

* Toxicology *

Date _____
Page _____

Q1 * Gastric lavage :-

- u) It consider only if patient has ingested a life-threatening amount of poison & present to hospital within 1 to 2 hr of ingestion.
- u) It involve passage of wide-bore orogastric tube in order to remove content of stomach.
- u) 0.9% saline or water used.
- * ~~Ind~~
- u) American Academy of Clinical Toxicology & AAPCCT prepare draft & procedure for gastric lavage.

* Indications

- u) Work for patient has taken - life threatening dose with ~~1 to 2 hr~~ of administration & come to hospital within 1 to 2 hr of administered.
- u) Some authorities preferred G/L upto 6 to 12 hr of administered.
- u) Eg. Salicylate, tricyclics, barbiturates

✓ Contraindications

- Relative - Haemorrhagic diathesis
 - Alkaline corrosive
 - Pregnancy
 - Oesophageal surgery
 - Coma

- Absolute - Hypothermia
 - Vomiting
 - Unprotected airway
 - Injection of acid
 - Depressed & conscious

✓ Procedure

- Explain process to patient & obtain consent. If refused, do not do lavage.
- Patient positioned in left lateral head down posture which give better lavage result
- length of tube is measured
 Adult :- 35-40 french or 50cm gauge tube
 Child :- 16-28 french gauge tube
 or
 25cm

- In India, Ewald tube is used which has soft rubber tube with funnel as rounded end.
- Tube passing through nasally cause damage thus oral route preferred.
- Glycerine or vasoline use to lubricate ends.
- Use mouth gag so patient will not bite the tube.
- As tube has inserted check air insufflation while listening over stomach or aspiration pH check.
- Lavage taken or carried out with 200-300 ml of warm saline or plain water. used each time.
- Lavage continued till no further particulate is seen.

* Complication

- + Laryngospasm
- + Pneumonia
- + Sinus bradycardia.
- + Perforation of stomach.

Method of Enhancement of Elimination

m. 3 type

(I) Multiple dose activated charcoal

(II) Urinary alkalinisation

(III) Extracorporeal elimination

(I) Multiple dose activated charcoal

→ Interruption of entero-hepatic circulation

~~also~~

→ Require biliary excretion to adsorb charcoal

• is I dialysis

→ Drug from Intravascular to gut
mucosa, absorbed via intraluminal
activated charcoal.

↓

Only drug, lipid soluble & low Vd
absorbed.

- Use :- carbamazepine
- = dapsone
- = phenobarbitone
- = quinine.

* Contra indication

- Unconsciousness
- Without prior airway protection
- Bowel obstructions

* Technique

50 g activated charcoal

↓
In intubated patient, administered
by oro-or naso gastric tube

↓
check Bowel sound before administer

↓
NO sound

↓
Stop administer

↓
Every 6 hr reconsider the
reason.

* Complications

- Vomiting
- Charcoal aspiration
- Constipation
- Bowel obstruction
- Corneal abrasion (Scratch)

(II) Urinary alkalinisation

→ Ionization of acidic medicine inhibits tubular reabsorption cause urine pH toward alkalinisation.

• Use :- Phenobarbital
Salicylate

• Technique

Hypokalaemia corrected

↓

$I = 2 \text{ mmol/kg}$ NaHCO_3

↓

5% dextrose 250ml

↓

20 mmol of KCl to maintain potassium level

↓

Every 4hr ~~check~~ serum bicarbonate

↓

Continue till toxicity removed

• Complication :- Alkalaemia

- Hypokalaemia

- Hypocalcaemia

C III) Extracorporeal

→ Start Haemodialysis if

- small molecule
- small V_d
- = slow elimination

→ CRRT (continuous renal replacement treatment) has low clearance per unit time

- use when patient is unstable
- highly protein bound toxin
- very long plasma life

→ Haemoperfusion for high protein-bound drug

- * Use: carbamazepine
- lithium
- Potassium
- lactic acidosis
- Methotrexate

* Theophylline :- RRT continue till its plasma level $< 20 \text{ mg/L}$

* Alcohols

(a) Methanol :- RRT till ^{less than} 25 mg/dl level.
- Rebound take 36 hr

(b) Ethylene glycol :- RRT less than 20 mg/dl
Rebound take 24 hr

* Valproate :- Saturated plasma protein given

* Haemoperfusion in Theophylline & Antiepileptic

* Complication :- Air embolism

- clotting
- bleeding from systemic anticoagulation
- Anemia
- Hypothermia

Q3

Supportive care

→ Supportive care keeps the patient ~~to keep~~ alive until physiological function is restored.

→ In supportive care patient receives physical, practical, emotional & spiritual ~~care~~ support.

(i) Airway.

→ Monitor and managing airway in treatment of poisoning.

→ Proper ventilation should provide

→ SpO_2 ventilation should provide

e.g. Atropine, cocaine, Salicylate.

→ Oxygen therapy

(ii) Breathing

- Hypoxia & pneumonia are managed

- Hyperventilation

- Manage shortness of breath

→ O_2 therapy, Thoracentesis & Paracentesis are given.

(iii) Circulation.

→ Altered mental status.

→ Pallor, cold clammy skin, thin or thready pulse.

→ Increased respiratory rate.

1) Inotropic support

- milrinone: 50 microgram / kg IV
- Insulin euglycaemia.
short acting

ciii) Drug-induced arrhythmias.

- QT prolongation & torsades should be monitored.
- Electrolyte include Mg & Ca^{+2} corrected.
- Adverse drug effect ranging mild to fatal.
- Manage all the cardiac diseases.

civ) Sedation

- The reduction of irritability or agitation by administration of sedative drug.

- Toxic dose can cause hyper sedation

(v) Seizure

- Common type of complication.

- It happens due to toxic dose or over load of drugs thus called drug induced seizure.

- Antidepressant, stimulant & antihistamine may cause seizure.

x Management

- Airway management, ventilation etc.
- Gastric decontamination & enhanced.

- ✓ Management of drug overdose
 - Magnesium sulfate 50% 50/10ml
 - Hypocalcaemia \rightarrow Ca^{2+} supplement
 - Hypokalaemia \rightarrow K^{+} supplement
 - Isoprenaline 20 mcg

✓ Management of Sedation.

- Patient keep away from area of potential harm.
- \rightarrow Make patient hydrated.
- \rightarrow Ensure airway & ventilation.

- Elimination

- 1. Sugar, B.P etc are monitored.
- 2. Benzodiazepines.

Q10 Nephrotoxicity :-

• Drug & toxic effect cause on nephron cause nephrotoxicity

→ Myoglobinuria can be treated by NaHCO_3 infusion, prevent acidic tubular fluid

- Air way, breathing, symptoms are managed

Q11 Note on Gut decontamination :- Emesis & ~~act~~ activation charcoal

→ Gastrointestinal decontamination refers to the practice of functionally removing an ingested toxin from gastrointestinal tract in order to decrease or increase the clearance.

→ Passive clearance from the GIT can be accomplished in a variety of ways.

- Emesis
- Gastric lavage
- catharsis
- whole bowel irrigation

① Emesis

- The sole option for getting a patient to vomit by prochlorperazine Syrup.
- Ipecac Syrup should only be used in exceptional conditions.
- * Syrup Ipecac
 - It is utilized in treatment of some type of poisoning in emergency situation.
- * Indications
 - Administration of Syrup of Ipecac is recommended for alert patient.
 - Usually it is not effective more than 4-6 hr after ingestion, unless the toxin itself delays.

Ads

- Esophageal injury
- persistent vomiting
- Nausea

→ Safety:- These produce side effect, including prolonged vomiting, diarrhoea, lethargy, aspiration.

- complication & contraindication

① Relative:- Seizure include drug
- Rapid coma inducing agent.

② Pregnancy:- heart diseases

③ Absolute:- corrosive
- children under 6 month of age.
- comotose

• Dose:- Infant (6-12 month of age) -
= 5-10ml + 15ml of clear fluids /kg/day
→ children (12 month - 5-12 yr of age)
- 15ml + 240ml of clear fluid/kg/B.w

• Activated charcoal

→ Activated charcoal is formed from organic material that has been burned. such as coconut, shells, peat or wood.

- Administration decrease the absorption of various poison by adsorbing them on to surface.

Name of preparation

Dose

Actidose - aqua
carbomix
charco-dati
liqui-char
~~Med~~

- Oral suspension
50mg in 240ml
powder 25g & 50g
- Oral suspension
& 50g

Medical

- granules 5g/sachet

Q5 ~~Write~~ Write classification of poisoning
& mechanism of toxicity

Ans: ③ Corrosive poison - Sulfuric acid

- HCl, H_2SO_4

- Boric acid

- Acetic acid

- Formic acid

- Carboxylic acid

② chemical poison :- Aluminium phosphide

- chlorine

- Bromine

- Sulphur

- Iodine

③ Organic poisoning :- Red pepper

- Castor

- Colocynth

④ Venomous bite :- Snake like viper

- cobra

- color snake

- sea snake

⑤ hydrocarbon & pesticide poisoning :-

- Benzene

- naphthalene

- pyrethrin

- Rodenticide

⑥ Therapeutic drug :- All drug overdose

⑦ Microbial food poisons :- Bacteria

- Virus

- Protozoa

- Fungal

- Parasite.

⑧ Poison due to abuse :- Tobacco

- cocaine

- cannabis

▼ Mechanisms

- ① Interfere with transport & utilization of oxygen
- ② Depress or Stimulate CNS
- ③ Adversely affect ANS
- ④ Affect lungs by aspiration
- ⑤ Directly toxic to heart
- ⑥ Tissue damage
- ⑦ Delayed effect on liver & kidney

~~7/2/11~~

Q13 Write clinical symptom & management of hydrocarbon poisoning.

(iii) A hydrocarbons are compound containing carbon and hydrogen and thus are group 14 hydride.

(iv) There are 5 type of hydrocarbon.

1) Aliphatic Hydrocarbon :- Saturated molecule
e.g. butane, ethane, propane (gas)
oil, petrol, diesel (liquid)
Paraffin wax, grease (semi solid)

2) Aromatic Hydrocarbon :- Has atleast 1 benzene ring e.g. Benzene, toluene, xylene

3) Halogenated Hydrocarbon :- Clear, colourless liquid
e.g. tetrachloride, ethylene

4) Cycloparaffin :- saturated hydrocarbon with closed ring e.g. Naphthalenes.

5) Alkenes :- One carbon-carbon double bond
e.g. Halogenated hydrocarbon.

* Sign Symptom.

1) Brain :- lethargy with depressed
- convulsion.
- coma.

2) Lungs :- Cracking
- Dyspnea
- Choking
- Cyanosis

3) Heart :- Arrhythmia
- Intravascular coagulation

4) GI :- Nausea
Vomiting
Haematemesis
- Diarrhoea

5) Liver :- Hepatomegaly - splenomegaly
- Liver Enzyme elevated.

6) Kidney :- Acute renal tubular necrosis
- Proteinuria
- Hematuria

* Investigations

① Xray

② CBC

③ electrolyte

④ LFT

⑤ RFT

⑥ ABG

* Treatment.

① Respiratory Support.

- Endotracheal intubation.
- Oxygen Supply
- Bronchodilator Salbutamol.
- High frequency jet ventilation

② Decontamination

If dermal Exposure.

- Remove clothes
- Wash with water

If Injected.

- Gastric lavage
- Stomach wash.

- Crystallised Solution must be administered.

→ Antibiotics & Corticosteroid are administered.

- iii) Treat renal failure with dialysis & hepatic failure with plasma, vitamin K
- low protein diet,
 - Neomycin
 - lactulose

iv) Rewarming :- 40°C - 42°C water bath

- ~~water~~ whirlpool bath

v) Wound care :- protective dressing

Q12

Clinical symptom & management of NSAIDs

Notes

Q11

What are the Sign Symptoms & treatment of TCM Poisoning

↳ Paracetamol also known as Acetaminophen

↳ It is white, odourless, Bitter crystal or Powder.

↳ Symptoms

↳ The Symptoms are according to the Type of Toxicity

(I) Acute Poisoning :-

(a) Stage I :- 1/2 to 24 hours

- Anorexia

- Vomiting

- Sweating

- Malaise

(b) Stage II :- 24 to 72 hours

- Right upper Quadrant Pain

- Abnormal LFT

(c) Stage III (72 to 96 hr)

- Coagulation defect
- Jaundice
- Encephalopathy
- Renal failure
- Coma
- Increase Total Bilirubin
- Prolong PT time

(d) Stage IV (4 days to 2 week)

- If Patient survive Stage III
- Complete resolution of hepatic damage

(2) ~~Chronic~~ Chronic poisoning

→ Common in children than adult due to less metabolism

Symptoms are :-
Anorexia
Vomiting
Lethargy
Oliguria

→ In pregnant women affect the baby and cause some birth defect

Treatment

① Decontamination

- Stomach Wash
- Activated charcoal
- Albumin Dialysis
- Haemofiltration

② Anti emetic

③ Supportive Measurement

- (a) 10-20% Dextrose for hypoglycaemia
- (b) Vitamin K - If PT is elevated
- (c) Mannitol - 0.5mg/kg over 10 mint. for cerebral Oedema
- (d) H₂ Antagonist - Prevent GI bleeding
- (e) Broad Spectrum Antibiotic IV.
(Cefazidime or fluoroquinolones)

④ Antidote :- Methionine - 2.5gm/4hr

- N-acetyl cysteine

140mg/kg

- followed by 17 doses of
70mg/kg/4hr

* NSAID poisoning *

- Diclo, Aceclo, Ibu, phen, Nap, ~~Nime~~

↓ M.O.A

Bind to cyclooxygenase

↓

Inhibit synthesis of - P_G

- Prostacyclin

- Thromboxane

* ~~Symptoms~~

~~① Brain~~

~~② Reproductive~~

① Renal :- Haematuria

- Proteinuria

- Anuria

- Nephropathy

② Respi :- ~~Alkalosis~~

M. Acidosis

③ GI :- Vomiting

- Ulcer

- Abdominal pain

- Diarrhoea

④ Brain - ~~Coma~~

- Vertigo

- Seizure

⑤ Liver :- ~~Failure~~

⑥ Heart :- Hypotension

- Failure

⑦ Repro - Delay labour

- Post

partum Bleeding

- delivery complication

Treatment

① Decontamination

- Gastric lavage
- Activated charcoal
- Extracorporeal Elimination

② Supportive Care

- Serum Electrolyte
 - Renal function
 - Urinalysis
 - GI bleeding
- } Control

③ Drug

~~Antacid~~

① Decontamination

- Gastric lavage
- Activated charcoal
- Extracorporeal Elimination

② Supportive measure

- Electrolyte maintenance
- Renal function maintained
- Urinalysis
- GI bleeding
- Haemodialysis

③ Drugs - Antacid

Q10 Clinical symptoms & management of Monoamine Oxidase Inhibitor.

→ MAOI have been replaced by ~~static~~ cyclic antidepressant for psychiatric disorders.

e.g. of MAOIs are isergyl, pargyline, selegiline, pimozone etc.

* Signs & Symptoms

- ① Anxiety, flushing, headache, nausea, tachycardia, HTN, hallucination, delirium, tremors, convulsion.
- ② Pupil may dilated.
- ③ Overdose complicated by hypotension leads to acute tubular necrosis.
→ Normal dose - 35-40 mg/kg.
- ④ Chronic use of drug lead to withdrawal reaction ~~like~~ anxiety, depression, confusion, hallucination, Nausea, Vomiting.

Treatment

① Maintenance of airway, oxygen, assisted ventilation.

② Cardiac monitoring

③ Electrolyte monitor

④ Monitor LFT, RFT & CPK level.

⑤ Hypertension treated by IV sodium nitroprusside.

⑥ Hypotension can be managed or shock is treated.

⑦ Decontamination with charcoal therapy.

⑧ Acute diuresis & hemodialysis.

⑨ Seizure, Hyperthermia.

~~⑩~~

Q9 Discuss in detail treatment of acute poisoning with salicylate.

→ Patient with symptoms of

- Seizure
- Metabolic acidosis
- Mental status change. are admitted to ICU.

→ Now the treatment of Salicylate poisoning is initiated.

- ① Stomach Wash with whole bowel irrigation
- ② Activated charcoal 50mg.
- ③ Urinary alkalinisation
 - (a) For mild poisoning :- 1mEq/kg of NaHCO_3 in 5% dextrose
 - (b) For Severe poisoning :- 50 to 100mg/kg of NaHCO_3
- ④ Hemodialysis when Salicylate is more than 100mg/100ml.
- ⑤ If skin exposure then, treat with cold water, milk or Ice.

- (5) If Ocular Exposure.
- Copious irrigation
 - Systemic analgesic

(6) Supportive Measures

(a) Electrolyte balance

(b) Correct dehydration with 0.9 %
10 to 20 ml/kg/hr

(c) Hypoprothrombinaemia corrected
by .25 to 5mg vit k

(d) Hyperpyrexia by ice

(e) NaHCO_3 for Metabolic acidosis

(f) Calcium gluconate for hypercalcaemia

(g) ~~5%~~ 5% dextrose for hypoglycaemia

(h) Benzodiazepines for convulsions

(i) Mannitol for Intracranial pressure
management

(j) Vitamin k for PT maintenance

Q8 What are symptoms, sign, M.O.A & treatment of Organophosphorus poisoning.

- Ans) It is a dust, granules or liquid.
- Ans) Same diluted with water or burn for smoke to kill insect.

* M.O.A.

Normally

Acetylcholinesterase



Acetylcholine

↓ Hydrolysis

Acetyl + choline

or

acetic acid

Ans) Now

Organophosphorus

↓ Bind to

Acetylcholinesterase



Accumulation of acetylcholine with continuous stimulation cause nerve paralysis

iv) ~~Action~~ on other cycle

- v) Organophosphorus also shows powerful inhibitory action on enzymes like
- Carboxylic ester
 - cholinesterase
 - hepatic carboxylesterases
 - chymotrypsin

+ Sign & Symptoms

vi) Symptoms are according to type of poisoning

(a) Acute poisoning :-

(a) Muscarinic :- Salivation
Lacrimation.
Urination.
Diarrhoea
- CRT Distress
- Vomiting

(b) Nicotinic :- weakness
Fatiguability
Hypertension
Paralysis
Tachycardia.

(c) CNS :- Ataxia
- Speech problem
- Delirium
- Hallucinations
- Convulsion

(d) others :- Blurred vision
- Dyspnea
- QTc prolongation

(2) Chronic Poisoning

(a) Polyneuropathy :- Muscle cramp
- weakness

(b) CNS Effect :- Anxiety
- Confusion

(c) Sheep farmer Diseases

(d) Chronic organophosphate induced
neuropsychiatric disorder

r Treatment

1) Decontamination

If skin exposure then Shower,
wash with cold water
- Rinse hair
- Repeated washing skin

- If ocular: Exposure then copious eye irrigation with Normal Saline. Urter.
- If in case of ingestion
 - Extensive lavage
 - Whole bowel irrigation
 - Stomach washing
 - Activated charcoal.

2) Antidote

- Atropine - a competitive antagonist of ACh. 1-2 mg. IV
- Oxime :- Commonest is pralidoxime help to regenerate ACh. 1-2 gm in 150 ml saline.

3) Supportive Care

- a) IV fluid.
- b) Maintain airway patency & oxygenation.
- c) Benzodiazepine / Barbiturates for convulsions.
- d) Antibiotics.

Q.7 What are clinical features & treatment of alkali poisoning.

~ Alkali poisoning include ammonia, carbonate of Sodium & potassium

~ Mode of action

Produce liquefaction necrosis

↓
Result in Extensive penetration & damage

↓
Ulcers in Stomach & Oesophagus

+ Symptoms

1] Corrosion of GI mucosa causes

- Dysphagia
- Vomiting
- Drooling
- Haematemesis

2] Oesophagitis :- inflammation in oesophageal wall are of 4 type

- Non-ulcerative oesophagitis
- mild ulcerative
- Severe ulcerative
- Oesophagitis & complication

- 3) Abd pain
- 4) Skin involvement result in greyish soapy necrotic area
- 5) Eye involvement serious complication.
- 6) Ammonia ingestion causes manifestation that affect respiratory system

+ Treatment

- ① Intubation, tracheostomy for respiratory distress
- ② Dilutes such as milk or water given on alkali ingestion
- ③ Gastric lavage, catharsis & activated charcoal
- ④ Electrolyte imbalance
- ⑤ Exploratory laparotomy for 2nd & 3rd degree burn in oesophagus
- ⑥ Corticosteroid
- ⑦ Antibiotic
- ⑧ Saline water irrigation of eye & skin for 20 to 30 minutes

Q6

Treatment in acid poisoning

1) Acid ~~poisoning~~ poisoning occurs by 7 types of acids

- 2) The acids are
- ① Sulphuric acid
 - ② Nitric acid
 - ③ Hydrochloric acid
 - ④ Hydrofluoric acid
 - ⑤ Phosphoric acid
 - ⑥ Boric acid
 - ⑦ chromic acid

3) Treatment of different acid are different according to their strength

① Sulphuric Acid :- ① Respiratory distress \rightarrow give 100% oxygen

② Cold water or milk within 30 min.

③ Remove clothes & clean skin with water

④ Eye injury should be avoided, if any then irrigation should be done

⑤ After endoscopy if safe then oral feed is given

⑥ Steroid are administered \uparrow 50 mg / day ^{prednisolone} for 4 days as loading dose & then maintain dose 40 mg / day

⑦ Powerful pain is treated by administered

by Morphine

(2) Nitric acid

(3) HCl

(4) Hydrofluoric acid:-

- ECG monitor

- Electrolyte

- Steroids

- Wash burn

→ If QTc prolonged & peaked T wave
treat with calcium & potassium
supplement.

→ If ingested then give fluoride or milk or
chewable calcium carbonate tablet.

→ For topical 3.5gm calcium gluconate in 10ml
& form gel & apply.

→ In case of arterial injection give 10ml 10%
calcium chloride in infusion.

→ Treat other symptoms

→ Autopsy may perform for severity of poisoning

(5) ~~For~~ Phosphoric acid:- Same as sulphuric

(6) Boric Acid:- Gastric lavage
- Emesis

- cathartics adminis/salmon
- Forced diuresis: 1mg/kg furosemide
- Haemodialysis

Q Chronic Acid: chelation therapy with
BAL (British Anti Lewisite)

- Haemodialysis
- DMPs (Dimercaptopropionate sulphonic acid)
- Respiratory restored

Qs Clinical Sign Symptoms & management of Radiation therapy.

→ Radiation poisoning affect death within 24 hr of exposure.

→ It mainly affect at cellular level which ~~is~~ more hazardous to health.

→ There are 3 type of Radiation poisoning

(a) Ionization poisoning

(b) UV poisoning

(c) Non ionization poisoning.

10) Ionization poisoning

It is caused by exposure to high energy X-ray, nuclear reactors, atomic accelerators & related systems.

- Diagnostic detectors are responsible for this.
- Radon gas from earth crust also cause poisoning.

Signs & symptoms

- 1) Alteration of somatic cell structure
- 2) Damages DNA
- 3) Triggers mutation
- 4) Sudden exposure cause:
 - Bleeding
 - Skin infections
 - Anorexia
 - Tiring
 - Nausea
 - Swelling
 - Vertigo
 - Edema

11) Treatment

- Diagnostic radiation should spread in weeks & months.
- Electrolyte balance
- Symptomatic management
- Reduce dose of radiation.
- Cardiovascular for topical.

(b) UV radiation

- ↳ UV radiation do not affect internal organ but damage ~~the~~ skin
- ↳ UV create reactive O₂ species that damage & inhibit melanin production
- ↳ High dose of UV cause DNA mutation & damage metabolite

↳ Sign & Symptoms

- Partial skin loss
- 2nd degree skin burn
- Erythematous blisters
- Severe sunburn
- Keratotic lesions
- Papules
- Dehydration, scaling, scarring etc.

↳ Treatment: Antibiotics

- Triazole
- Corticosteroid
- Suncreams
- H₂ blockers
- Hydroxychloroquin

(1) Non ionization radiation

- ↳ Non ionization radiation lower frequency & longer wavelength.
- ↳ IR, UVA, microwave are examples.

4 Sign & Symptom

- ① Burns
- ② Thermal burns
- ③ Pacemaker affected
- ④ Headach
- ⑤ Dizziness

Treatment

- Skin lotion or cream
- NSAID
- Ondansetron
- Supportive measures
- Care for the usage

Q4 Note on Barbiturate poisoning & its treatment.

- ↳ Barbiturates are derived from barbituric acid and used as sedative & hypnotics.

example

① Long acting :- Mephobarbitone
Phenobarbitone

② Intermediate :- Amobarbitone
Butobarbitone

③ Short acting :- Pentobarbitone
Hexobarbitone

④ Ultra short :- Thiopentone
Methohexitone

* Fatal Dose
phenobarbitone :- 6-10 gm
others 2-3 gm

* Signs & Symptoms

① Brain :- Slurred, ataxia, lethargy
confusion

② CNS depression, coma, shock

③ Eye :- Pupils contracted

④ Hypothermia

⑤ Cutaneous blisters :- Bubb Bruin

⑤ Skin :- Bubb Burn
- Erythematous blisters

⑥ Respiratory or CVS arrest or delay death due to collapse of renal function, pulmonary, cerebral edema.

⑦ Others :- Insomnia
- Cramps
- Seizure
- Delirium
- Hypotension

✓ Diagnosis,

① Serial plasma level useful in management of phenobarbitone

$\leq 8 \text{ mg/dl}$ indicate toxicity

② EEG

③ CBC, ESR, Electrolyte, BUN

• Treatment:

① Decontamination

(a) Gastric lavage :- It benefit upto 12 to 24 hr post ingestion

cb) Activated charcoal

cc) Induced alkaline diuresis

cd) Haemodialysis or haemoperfusion

ce) Exchange transfusion

cf) 10-20 ml/kg Saline solution
to treat hypotension.

↓

g)

If no response

↓

Administer Dopamine / Nor adrenaline

② Supportive care

a) Supplement of Oxygen

b) Intubation

c) Ventilation

cd) IV fluid.

Q2

m)

Write a note on universal antidote:
It is formed from organic material that has been burned, such as coconut shell, peat or wood & then heated to very high temperature in steam, air or carbon dioxide.

m)

The end product is finely divided powder with a large pore structure that can absorb a variety of chemical.

m)

The availability of a chemical adsorbed by charcoal to be absorbed systemically is reduced.

m)

Each gram of activated charcoal works out to surface area of 1000 sq meters

m)

Mode of Action

→ Decrease the absorption of various poison by adsorbing them on its surface.

m)

Activated charcoal is effective to varying extent, depending on nature of substance ingested

m)

Dose :- 1 gm/kg :-

w) Activated charcoal is more effective when administered within 1 hour of ingestion of poisoning.

w) Add 4 to 8 times the quantity of water to the calculated dose & form the suspension

w) Due to repeated dose administration 150 to 200 gm may help in elimination of drug like

- theophylline
- phenobarbitone
- Quinine
- digitoxine
- phenylbutazone

w) The charcoal preparations are

(1) Actidose-aqua - Oral suspension 50g in 240ml

(2) Carbo mix 25g & 50g

(3) liqui char Suspension 25g & 50g

(4) Medicoal Granules 5g/packet

Uses :- Taken toxin & can be
treat with charcoal
- ~~More~~ More effective when
given within hr of toxin
ingestion.

Contraindications :- Unprotected airway
obstruction
- Absent of bowel sound
- caustic ingestion
- Ingestion of petroleum
product.

Q1 Detail Sign Symptom & Treatment of Methanol poisoning

It also known as Colonial spirit,
Columbian spirit. Or wood alcohol.

Toxicokinetic

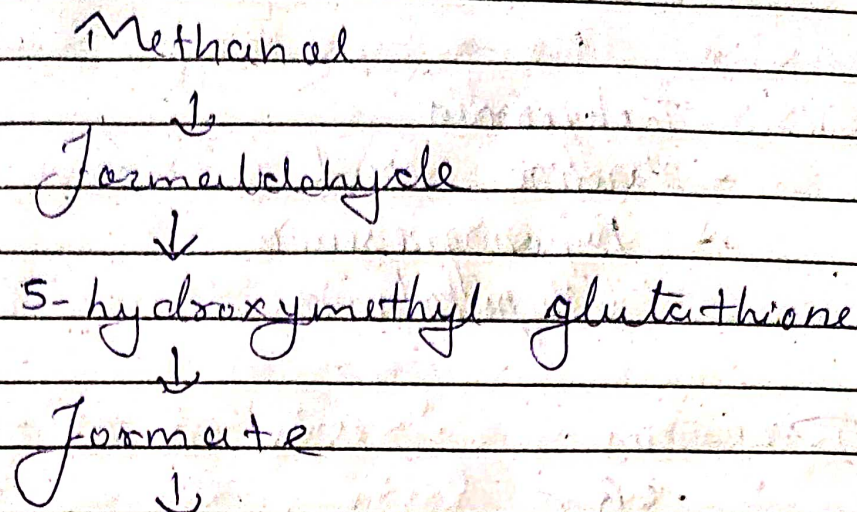
Well absorbed through GI, skin &
lungs.

Plasma level after 30 to 60 min

ADH in liver metabolise methanol
to formate

Elimination half life 3.5 hr

* Mechanism of toxicity



Cause of toxicity

* Total dose 70 to 100 ml

m) Sign & symptom

(1) Brain :- Vertigo
- Headache
- Stiff neck
- Convulsions

(2) Ocular :- Blurred vision
- Photophobia
- Retinal edema

(3) GI :- Nausea
- Vomiting
- Abdominal pain

(a) Lungs: - Respiratory failure
- Metabolic acidosis

(b) CVS: Tachycardia
- Cardiac arrest
- Hypermagnesaemia
- Hypokalaemia

* Diagnosis
- CBC
- Urinalysis
- ABGs
- Electrolyte

* Treatment

(1) Decontamination
(a) Stomach wash with sodium Bicarbonate
(b) Haemodialysis
(c) Emesis
(d) Ipecac

(2) Antidotes

(a) Ethanol: Same enzymatic action
- Prevent methanol metabolism

10% ethanol at a dose of
20 ml/kg administered over
30 min followed by 1.5 ml/kg/hr

- maintained 100 - 130 ml/kg of blood.

(iii) Fomepizole :- Does not ~~cause~~ cause CNS depression
- 20 mg/kg for 5 days

(3) Sodium bicarbonate 500 to 800 ml
slowly

(4) Folic acid :- 1 to 2 mg/kg @ 6 hr

(5) Hemodialysis more than 500 ml.

- | | |
|-------------------------------|------------------------|
| 1. Hydrocarbon | 8. Acid |
| 2. NSAID | 9. Radiation |
| 3. PCM | 10. Barbiturate |
| 4. AMP : monoamine | 11. Anticholinergic |
| 5. Salicylate | 12. Universal antidote |
| 6. Organophosphates | 13. Methanol |
| 7. A Koli | |

mol-2

Hydrocarbon (13)

NSAID (12)

PCM (11)

~~Am~~ monoamine (10)

Salicylate (9)

Organophosph (8)

Alkali (7)

Acid (6)

Radiation (5)

Barbiturate (4)

Anxiolytic (3)

Universal antacid (2)

Methanol (1)

Q3) Write brief note on toxicokinetics.

- Toxicokinetics is the study of toxicants movement & fate, often known as disposition.
- Toxicokinetics deals with Absorption, distribution, biotransformation & excretion of chemicals.

Q4) Absorption

- Absorption is the process by which the chemical enters the body.
- It depends on the route of administration.
- Oral route - the GIT is the most imp route of absorption, as most acute poisonings involve ingestions.
- Dermal route :- lipid solubility of a substance is an important factor affecting the degree of absorption through the skin.
- Inhalation route = toxic fumes, particulate & noxious gases may be absorbed through the lungs.
- Bioavailability :- is the fraction of unchanged

drug reaching the systemic circulation following of non-vascular administration.

(2) Distribution

- Distribution is defined as the apparent volume into which a substance is distributed.

→ V_d calculated from the dose taken & the resulting plasma concentration.
 $V_d = \text{Volume of distribution}$

⇒ Importance of V_d in toxicology is in
- predicting peak blood conⁿ of the chemical taken.

- deciding whether to apply systemic toxicity elimination technique.

⇒ Factor determining the rate of distribution of chemicals in the body are

- Protein binding -
- Plasma conⁿ -
- physiological barriers -

(3) Biotransformation (Metabolism)

⇒ Biotransformation is a critical body defence process in which xenobiotic chemicals are transformed in the body through chemical reaction.

⇒ - It can produce metabolites that are pharmacologically & toxic.

Ex - paracetamol - paracetamol

- There are two phases
- (1) phase I = the drug is converted into more polar compound.
ex oxidation, reduction, & hydrolysis
- (2) phase II (conjugation) :- a drug or its metabolite is conjugated with an endogenous sub.
ex glucuronide conjugate
- ⇒ Enzyme inhibition - cause of ↑ toxicity
- ⇒ Enzyme induction - cause of therapeutic failure
- ⇒ First pass effect :- Biochemical formation of some chemicals by the liver during the initial pass from the portal circulation after oral administration.
- ⇒ Half life ($t_{1/2}$) - time required to reduce the blood concⁿ of the chemical to half.

- (4) Excretion
- Excretion is the final means of chemical elimination, either as metabolites or unchanged parent chemical.
- Additional routes include sweat, saliva, tears, nasal secretions, milk, bile & feces.
- Clearance - elimination of chemicals from the body may be described by the term clearance (CL).

→ clearance is calculated as follows (-

$$CL = 0.7 \cdot (Vd) \cdot (t_{1/2})^{-1} = \text{ml/min/kg} \quad (1)$$

→ Drug absorption after toxic ingestion may be delayed & prolonged.

→ The half-life & total body clearance are often lengthened.

CT - Mid 3

Date _____

Page _____

Q: Write symptom & management of
arsenic poisoning

* Arsenic Poisoning *

It is silver-gray or tin-white, shiny, brittle, crystalline element

* Toxicokinetic

- well absorbed
- well distributed & deposit in hair & bone
- No BBB cross, but cross placenta

* M.O.A. of Arsenic toxicity

from Pentavalent to trivalent



Bind to SH & OH grp



Inhibit enzyme function



Inhibit oxidative pathway



prevention of formation of ATP



Disrupt cell function

Symptoms

- 1) Skin :- Hair loss
 - Hyperpigmentation
 - Hyperkeratosis
 - Facial edema
 - Skin cancer
- 2) Eye :- Dimness of vision
 - Conjunctivitis
- 3) GIT :- Anorexia
 - Nausea
 - Diarrhoea
 - Abd pain
 - Weight loss
- 4) Lungs :- Perforation of nasal septum
 - Laryngitis
 - Bronchitis
- 5) Liver :- Hepatomegaly
 - Jaundice
 - Cirrhosis
- 6) Brain :- Convulsion
 - coma
 - tremor
 - Ataxia

- 8) CVS :- Tachycardia
- Hypertension
- Myocarditis.

* Diagnosis *

- CBC
- Urine
- Hain Volume
- X-ray - Abd
- LFT.
- Skin biopsy.

* Treatment *

1) Supportive care :-

- Gastric lavage
- IV fluid
- CVS monitoring
- Haemodialysis

2) chelating agent therapy -

- British Anti Lewisite :- 3 to 5mg/kg @ 4hr
(BAL)
till urinary arsenic below
50mcg/24hr.
- Penicillamine - 100mg/kg @ 5hr

Q2 Discuss the treatment strategies for snake bite.

Ans Mainly the strategies use for treatment of snake bite as

First aid treatment



Transport to hospital



Rapid clinical assessment and resuscitation



Antivenom treatment or other therapy



Neurotoxic envenoming



Manage the vital & treat symptoms



Rehabilitation

3) Description of step in strategy for the treatment of snake bite.

① First Aid :- calm down the patient.

- Immobilize the bitten area
- Remove ornament if present.
- Clean the wound but not with water

② - Make sure the bitten area at or below heart level

③ - Tight the upper area & make sure not affect blood flow directly

④ - Bandage are bound to affected area firmly.

⑤ - Don't try to take out venom if you have no practice

② Identification snake :- By describing the snake type, the consultant may get idea of snake & initialize the treatment as soon as possible

③ Other therapies :- Other therapy include cryotherapy, in which local cooling is done to affected areas, electric shock in which electric treatment given to affected

Date _____
Page _____

area, corticosteroid therapy.

(4) Antivenom treatment:

Initial dose :- 8-10 vial

Max dose :- 25 vial

(a) Common Krait :- 100ml

~~(b) Russell's viper :- 100ml~~

(b) Russell's viper :- 100ml

(c) Saw scaled viper :- 50ml

(d) Indian cobra :- 100ml

(5) Neurotoxic envenoming :-

Atropine - 0.6mg

Neostigmine - 0.02mg/kg

Dopamine - 2.5-5 mcg/kg/min

(6) Resuscitation :- Assess the vitals and maintain proper ABC (Airway, breathing, circulation), vitals

Q23 What is opioid poisoning? Symptoms & treatment of it.

Ans) The symptoms develop like miosis, coma, respiratory depression, vomiting, headache etc after consuming more than a limit of opioid is called opioid poisoning.

* M.O.A *

Opioid acts on opioid receptors & bind to them



Stimulate receptors



lead to analgesia, nausea, sedation etc.

* Symptoms

① Nervous System : CNS depression,
Respiratory depression,
Seizure.
- Hypotonicity.

② Respiratory :- ↓es Tidal volume
- Bronchospasm
- Odema
- Bradypnoea.

③ Eyes - Miosis

④ Cardiac :- Hypotension
- Bradycardia
- Sinus tachycardia.

⑤ Gastro Intestinal :- Nausea
- Vomiting
- ~~Diarrhoea~~
- Dizziness

⑥ Renal :- Urinary retention
- Hyperkalaemia.

Treatment

@

ABC analysis

↓

Gastric lavage

↓

Activated charcoal

↓

Antidote therapy

⊗

- ↪ ABC analysis means maintain airway, breathing, circulation & other vital.
- ↪ Gastric lavage perform to excrete the poison.
- ↪ Activated charcoal 1gm/kg PO given.
- ↪ Antidote therapy

@ Naloxone :- opioid antagonist
Reverse the poisoning condition.

Dose :- 1-2mg IV adult
0.4mg IV child.
Max dose :- 10mg

(b) Nalmefene :- 0.1 mg IV

(c) Naltrexone :- 50 mg/day PO

(d) ~~Phys~~ Physostigmine :- 0.04 mg/kg IV

→ If opioid poisoning occur due to it withdrawal than give

Methadone :- 20 mg oral
or
10 mg IM

clonidine :- 0.1 mg oral
every 30-60 min

Q4 Detail cause of food poisoning

→ Food poisoning is an acute illness, usually of sudden onset due to eating of contaminated or poisonous food.

* causes of food poisoning

→ By 2 way food poisoning is cause

- ① Biological :- Bacteria, Virus, fungi etc
- ② Chemicals :- Metal leaching, Pesticide, Degraded preservatives etc.

① Biological agent are as

Incubation

- ① Bacteria :-
- campylobacter - 2-5 day
 - salmonella enteritidis - 12-36 hr
 - E. coli - 3-4 day
 - listeria monocytogenes - 3-7 day
 - clostridium botulinum - 4-8 day

- ② Virus :-
- Hepatitis - 10-50 day
 - Norwalk - 10-50 hr
 - Rota - 1-3 day

- ③ Fungi :-
- mold
 - yeast

- ④ Parasite :- Trichinella spiralis

Date _____
Page _____

Q25 Treatment strategies of tobacco addiction.

→ The 5 A's strategies are there for treatment of tobacco addiction.

① Ask :- ask about tobacco use.

Document the answer every time of visit.

② Advise :- Advise to quit in clear, strong & ~~per~~ personalized manner.

③ Assess :- assess willingness to make quit attempt.

Is the tobacco user willingly try to quit tobacco.

④ Assist :- Assist in quit attempts.

- Give CBT or NRT therapy along with some medication like Bupropion.

- Give motivation & support.

⑤ Arrange :- arrange the follow up.

- Make & contacts of patient & take follow up for their improvement.

• Other therapies like

- ① Nicotine gum
- ② Nicotine transdermal patches
- ③ Nicotine spray

• Other like - Bupropion,
Antidepressant
Tobacco
Mecamylamine.

Q6 Define drug abuse. Diagnosis & management of amphetamine poisoning.

→ Amphetamine influences the neurotransmitter that related to attention, alertness, blood flow, reward, motor control, & motivation.

→ People use amphetamine drug to boost there performance ~~for~~ ^{by} increasing such neurotransmitter.

→ By continuous use of drug develop tolerance and hence the dose should be increase for it effect.

→ Due to it addictive property, the person try to quit this drug but the body

Start causing fun drug

→ People misuse this drug ~~for many~~ as

- ① for relieving fatigue
- ② for be happy
- ③ To increase productiveness
- ④ To boost athletes performance
- ⑤ To reduce stress & anxiety
- ⑥ To ~~make~~ increase confidence etc

• Diagnosis

① Urine specimen of choice

level above 2mg/100ml - Acute toxicity

Methods like TLC, RIA, HPLC etc

Most accurate :- GC-MS

② New method (electron - impact mass fragments - graphy) ~~can~~ help in quantity of amphetamine in hair, nail, sweat & saliva

③ Hair analysis show amount of drug use for several month.

Treatment

- ① Stabilization : IV line,
Oxygen
- Heart sounds clear.
- ② Supportive : ATSC, vitals.
- Rehydration.
- Acute decontamination.
- ③ Symptomatic : Anxiety } Benzodiazepam
Hyperactivity } - Diazepam 10mg
- Hyperthermia controlled by
blank, heater etc.
- Ventricular tachycardia managed
by lignocaine, amiodarone
and sotalol.
- Rhabdomyolysis :- Early aggressive
fluid replacement therapy.
- Amphetamine induced chorea treated
w/ clonazepam & chlorpromazine.
- Imipramine & fluoxetine used to
treat amphetamine dependency syndrome.

Q8 Write mode of intake and mode of action of cannabis. Describe its treatment.

- 1) Cannabis toxicity or poisoning occurs through various mode of intake and its severity also based on mode of poisoning.
- 2) By 6 mode the cannabis poisoning occurs.

① Marijuana :- Plant part or its extract used to induce psychoactive or therapeutic effect.

Synonym :- Mary Jane, weed, doggie.

② Ganja :- It is resinous mass composed of leaves & bracts.

- Smoked in pipes or cigarettes
- It has 1% - 2% THC

③ Bhang :- consist of dried ~~matter~~ ^{mature} leaves & flower stem mixed with milk.

④ Hashis (charas) :- Dried resin from flower tops & contain varying of 10% THC.

- Hashis oil is an alcohol which occurs dark green viscous liquid contain tar.

(5) Sinsemilla :- Refer as seedless plant with average 5% THC (Tetra hydrocannabinol)

(6) Marijuana Blunts :- Cheap cigar sliced open, packed with cannabis & resealed.

* Treatment

• ① Acute poisoning

(a) Decontamination measures in case of ingestion.

(b) Acute psychotic reaction respond to benzodiazepam

(c) Supportive measure

- Airway

- Breathing

- Circulation

- Other vitals

② Chronic poisoning

- psychosocial therapy

- Family therapy

- Drug focussed group therapy :- lowering burden or stress

- Anxiolytic agent - benzodiazepam

- Anti psychotic medication

Q9

Important principle involved in management of curare poisoning.

- Curare directly blocks the neuromuscular receptor & thus 1st step is to reverse the condition by administering

Neostigmine :- 0.04 - 0.08 mg/kg

pyridostigmine :- 0.2 - 0.4 mg/kg

Atropine (0.02 - 0.03 mg/kg)

- Proper respiratory ventilation

- Succinylcholine & other drug
them contraindications.

- Supportive therapy:-

Oxygenating

- Airways

- Breathing

- Circulatory

- Other vitals

- Control & maintain malignant
hyperthermia with
dantrolene i 2-3mg/kg IV
bolus

→ Treat the symptoms like

- Arrhythmia with antiarrhythmic drug
- hyperkalemia with hyperventilation, sodium bicarbonate & glucose & 2 to 5 mg/kg calcium chloride

→ Maintain urine out flow

→ for rhabdomyolysis :- fluid replacement therapy & prevent renal insufficiency.

→ Pre treatment with 0.125 mg/kg

Q10 Sign, Symptom & treatment of mycotoxin

Q10 Sign & symptom of mycotoxin.

① Brain :- Headache
- Insomnia
- Brain fog
- Depression
- Anxiety.

② Respiratory :- Asthma
Allergic condition
⑤ Dyspnea.

③ Digestive :- ~~Hemorrhage~~ Ulcer
dysphagia
- Abdominal pain.
- malabsorption.

④ Immune :- Autoimmune diseases
- Weakness
- lower antibodies.

⑤ Skin :- Eczema
- Rashes.

⑥ Bone :- Damage bone marrow
Cause bone fracture.

Treatment

① Supportive care.

- Airways
- Breathing
- Circulation
- Vitals like

heart rate

Temperature

consciousness

pulse

② Antifungal medications.

Amphotericin B :- 0.3 - 1 mg/kg IV

Fluconazole :- 200 - 400 mg PO

Itraconazole :- 200 - 400 mg

③ Symptomatic treatment.

For fever :- Paracetamol 500 mg

Nausea :- Ondansetron 4 mg

GI Burning :- Pantoprazole 40 mg

Q1) Sign, Symptom & management of mercury poisoning.

1) The sign and symptom of mercury poisoning differ according to the route of administration.

2) By 2 route the mercury poisoning occur.

① Inhalation route

② Ingestion route

① Inhalation route.

- Danbury tremor

- Ataxia

- Parkinsonism

- metallic taste

- Anorexia

- Nausea

- Gingivitis

② Ingestion

- Colitis

- Melanosis

- Dementia

- Tremor

- Renal failure

- Acrodynia

Treatment

- ① BAL therapy (British Anti Lewisite)
 - 100mg IM @ 4hr. for 48hr
 - followed by
 - 100mg @ 8hr for 10 days.

OR

- ① DMPS [2,3. dimercaptopropane-1 Sulfonate]
 - 5mg/kg IV followed by 100mg BD
 - for 24 days

OR

- ① DMSA [Neso 2,3 Dimercapto succinic acid]
 - 30 mg/kg/day for 5 days.
 - followed by
 - 20 mg for 14 days.

OR

- ① D. penicillamine
 - 250 mg QDS for 5-10 days

- ② Supportive therapy

- ③ Symptomatic treatment

Q12 Sign Symptom & management of mushroom poisoning.

u) The sign symptom of mushroom poisoning are divided in the phase.

① Phase I

- Abd pain.
nausea.

Vomiting

Tachycardia

Hypotension

Electrolytic imbalance

② Phase II

- Toxic shock phase of remission.

③ Phase III

- Hepatic failure

Renal failure

Pancreatic failure

- Cardiovascular collapse

• Treatment

① Stabilisation

- Restoration of fluid and electrolyte balance for hypotension
- IV glucose for hypoglycaemia
- vit. K : 30 to 100 mg/day for hypoprothrombinaemia
- Potassium chloride in 5% dextrose : hypokalaemia

② Decontamination

- Activated charcoal
- Forced diuresis : 6-9 L/day
- Haemoperfusion
- Plasma exchange

③ Antidotes

- Benzyl penicillin : 3,00,000 to 10,00,000 unit.
- Thioctic acid : alpha lipoic acid
- Silybinin
- Cimetidine
- N-acetylcysteine

④ Symptomatic treatment

Q13 Define drug abuse. Describe diagnosis & management of CNS depressant poisoning.

Ans) Drugs or substance ~~are~~ used for the purpose of creating pleasurable effect on brain which give physical & psychological relief for some period of time is called drug abuse.

Ans) CNS depressant contain 2 main content.

- ① Barbiturates
- ② Benzodiazepine

Ans) Diagnosis.

- Serial plasma level may be useful in diagnosis.

- plasma exceeding 8mg/dl are associated with degree of coma.

- EEG

- Urine Test : remain positive from 24 hours to 7 days after last dose for barbiturate

&
remain positive for 3 days for benzodiazepam.

- Skin test : Blister develop on skin

Management.

① Supportive measures

- Airway
- Breathing
- Circulation
- Electrolytes balance
- Oxygen therapy
- Altered stress
- Hemodialysis

② Prevent symptoms

① Vomiting by Ondansetron :- 4mg

② Fever :- Paracetamol 500mg

③ Ac burning :- Antacid or Pantoprazole

④ Weakness :- Multivitamin

⑤ If any inflammation give NSAIDs

③ CBT therapy :- Helpful in chronic depression and addiction

④ Antidotes :- For benzodiazepam toxicity give 1mg Flumazenil. following ~~administration~~ administering as series of dose at

0.2 mg every 12 ~~mg~~ minutes.

② Decontamination

④ Stomach lounge

③ Flash therapy

Q14 Note on LSD.

→ Lysergic acid diethylamide is the full form of LSD.

→ It is the most common stimulant of central nervous system.

→ It is an ergot alkaloid.

→ It is said to be most powerful substance produce high level of hallucination by taking b/w 50mg to 100mg.

→ It obtained from plant like morning glory, Hawaii baby woodrose.

→ More than 20mcg produce toxic effect like Euphoric & psychotic effect.

→ By taken orally its onset of action is quick & last for 18 hours.

M.O.A.

LSD



Stimulate 5-HT_{2c} receptor
on glutaminergic axon
of thalamus.



Thalamocortical fibre
project to layer IV
cortex



affect Cortical pyramidal cell



Release glutamate

Sign Symptoms

Grade I :- Diaphoresis

Sweating

Flushing

Mydriasis

Tremor

Grade II :- Hyperactivity

- Confusion

- Jitter

- Tachycardia

Grade II - Delirium

Mania

Arrhythmia

Grade IV - Convulsion

Coma

Cardiovascular collapse

Treatment

1. Quiet environment.

2. Social support

3. CBT therapy

4. Reassurance

5. For panic attack

clonazepam 5/10 mg IV.

or Haloperidol.

6. For psychosis.

- Anti anxiety agent

- Neuroleptic

- Anticholinergic

7. For post hallucinogen perception

- clonazepam

- lorazepam

- Valproic acid

Q15 Explain briefly management on plant poisoning.

Ans) The plant poisoning are managed by step wise

① Identify the plant.

↓

② Determine when exposure happen

↓

③ Determine amount of ingestion

↓

④ Try to manage symptoms.

↓

⑤ Syrup Ipecac for vomiting inducing

↓

⑥ Decontamination or Activated charcoal therapy.

↓

⑦ If antidote present start immediately like

for mushroom poisoning

Benzyl penicillin : 3 to 10 lakh unit / day

or

Thiolic acid, cimetidine

or

N-acetyl cysteine.

↓

⑧ Supportive therapy

- Airway, Breathing & Circulation management.

- Electrolyte balance
- Vital should be manage



⑨ Advice for ~~any~~ use of any barrier that prevent direct contact to plant.



⑩ Proper rest & immune booster

lowers

- ← ~~lowers~~ = canal
- Paint
- Ink
- Lead pipe
- Battery
- ~~chromes~~

→ MORA

Binds to
cysthydryl enzyme



Interfere with action

- Interfere with ~~amino~~ lactic acid



Anemia

→ Acute Symp

○ Acute

Respiratory distress
metallic taste
abdominal pain
Bloody diarrhoea
lethargy

② Chronic poisoning

- mild :-
 - Fatigue
 - Lethargy
 - Abd
 - Irritability
- Moderate :-
 - Tremor
 - Handclench
 - Weakness
 - Weight loss
 - Hypertension
 - Anorexia
- Severe :-
 - Wrist drop
 - Burton's line
 - Ataxia
 - vertigo
 - coma
 - convulsion

management.

① Acute treatment

- ▷ penicillamine - 150mg/kg/day
- EDTA - 30mg/kg/day

Supportive care.

② Chronic treatment

- in with encephalopathy
- BAL - 4mg/kg

mannitol 20%

furosemide

Dexamethasone 1 mg

Diazepam 10 mg

iii) Without Encephalopathy

BAL :- 12 mg

EDTA 50 mg

* Symptomatic

* Mercury

mercury agad ni notes ma che

* Iron

MOA

Free iron ion

↓
Genotoxicity

↓
Metabolic activation

↓

* symptoms

* Stage I :-
Abel
Worm
Hem
Shock
acid

Stage II :- False Recovery

Stage III :-
Fever
Hypotension
CNS dx

Stage IV :-
Hem
Renal

Concussion

Stage V :-
RT scaric
Pyelonephritis
UTI obstruction

* T/E

chelating = desferrioxamine

50 mg/kg/hr

A Copper

10-20 gm

B Sym

(1) Acute :- (1) myalgia

Abel

Bluish - green

Sandwich

Renal failure

(2) Hepatomegaly

(3) sore throat

(4) Eye + conjunctivitis

(2) Chronic :- liver damage

conjunctivitis

lung change

- Green hair discoloration

- Wilson's disease

- Kayser - Fleischer ring in eye

C T/E

(1) Hemolytic's

(2) Milk

(3) Stomach issues

⑤ Chelating

- \rightarrow penicillamine 100 mg/kg

- Dimercaprol:- 3-5 mg/kg

- Unithiol:- 10-15% solution
5 mg/kg

- EDTA:- 50 mg/kg

⑥ Symptomatic

⑦ Eye exposure - Saline irrigations.

⑧ Discolouration of hair - use Shampoo has penicillamine or EDTA.