive care with poisoning

- ▶ Try to identify the poison.
- ▶ Accurate and complete history from sources other than patient(family, friends, pharmacist, and pill bottle at the scene).
- ▶ Attempt to establish the time and the amount of the ingestion.
- ▶ **Supportive Care and Monitoring**
- ▶ Remember that acute poisoning is a dynamic illness and the patients condition may fluctuate over time. Therefore repeated examination and ongoing clinical assessment and management are required.

# Physical examination

- ▶ This may provide guide as to what the drugs ingested were:
- ▶ **Important aspects of the examination include:**
- ▶ Vital signs(PR,RR,BP,temp,O2 saturation if available).
- ▶ Neurological exam(pupil size, mental state, tone, reflexes, clonus, focal signs).
- ▶ Skin (colour, sweating absent/present).
- ▶ Dry mouth/salivation, bowel sounds, urinary retention
- ▶ Evidence of trauma.

# Investigation

1. Blood sugar level
2. ECG\_ look for:
  - Rate (Bradycardia or Tachycardia)
  - Rhythm

## Management

The management of poisoning is directed towards

1. The prevention of further poison absorption
2. The increase of poison elimination
3. Use of an antidote (if appropriate)

# Prevention of further poison absorption

## 1-Dermal Exposure

- \*Remove all clothing

- \*Washing skin gently with soap and water for at least 30 minutes.

## 2- Eye Exposure

- \*Washing conjunctiva with running water or normal saline for 20 minutes.

- \*Solid corrosive should be removed by forceps.

# Prevention of further poison absorption

## 3-GIT Exposure

- \*Gastrointestinal Decontamination
- \*Induction of emesis
- \*Gastric lavage
- \*Activated Charcoal
- \*Cathartics
- \*Whole bowel irrigation

# INDUCTION OF EMESIS

Ipecac syrup: the only safe method for induction of vomiting, should be given within 30 minutes of poison.

Syrup of ipecac should no longer be used routinely as a poison treatment intervention in the home.

## Emesis Contraindication

- 1.Convulsion
- 2.Corrosives
- 3.Hydrocarbon
- 4.Coma
5. Less than 6 months of age (not well develop gag reflex).

# GASTRIC LAVAGE

- ▶ Used in hospital when emesis was failed or there was contraindication for it.
- ▶ Gastric lavage is effective in the first 4-6 hrs after ingestion.
- ▶ Technique:
  1. An assistant with suction machine should be available.
  2. Dentures, mucous, vomitus should be removed from patient's mouth.
  3. Proper tube size to be selected according to the patient's age.

# Activated charcoal

- ▶ Adsorption of a wide variety of drugs and chemicals. It is not digested; it stays inside the GIT tract and eliminated the toxin when the person has a bowel movement. Adult dose is 1gm/Kg.
- ▶ Indication: (all of these must be met)
- ▶ Within one hour of time of ingestion
- ▶ Patient at risk of significant toxic effects
- ▶ Patient **NOT** at risk of airway compromise



# Activated charcoal

- ▶ Contraindication:
- ▶ Non-toxic ingestion
- ▶ If an oral antidote is given
- ▶ Seizures, coma
- ▶ Corrosive
- ▶ Agent not bound to activated charcoal:
- ▶ Hydrocarbons, alcohols and corrosive (acids, alkali)

# CATHARTICS(laxative)

- ▶ These are substance that enhance the passage of material through GIT and decrease the time of contact between the poison and the absorptive surfaces of the stomach and intestine.
- ▶ A)Osmotic cathartics: increase osmotic pressure in the lumen, as Magnesium sulfate.
- ▶ B) Irritant cathartics: act by increase motility, such as castor oil.
- ▶ Contraindication:
- ▶ GIT hemorrhage, Recent bowel surgery, Intestinal obstruction.

# WHOLE BOWEL IRRIGATION

- ▶ The goal of WBI is to clean GIT from nonabsorbed ingested toxins.
- ▶ Polyethylene glycol electrolyte solution are used and administered by gravity.
- ▶ Indications:
  - ▶ Ingestion of a toxin that is known to be poorly adsorbed by A charcoal.
  - ▶ Ingestion of massive amounts of drugs.
  - ▶ Ingestion of sustained-release or enteric-coated preparation.
  - ▶ Removal of ingested packets of illegal drugs (body packers).

# ANTIDOTE

- ▶ A therapeutic substance used to counteract the toxic actions of a specific xenobiotic.
- ▶ Antidote are classified according to mechanism of action into
  - 1-Interacts with poison to form a nontoxic complex that can be excreted e.g. chelators
  - 2.Accelerate the detoxification of the poison:N-acetylcysteine,thiosulfate.
  - 3.Decrease the rate of conversion of poison into its toxic metabolites: Ethanol, Fomepizole.

# ANTIDOTE

4-Compete with poison for certain receptors:  
Naloxone.

5-Block the receptors through which the toxic effects of the poison are mediated: atropine.

6-Bypass the effect of the poison: O<sub>2</sub> treatment in CO and cyanide toxicity.

7-Antibodies to the poison: digibain, antivenoms.

## Antidote are classified into

1-Physical Antidote Agents used to interfere with poisons through physical properties, not change their nature

- a) Adsorbing: the main example is activated charcoal.
- b) Coating: a mixture of egg and milk makes a coat over mucosa.
- c) Dissolving: 10% alcohol or glycerin for

## 2-Chemical Antidotes

a) Oxidizing: Amyl Nitrite is used in cyanide toxicity.

b) Reducing: Vitamin C: used for drugs causing Met-Hb.

c) Precipitating: Starch, it makes blue precipitate with iodine.

# 3-Physiological(Pharmacological) Antidote

## a)Antagonism

1-Competitive Antagonists

2-Non-Competitive Antagonism

## b)Chelating Agents

Unite metallic poisons to form soluble, nonionizable, less toxic, and easily excreted chelates.e.g Dimercaprol (BAL)

C)Antibodies (Immunolgy-based Antdotes) e.g. Digoxin Specific Antibody Fragment (FAB fragments, Digiband)



# ENHANCEMENT OF POISON EXCRETION

## 1- Forced Diuresis

It is a simple method for some poisons. Its effect is increased with manipulation of urine Ph.e.g. Fluid Diuresis, Osmotic Diuresis as mannitol 10%.

## 2-Dialysis

By allowing toxic substances to pass through semi-permeable membrane depending on the concentration gradient. It is beneficial when renal function is impaired.

a) Peritoneal dialysis

b) Hemodialysis

## 3-Hemoperfusion

Using equipment and vascular access similar to that for hemodialysis, the blood is pumped directly through a column containing an adsorbent material (either charcoal or resin).