Corrosive poisoning

CORROSIVE POISONING

caustics

- Def:
- These are the substances –which fixes, Destroys & erodes the surface with which, it comes in contact.

- Acids are hydrogen containing substances which on dissociation in water produce hydronium ions
- Action – with Hb-it forms hematine
  -with tissue-it extract water-& coagulates it

- Classification-Acid-organic
  -inorganic
  -Alkali
  -Others- H^2O^2,KMnO4, NH4Cl

CLASSIFICATION

CORROSIVES

ACIDS

INORGANIC mineral

- SULPHURIC ACID
- NITRIC ACID
- HYDROCHLORIC ACID
- Boric acid
- Phosphoric acid

ORGANIC

- CORBOLIC ACID
- OXALIC ACID

ALKALI

- HYDROXIDE SODIUM POTASSIUM CALCIUM
- AMMONIUM HYDROXIDE
- CARBONATE SODIUM CALCIUM
- SODIUM HYPOCHLORIDE

SULPHURIC ACID;

OIL OF VITRIOL, H2SO4, Olium

It has tendency to carbonize the body tissue

Features-heavy, -colourless, -odourless, nonfuming-liquid

USES: Indistrial chemical, Batteries, Drain Cleaner

Fatal dose - 20 -30cc

Fatal period- 18-24hr

SIGNS & SYMPTOMS

-corrosion

-burning pain-epigastrium-mouth to stomach

-dysphagia/dysphonea/dyspnea

-spreading epigastric pain to throat and abdomen

-eruct, nausea, vomiting-brown blood

-strongly acid

-charred wall of stomach

-Intense thirst

-tongue-swollen-black(mouse like)

-teeth-chalky white

-perforation-chemical peritonitis

After recovery – scar
- esophageal stricture
- pyloric stenosis

COD- shock (area collapse)
- spasm/Oedema glottis
- stomach/intestinal perforation
- toxemia

Delayed death –pneumonia
-secondary infection
-renal failure
-starvation

Diagnosis: Litmus Paper-Blue – Pink

On Stains: Sod Carbonate drops : Effervascence

Treatment

1) G.L. & Emetics are Contraindicated.
2) Acid Dilution and neutralized by
   -1/4 ltr water/milk/milk of magnesia/lime water
   -Aluminum Hydroxide gel
   c/i-alkaline carbonate, sod bi carbonate
3) demulcent-olive oil/egg white
   -milk, melted butter
   -mineral oil, starch water
4) prednisolone-60 mg/day-prevents esophageal stricture shock

5) Bismuth sub carbonate-2 gm

6) Correct circulatory shock

7) Tracheotomy –edema glottis

8)Nil orally-i.v. fluid

-nutrient g/v

-fluid/soft food

-regular diet

9) Skin burns - wash with water/$NaHCO_3$/apply paste MgO/ $NaHCO_3$

10)Eye burns - wash with water/$NaHCO_3$

External-lips/chin/angle-dribbling

-spurting

-teeth- chalky white

-voice- hoarse/husky

-eyes- sunken and dilated

Clothes- shows stains

- perforations

After recovery – scar formation

Postmortem Examination

-External

-corrosion-skin-chin, angle ,hands

-mucous membrane- lip, mouth, throat

-necrotic area-grayish white

-brown/black & lathery

-clothing - burns & stains

Internal:-

upper GIT-swollen/inflamed/intestinal hemorrhages

stomach -soft boggy/black-wet blotting ppr

-mucosal ridge-damaged

-perforation-chemical peritonitis

-corrosion of organs

kidney-failure

Test-a. strong acid chars-organic material

b. Ba nitrate/chloride soln.- white ppt.
Of (BaSO4)

Circumstances-vitriolage

-suicidal-common

-accidental-glycerine

mistaken with -castor oil

-inhalation in factory

-abortificient

VITRIOLAGE

- Throwing of acid on on the face/body of a person in order to disfigure /blind him/kill.
- Motive : Revange/ Jealousy
- Origin : Glasgow in 1820
- Commonly Sulphuric so name derieved/ others
- Considered to be grievous Hurt

NITRIC ACID

It is a Clear, colourless, Fuming, Heavy Fluid having(peculiar)Choking odour

Conc. Acid + organic matter-picric acid(yellow discolouration) -xenthoproteic reaction

SIGNS/SYMPTOMS:

-same as above

-but more eructation & distention

-& yellow discolouration

Fatal dose :-20-30 ml

Fatal period :-24-30 hr

Postmortem Examination

-same but yellow patches.

-may be brown/black due to hematin

-perforation less common

TREATMENT

-same as above

Tests-a. solution+FeSO4+H2SO4-brown ring.

b. solution + Ca--→pungent+ dark, brown heavy fumes

Circumstances-accident/suicide

HYDROCHLORIC ACID,HCL

It is less corrosive in action.

It is a natural constituent of Stomach

It is a Pungent, colourless, fuming liquid.

-mucus mm is first grey/grayish-white-then brown/brown-black due to acid haematin formation

FUMES –intense irritation throat/lung with cough, dyspnoea/suffocation, cyanosis

-coryza/conjunctivitis/corneal ulcer/tooth loosening

-pharyngitis/bronchitis/gum inflammation

FATAL DOSE -30-40ml

FATAL PERIOD -24-30HRS

TREATMENT : SAME

POSTMORTEM EXAMINATION

-same except corrosion less severe

-acute inflammation & edema of respiratory passage & lung tissue

TEST -with AgNO3 – heavy curdy white ppt of $AgCL^2$ is formed

c a r b o l i c a c i

- COLOURLESS, PRISMATIC NIDDLESHAPED CRYSTAL
- BURNING SWEETISH TASTE
- IT TURNS PINK WHEN EXPOSED TO AIR
- PHENOLIC/CARBOLIC SMELL
- SLIGHTLY SOLUBLE IN WATER BUT HIGHLY SOLUBLE IN ALCOHOL, ETHER, BENZENE, GLYCERINE

- USED AS:
  - ANTISEPTIC,DISINFECTANT
    - DETTOL: CHLORINATED PHENOL WITH TERPINOL
    - LYSOL : 50% CRESOL IN SAPONIFIED VEGITABLE OIL
    - PHENYL(HOUSEHOLD):5% PHENOL IN WATER
  - PRESERVATIVE
  - PHARMACEUTICAL
  - MEDICAL USES-FACIAL PEEL
  - NEURULYSIS FOR FACIAL SPASTICITY
- ABSORPTION:
  - Through GIT,RESPI,RECTUM,VAGINA,WOUND,SKIN
- Very mild corrosive but act as systemic toxicity
- EXCRETION: as hydroquinon & pyrocatacol
- FATAL DOSE : 10-30 GM
- FATAL PERIOD : 3-4 Hr

CARBOLISM

- Acute poisoning
  - LOCAL:
    - SKIN: Burning & Numbness
      - White opaque eschar-later brown stain then falls
      - Precipitate protein

    GIT: burning pain from mouth to stomach-then tingling & anaesthesia
      - Painfull & difficult deglution & speech
      - Corroded Lip,Mouth,Tongue-later white & hardened
      - Nausea & Vometing
    - RESPIRATORY: Pulmonary & Laryngeal Oedema
      - Bronchitis & Bronchopneumonia

- SYSTEMIC:

- CNS DEPRESANT- Respi Centre Depression
  - Headache ,Giddiness, Unconsciousness, coma
  - Hypothermia
  - Pupil constricted
  - Startorious Breathing
  - Pulse: rapid, thready, feble, irregular
  - Convulsion, lock jaw,
  - Face : cold sweat, cyanosed
- URINE: (CARBOLUREA):
  - Scanty urine with albumin & Hemoglobin
  - Colourless/Green urine--air—Dark Green/Black

- Treatment:
  1. Stomach wash with luke warm water & animal charcoal/
  2. 30 gm of MgSO4 left in stomach
  3. Demulcent-
  4. N.S. 7gm soda-bicarb-IV
  5. Hemodialysis
  6. Methylene blue
  7. Skin cleaned with soap & water

OXALIC ACID

- colorless , odorless, prismatic crystal with sour & slightly bitter taste
- USES:

1. Bleaching & cleaning Agent
2. Ink Removar/ Rust Removar
3. Metal Polishing
4. Industry: Ceramic, Leather, Metallurgic, Paper, Pharmacutical, Rubber Industry

- FATAL DOSE: 15-30 gms
  - LARGE DOSES: causes shock and then rapid death
- FATAL PERIOD: 1-2 Hrs

MOA:

- LOCAL: Corrosive on skin & mucus mm
- SYSTEMIC:
- HYPOCALCEMIA: Combine with serum calcium to form Ca Oxalate Crystals (insoluble) get deposited in the liver, kidney, heart, lung, blood & is excreted in urine. (OXALURIA) ; leading to RENAL DAMAGE
- DELAYED: Renal Damage (Uremia): Tubular Necrosis-uremia-shock-DEATH (1-2 wks)

CLINICAL FEATURES

- LOCAL:
  - CORROSION: whitish/yellowish – skin/ mucus membrane later turns blackish due to acid hematin formation
    - Scalded mucosa
  - SYSTEMIC:
    - Vomiting (coffee coloured) & diarrhoea
    - Tetany:
    - Tonic muscle spasm, cramping
    - Accoucher's Hand : due to carpopedal spasm
    - Trousaeau's sign : spasm due to pressure on vessels
    - Chovstic's sign :spasm of facial muscle following a tap on facial nerve area

- DIAGNOSIS:
  - oxalate crystals in urine – Prism/needle/tent/envelop shaped
  - Serum Calcium/Oxalate level estimation
- TREATMENT
  - Stomach wash with Lime water/Ca Gluconate/Lactate Soln
  - Ca Gluconate I.V.—10 ml of 10% soln/wall scrapings.
  - Demulcent
  - Hemo-Dialysis /Exchange Transfusion for renal failure
  - Wash affected skin/eye with copious water
  - Supportive Tt

- AUTOPSY FEATURES
- EXTERNAL:
  - Skin:Brown Eschar
  - Mucosa: Whitish mucosa

❑ Scalded mucosa :of Stomach & GIT

❑ Brown/black colour due to acid hematin

❑ Crystals of Ca Oxalates on mucosa seen on m/e

❑ INTERNAL: Congested Organs-Brain, Liver, Kidney.

❑ KIDNEY: Cloudy swelling, Necrotic & Hyaline Changes

❑ MLI: Accidental for epsom salt (cathartics)

ALKALI

- Mostly as white powder/colorless soln
- Ammonia gas is colorless, with pungent & choking odour

❑USES:

- ❑Ammonia gas: smelling gas
- ❑Ammo Hydroxide: paint remover
- ❑Sod Hydroxide : Drain cleaner (caustic soda)
- ❑ Pot Hydroxide : Drain cleaner (caustic potash)
- ❑Sod carbonate : Household cleaning (washing soda) detergent
- ❑Pot carbonate : Household cleaning
- ❑Sod Hypochloride : Household bleach

- FATAL DOSE: 10-15 gms
  - 15-20 ml for ammonia

- MOA:
  - Produce Liquifactive necrosis→extensive penetrating damage due to soponification of fat & solublisation of protein
  - ***Ulcer production :*** *persists for several weeks*
  - *Skin : greyish, soapy ,necrotic area, with charring*
  - *Eye : Involvement.*
  - Oesophagus is more severely affected than stomach (contrast to acid poisoning)
  - Ammonia Ingestion : also respiratory symptom

CLINICAL FEATURES:

- Corrosion of GIT with grayish pseudo-membrane
- Esophagus severely affected→dysphagia , vomiting, drooling, hematemasis
- Abdominal pain, Diarrhoea, tenesmus
- Grayish, soapy, necrotic areas without charring
- Eye involvement
- In Ammonia, respiratory involvement is also seen

TREATMENT

- Respi Distress: Tracheostomy, endotracheal tube
- Diluents: milk/water for adults 1-2 glasses
- Neutralization with acid is contraindicated
- c/i- emisis/gastric lavage/catharsis/activated charcoal
- Withhold all oral feed
- Assess fluid & electrolyte balance
- Eye injury: wash with copous water/saline

AUTOPSY FEATURES

- Characterstic odour.
- Brown/greyish stain on skin.
- Inflammatory oedema with corrosion & sliminess of tissue of oesophagus & stomach.
- Respiratory tract inflammation & Pulmonary oedema. (Spe : Ammonia)

FORENSIC IMPORTANCE :

- Accidental Poisoning : mistaking as water, bear , lemonade.
- Industrial ACCIDENTS :
- Suicidal : Occasional
- Homicidal : Rare
- Robbery : Ammonia used.