



- Meaning: Pulselessness (exactly it is O₂ supply stopped)
- Another word for it is known as Hypoxia.

Sign of Asphyxia: Death

00:00:56

- CPC (Classical triad of Asphyxial death)
 - Cyanosis:**
 - It is peripheral. It is m/c seen in the Nail bed, Ear, and Nose.
 - The reason for this is Deoxy Hb > 5gm%.
 - Also, the structure becomes blue.
 - Petechial Hemorrhages:**
 - These are pin-point hemorrhages.
 - The size is 0.1-2 mm (>2mm is Ecchymosis).
 - The reason is due to asphyxia, the pressure in capillaries increases which leads to damage in Capillaries & Venules.
 - The common sites for it are the Eyelids, Conjunctiva, Forehead, Visceral Pleura, and visceral peritoneum.
 - Congestion:**
 - It is visceral congestion.
 - Liver, lungs, and heart are involved.
 - The mechanism is increased permeability of capillary.
 - Other (not classical)**
 - Right Ventricular Enlargement
 - PM fluidity of blood

Types of Asphyxial Deaths

00:06:04

1. Hanging
2. Strangulation
3. Suffocation
4. Drowning

Post-mortem

- There is a modified Y dissection.
- Neck dissection should be done last because we want the neck bloodlessness field.
- This is to avoid Prinsloo & Gordon Artifact (hemorrhage on the anterior aspect of the cervical spine, Posterior to the trachea and Esophagus).



Tardieu Spot in Eye

- Also, known as Bayard Spot
- It is Petechial. Hemorrhage.
- It is mainly seen in Visceral Pleura, Peritoneum.
- Mechanism is Increased Acute rise in venous pressure

1. Hanging: m/c asphyxial method

00:09:55

- Suspension of the body with Ligature that encircles the neck.
- Constricting Force: Weight of the body.
- **Types:**
 - **Suicidal: m/c in India**
 - **Homicidal: rare**
 - This method is known as lynching (A group of people hangs up someone)
 - **Accidental: not very common.**
 - **Judicial:**
 - It is the method of the death penalty in India.



- **Types - Position of Knot:**
 - Typical: if the position is on Occiput.
 - Atypical: it is the position of the knot at any other place.
- **Types- Suspension:**
 - **Complete:**
 - It means the whole body is suspended. No part is touching the ground.
 - Constricting Force here is whole body weight.
 - **Incomplete:**
 - Also known as Partial hanging
 - Here, some part of the body is touching the ground.
 - Constricting Force here will be the weight of the head (around 4-5 kg).
- **Structure-Pressure Needed-COD**

Structure	Pressure needed	Cause of death
Jugular Vein	2 kg	Venous congestion.
Carotid artery	5 kg	Cerebral Anaemia/ Anoxia.
Trachea	15 kg	Asphyxia.
Vertebral artery	25-30 kg	Many damages.

- **M/c Cause of Death:**
 - Asphyxia + venous congestion (in hanging)

- **Others:**
 - Carotid artery damage leading to cerebral Anoxia.
 - Reflex vagal inhibition.
 - Fractures or dislocation of vertebrae.
- **Delayed cause:**
 - HIE (m/c cause)
 - Aspiration Pneumonia
 - Larynx Edema
 - Infections
- The fixed knot Ligature mark is oblique. It is an incomplete Ligature.
- If the knot is slippery & we have the running noose, and the Ligature mark is transverse. It could be complete.
- **PM finding:**
 - External:
 - Ligature Mark: Most Specific finding
 - It is Pressure Abrasion.
 - Sometimes it forms a pattern, so it can be patterned abrasion.
 - In up to 85% of cases, it goes above the thyroid & in 10% at the thyroid the remaining 5% below the thyroid.
 - Complete/incomplete (depends on): Knot.
 - CPC
 - Face is deeply congested in partial Hanging because there is blockage of venous congestion & arterial supply is intact.
 - Staining: It is seen in the upper limb & lower limb, known as the Glove and stocking pattern.

Ligature Mark

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- Pale, White, Glistening (Parchment).
 - **Internal:**
 - After dissection of the ligature mark, we find a white & glistening area.
- **Amussat's Sign**
 - It is seen when you have a long drop.
 - Common in judicial hanging.
 - There is a horizontal or transverse tear in the carotid artery.
- **Simon's Hemorrhage:**
 - Hemorrhage into the outer layer of the intervertebral disk of the lumbar and lower thoracic vertebrae (below the anterior longitudinal ligament).
- **Dribbling of Saliva**
 - M/c finding of AM hanging (died due to hanging).
 - Not present in every case.
 - It is due to stimulation of the Pterygopalatine Ganglion (submandibular gland).
 - Opposite side of the knot.

- **La Facies Sympathique**
 - Important finding of AM hanging
 - Due to stimulation of the cervical Sympathetic chain by a knot.
 - On the Same side of the knot, the eye remains open & pupil is dilated.
- **Fracture of Neck:**
 - It is the fracture of the hyoid bone.
 - At the junction of inner $\frac{2}{3}$ rd & outer $\frac{1}{3}$ rd
 - This fracture is known as abduction or outward or anteroposterior compression fracture.
 - It is Antemortem: if the surrounding tissue has a contusion, Hemorrhage
 - Fracture of the Superior horn of the thyroid can be seen.



- **Sexual Asphyxia / kotzwainism-partial hanging:**
 - Accidental hanging
 - Very common when you are having partial hanging.
 - It is seen in masochism.
 - Generally naked in opposite-sex Clothes (transvestism)
 - Pressure on the carotid artery which causes cerebral ischemia leading to erotic hallucination.
 - If orgasm is there, you will release the patient.
 - If it becomes persistent pressure, it becomes accidental death.
 - Common in young males.
 - Person will be in the bathroom, naked with some pornography material and semen discharge.
- **Judicial Hanging:**
 - Death penalty in India
 - Person is standing on a Platform that is suddenly moved and a long drop is caused.
 - Hangman Knot:

- Ideal site is below the chin, submental.
- In India, the site is the left lateral side (sub-aural) at the angle of the mandible.
- Causes hyperextension of the neck leading to Hangman's fracture (main C2 / axis vertebrae fracture).
- Leads to Brain stem damage causing instantaneous death.

2. Strangulation

00.42:32

- Only constriction of the neck & no suspension.
- Types:
 - Ligature
 - Manual:
 - By hand & known as Throttling.
 - And only stimulated by palm, so Palmar strangulation.
 - Bend of Elbow/Forearm: Mugging
 - Bamboo Sticks: Bansdola
 - Garroting:
 - Common in Spain, and Turkey.
 - This is judicial strangulation.

Garroting



- It is known as Spanish windlass method.
- There is a lever that causes constriction of the neck.

Ligature strangulation

- Cause of Death:
 - A-Asphyxia
 - C-Cerebral Anoxia
 - V-Vagal inhibition leading to cardiac arrest.
 - F-Fracture
- PM findings
 - External:
 - Ligature marks are generally transverse and complete.
 - Level: either at the level of the thyroid or below the level of the thyroid.
 - Peri-ligature injuries and hemorrhages are seen.
 - Asphyxial signs: CPC (more prominent).

- Face: congested
- Petechial hemorrhage- present in face
- Subconjunctival hemorrhage present & bleeding from Nose and mouth can be seen.
- Signs of struggle: injuries on the body.

- Internal:
 - On dissection of ligature mark, there will be contusion & Hemorrhage of tissue, neck of muscle, tonsil, and gland.
 - Fracture of the thyroid is most commonly seen.
 - Hyoid bone fracture is generally not seen because it is at or below the level of the thyroid.

Ligature Strangulation



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- Throttling:
 - Always Homicidal.
 - Thyroid fracture & hyoid bone fracture (30-50% cases) is present.
 - External findings:
 - Abrasion of the nail, neck semilunar, crecentric over the neck (important finding)
 - Bruises: Oval or round shaped because of fingertip pressure. These are known as Sixpenny Bruises (like coin shapes).
 - Face congested.
 - Petechial hemorrhages present.
 - Subconjunctival hemorrhages present.
 - Bleeding from mouth and nose.
 - CPC
 - Internal findings:

- On dissection of the neck, Bruises/contusions of different neck muscles present
- Hyoid fracture is an example of adduction fracture or inward compression.
- Cricoid fracture is very rare but specific.
- Hyoid fracture most common in throttling > hanging > Ligature strangulation.
- Thyroid fracture is most common in Ligature strangulation.

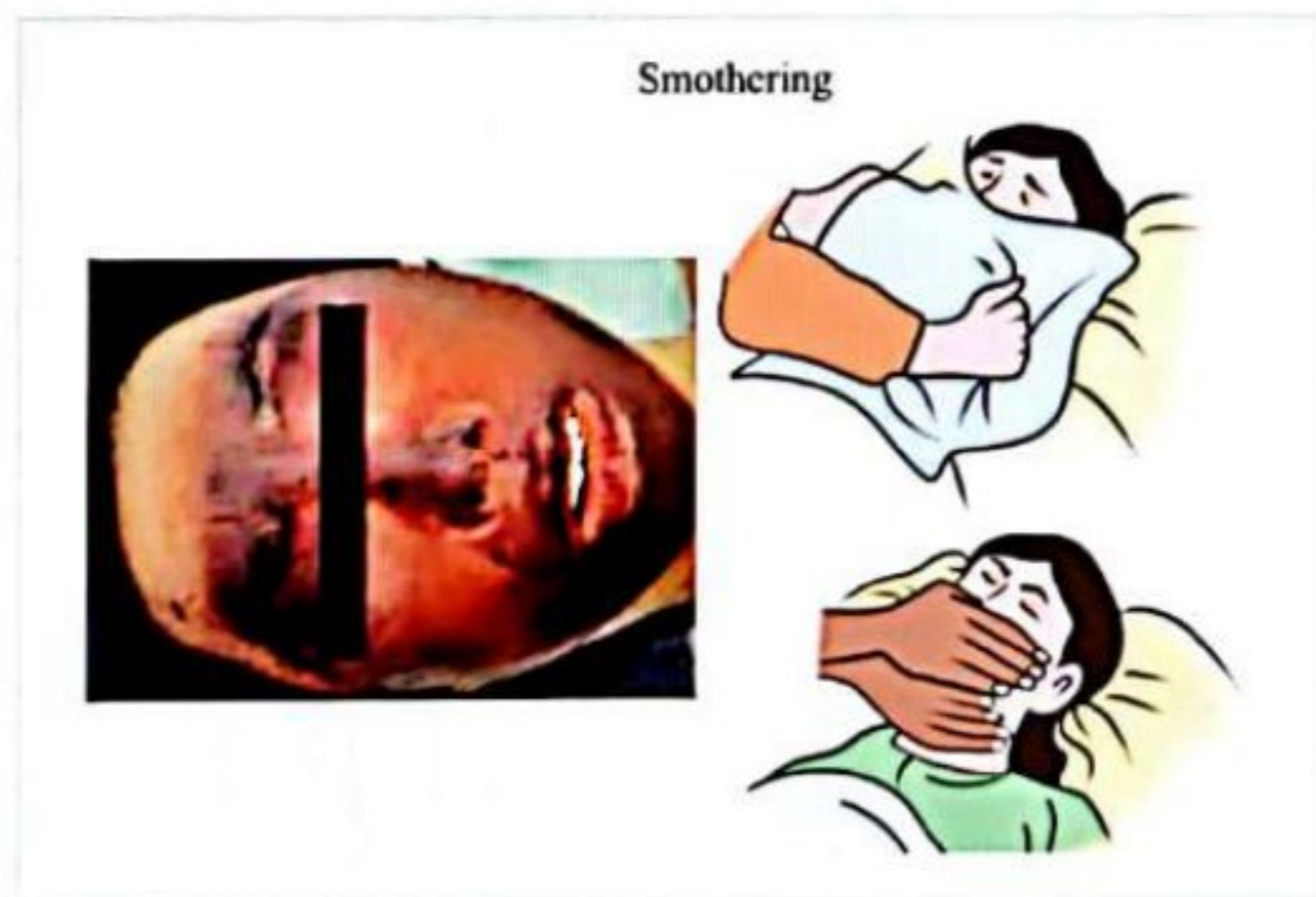
3. Suffocation

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- No neck compression, no suspension but it is a blockage of the airway.
- Purest form of asphyxia with CPC always present.

Methods of Suffocation:

- **Smothering:**
 - Blockage of mouth and nose
 - In PM, CPC, Abrasion (face, semilunar, crescentic), contusion (mouth & lips), laceration (tear in frenulum of lip)



- 1st image of smothering
- 2nd and 3rd image of Smothering by pillow and hand image.
- After dissection of this contusion, there will be a hematoma or hemorrhage.

- **Choking:**
 - It is by any object airway is blocked.
 - common in children.
 - Ex- By coin.
 - Most of the time, it is accidental.
 - The Heimlich manoeuvre (holding the epigastrium with upper & inward pressure) can be used for choking.
- **Gagging:**
 - It can be a cloth piece that is put in the mouth but sometimes the cloth piece goes to Oropharynx and blocks the oropharynx & nasopharynx & airway.
 - It is always Homicidal.

- **Café Coronary:**
 - Term was given by Roger Hougen
 - Seen:
 - If you are intoxicated & eat food that acts as a bolus and goes to Larynx / Pharynx where it causes mechanical Asphyxia.
 - But the cause of Death is reflex vagal inhibition leading to cardiac arrest (cause of death).
 - Happens because when intoxicated, cough reflexes are inhibited.
 - Common in restaurants.
- **Traumatic Asphyxia:**
 - Known as Perthe's Syndrome.
 - Due to trauma → chest fixed & not able to respire.
 - Seen in earthquake-leading building collapses = Stamped
 - Masque ecchymotique: Line of Demarcation.
- **Positional Asphyxia**
 - Jack-knife position



- Because of compression the lower area compresses the diaphragm & you won't be able to respire.
- Inverted Crucifixion
- **Overlaying**
 - Suppose a mother sleeping beside a child comes over the child, then the face will be occluded leading to smothering. This is known as overlaying.
- **Burking**
 - Word was given by William Hare & Burk.
 - They killed 16-18 people and were sent as a cadaver to an anatomist (R. Knox)
 - Burking = Traumatic Asphyxia + Homicidal smothering



→ Sitting on the chest and smothering is burking.

- **Wedging**

- If any child comes between 2 surfaces & not able to respire is Wedging

4. Drowning

01:13:00

- It is the immersion of the body in water or liquid.
- M/c, it is accidental > suicidal > Homicidal.

Types of Drowning:

1. Wet Drowning / Typical Drowning / Primary Drowning:

- In this, water goes into the lungs.
- If less water (3-4 ml/kg) goes into the lungs, it causes loss of Surfactant leading to a Collapse of alveoli → Cerebral Hypoxia → Death.
- If water goes into the lung is more (10/12 mg/kg), there are two types:

→ Freshwater Drowning:

- Hypotonic fluid → Pulmonary Capillaries → Hemodilution.
- To neutralize fluid, RBCs are lysed and liberate K⁺ causing Hyperkalemia.
- Hyperkalemia causes ventricular fibrillation → Cardiac arrest.
- Fatal period is 5 min.

→ Sea / Saltwater Drowning (contains Na, Mg, Cl):

- Hypertonic fluid → Pulmonary Capillaries → Hemoconcentration
- Pulmonary Edema presence which comes to Alveoli from blood
- There will be Hypernatremia.
- Can cause bradycardia & cardiac arrest.
- Respiratory distress because of edema.
- Fatal period is 10 min.

2. Dry Drowning

- Water does not enter the lung, but it causes reflex laryngospasm (due to vocal cord Spasm)
- It is an atypical Drowning.

3. Hydrocution

- Also known as Submersion or immersion syndrome, cold water Drowning.
- Shock treated by water (cold water 5°C or below).
- Water touches the ear, skin, nasal area, and epigastrium (sensory nerve endings stimulated).
- Causes reflex vagal inhibition → cardiac arrest.

4. Near / Delayed / Secondary Drowning / Post Immersion Syndrome:

- Death due to delayed complications such as Pneumonia, Metabolic acidosis, electrolyte imbalance, and encephalopathy.

PM Finding (Specific)

- **AM Drowning: Died in Water**

- External:

- Cadaveric Spasm (m/c sign): Clenched hand with grass particle. Indicates struggling in the water. After death, the hand remains spasm.
- Water → airway → mucoid froth (water + mucus + air).

Cadaveric spasm



- This effect is known as a churning effect.
- Features of froth include fine, white, leathery, tenacious, and copious from nose and mouth.
- Froth without mucus is seen in deaths such as snake/opium poisoning, electric shock, epilepsy death, putrefaction and pulmonary edema.

Drowning



- Internal

- Lungs are Voluminous with Rib Marking.
- Emphysema Aquosum is seen in conscious people.

- Froth is present because there is mucus (Frothy water).
- Lung shows marbled appearance (alveoli ruptured, damaged, thin).
 - Edema Aquosum is seen in an unconscious person (passive filling of water in the lung)
- Froth is not present here as no mucus is present.



Paltauf hemorrhage

- Subpleural hemorrhage.
- Mainly because of forced expiration → Alveoli ruptured.
- Mainly on the anterior lower lobe at the margin.
 - Mud particle & water present in stomach & small intestine.
 - Mud particle in Trachea is also a specific finding.
- **PM Drowning: Died outside & body is then put into water.**

Signs

- **Sehrt's Sign:**
 - Micro Rupture in Gastric Mucosa.
- **Sveshnikov's sign:**
 - Free liquid in the paranasal sinus.
- **Sabinsky's Sign:**
 - Small and anemic Spleen.
- **Ueno's Sign:**
 - water in the middle ear with Hemorrhage.
- **Wydler's Sign:**
 - Gastric content in a container with three layers (Foam, liquid, solid) forming a ring.
- **Drowning Index:**
 - $\text{Weight of both lungs} + \text{weight of pleural effusion} / \text{Weight of spleen}$
 - If $> 14.1\%$, it suggests AM drowning.

Non-specific signs

Can be present in AM Drowning as well as PM Drowning

- **Cutis Anserine:**
 - Due to contraction of the Erector Pili muscle leading to granular / puckered skin.
 - Contraction of the erector Pili muscle can also be a feature of Rigor-mortis.
- **Washer woman hand:**
 - If the body is in water for a long time, change in the skin of the Palm, and sole is seen due to Imbibition.
 - Wrinkling (2-3hr), Soddening (12hr), Bleaching (12-24hr), Peeling / Degloving (3-4 days)

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DIATOM

- It is present in water.
- A unicellular algae.
- Types:
 - Oligo Halophilic: Present in freshwater.
 - Polyhalophilic: Present in Seawater.
- Covered by Wall composed of silica (hard layer)
- Resists Putrefaction
- Goes with water in the body → penetrates pulmonary capillaries & goes to systemic circulation → To different organs.
 - DIATOM around 60 microns can penetrate the pulmonary Capillary.
- Best organ for detection is Bone marrow (of the femur & sternum).
- Best Viscera is the spleen.
- Acid Digestion Test is done by using nitric acid.
- DIATOM remains intact because it is covered by silica.
- Suggestive of AM Drowning.

Gettler's Test

- Chloride Ion test for heart chamber.
- Normally left chloride ion concentration is equal to the right.
- If the difference is more than 25%, it suggests that it's AM Drowning
- Fresh water: Right side concentration $>$ Left.
- Sea water: Left side concentration is $>$ Right.
- Not useful in Putrefaction or Patent Foramen Ovale or Dry Drown.
- High levels of serum strontium (most significant) and magnesium in the left ventricle are indicators of Seawater Drowning.



PREVIOUS YEAR QUESTIONS

Q. A person was found dead. Post mortem shows nail scratches in the face, lip laceration in the inner side of the lip. Hypostasis is fixed. Which of the following cannot be the reason? (FMGE Dec 2020)

- A. Cause of throttling
- B. Post mortem was done with 24 hours
- C. Due to asphyxia
- D. It is Homicide

Q. True about freshwater drowning? (INICET-NOV-2020)

- A. Hemodilution
- B. Hypokalemia
- C. Hyponatremia
- D. Arrhythmia

Q. Gettler's test is positive in?

- A. Hanging
- B. Poisoning
- C. Strangulation
- D. Drowning

(FMGE-May-2018)

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GENERAL TOXICOLOGY PART - 3 (STARVATION DEATH, ASPHYXIAN POISON, AND MISCELLANEOUS LAWS)



Starvation

- Withholding of food and water or administration of unsuitable food leads to starvation.
- **Baby farmer:** Term used to describe any child who is starved by their parents



Causes

- Age.
 - Child starvation occurs in battered baby syndrome.
 - Starvation of the elderly occurs in abuse.
- Sex.
 - Female starvation due to sexual discrimination.
- Trapped.
 - Being trapped in pits, mines, or landfills.
 - Accidental starvation.
- Neglect.
 - May be of children, adults, or the elderly.
- Religious.
 - Religious starvation occurs through mandatory fasting.
- Hunger strike.

Medicolegal aspect

- Accident starvation – most common.
- Suicidal starvation.
- Homicidal starvation.
 - Battered baby syndrome.
 - Elderly abuse.

Fatal starvation

- Death usually occurs when 20% of total body protein is lost.
- 40% of the original weight is reached.
- 70-90% of body fat is lost.

Fatal period

- If completely withdrawn from both food and water → Death in 10-12 days.
- If only food is withdrawn → Death in 6-8 weeks.
- Newborns may survive for 7-10 days without food and water.

Postmortem findings

- Extreme emaciation and the general reduction in size and weight of all organs, ~~except the brain.~~
- Gall bladder is distended with bile.
- Brown atrophy of the heart.
- Rigor mortis sets in and disappears early.
- Face is pale with inelastic and pigmented skin.
- Ankle edema.
- Fat is completely absent in subcutaneous tissue sparing the female breast and orbit.
- Stress fracture due to demineralization and osteomalacia.
- Wall of the intestine appears like tissue paper with atrophy of mucosa and all layers are also bile stained.

Asphyxiant

00:06:43

Gases that cause asphyxia

- Carbon monoxide.
- Cyanide.
- Hydrogen sulphide.

Carbon monoxide (CO)

- Colorless.
- Odorless.
- Lighter than oxygen.
- No irritation.
- 40x more affinity for myoglobin than oxygen.
- 210x (200-300x) more affinity for hemoglobin than oxygen.
- Shift the oxygen dissociation curve to the left side.
- Anemic anoxia or anemic hypoxia.
- Anaerobic metabolism leads to lactic acid formation and high anion gap metabolic acidosis.

CO poisoning

- May be accidental or suicidal.
- Accidental reasons:
 - Car engine.
 - Chimney.
 - Heater, especially gasoline.

CO poisoning symptoms

- CO automatism.
 - Erratic movements of the dying victim inside the room, disturbing clothing and furniture which indicate a violent struggle.
- Upper limit of safety is 0.01% CO in the air.

CO concentration	Symptom
10-20%	<ul style="list-style-type: none"> • Headache. • Muscle weakness.
20-30%	<ul style="list-style-type: none"> • Throbbing headache. • Dyspnea. • Emotional irritability
30-40%	<ul style="list-style-type: none"> • Dizziness. • Disorientation. • Judgmental impairment.
40-50%	<ul style="list-style-type: none"> • Similar to alcoholic drunkenness'. • Ataxia. • Hallucination. • Disorientation. • Slurred speech.
50-60%	<ul style="list-style-type: none"> • Syncope. • Coma. • Convulsion. • Myocardial infarction. • Arrhythmia.
60-70%	<ul style="list-style-type: none"> • Coma. • Death.
>70%	<ul style="list-style-type: none"> • Death.

CO poisoning treatment

- 100% high-flow oxygen until carboxyhemoglobin falls to 15-20%.
- Hyperbaric oxygen.
 - Barotrauma is a side effect.

**Important Information****Rebound toxicity of CO**

- Oxygen exposure to carboxyhemoglobin (CO-Hb) leads to CO binding with myoglobin.
- CO diffusion into the blood at a later stage leads to the reformation of Co-Hb.

CO poisoning tests

- Hoppes-Seyler's test.
- Kunkel test.
- Spectroscopy.
- Wetzel test.
 - Discontinued.

PM findings in CO poisoning

- Cherry-red post-mortem staining.
- Blisters in dependent or frictional areas.
 - Axilla, buttocks, inner thigh, calves, wrists, and knees.
 - Also seen in barbiturates poisoning.
- Bilateral and symmetrical necrosis and cavitation.
 - Seen in globus pallidus and putamen i.e., basal ganglia change.

Cyanide

- Produced in apple, apricot, peach, plum, almond, and linseed.
- Liquid cyanide → Hydrocyanic acid or Prussic acid.
- 4% cyanide in water → Scheele's acid.
- Gas → Cyanogen or Hydrogen cyanide.
- Bitter almond smell.
 - Smell perception is a sex-linked recessive trait.
- Ideal for suicidal poisoning.
- Salts such as KCN and NaCN are non-toxic.
 - Combine with hydrochloric acid in the stomach to form HCN that is absorbed.
- No effect in achlorhydric individuals.

Mechanism of action

- Has an affinity for ferric ions Fe^{3+} .
- Binds with cytochrome C oxidase (complex IV of electron transport chain).
- Cell cannot utilize oxygen leading to histotoxic/cytotoxic anoxia.
- Anaerobic metabolism leads to lactic acid formation and high anion gap metabolic acidosis.

Cyanide poisoning signs and symptoms

- Inhalation → Dizziness, vertigo, and constriction of the throat.
- Ingestion → Nausea, headache, loss of muscular power, hypotension, cardiovascular failure, and convulsion.
- Death occurs from respiratory failure.

Uses of cyanide

- Electroplating.
- Fumigation.
- Goldsmith.
- Photography.

Cyanide poisoning treatment

- Remove the exposure source and clothes (avoid absorption through the skin).
- Vitamin B12 → Best antidote.
 - Hydroxocobalamin combines with cyanide to form CN-cobalamin that is excreted.
- ELI-LILLY antidote.
 - Triple antidote.
- Amyl Nitrite inhalation.

- IV Sodium nitrite.
- Sodium thiosulphate is 50%.
- Sodium bicarbonate.
 - Correction of acidosis.
 - IV methylene blue used in severe conditions.
 - Para-aminopropiophenone (PAPP) can also be used.



Important Information

Amyl Nitrite, sodium nitrite, and 50% sodium thiosulphate

- Conversion of hemoglobin to methemoglobin that combines with cyanide to form cyanmethemoglobin.
- Sodium thiosulphate combines with cyanmethemoglobin to form water-soluble thiocyanate that is excreted in the urine.

Post-mortem findings

- Brick-red or bright red staining.
- Bitter almond smell.

Cyanide poisoning test

- Lee-Jones test.

Hydrogen sulphide

- Formed during the decomposition of organic substances containing sulphur.
- Rotten egg smell.
- Knock-down gas → Sudden loss of consciousness.
- Also known as sewer gas.
- Detergent suicide phenomenon is seen in Japan.
 - Bath salt containing sulphur combined with toilet bowl cleaner containing hydrochloric acid.

Management

- Hyperbaric oxygen and nitrites → Antidote.



Important Information

- Hydrogen sulphide acts on **Cytochrome C oxidase** (Complex IV of electron transport chain).

Miscellaneous laws

00:30:51

Juvenile Justice Act

- Any child < 18 years.
- Age decided by birth certificate, physical appearance, and medical examination.
- Functions:
 - Punishment for cruelty against a child.
 - Juvenile justice board formed to deal with juveniles who have committed crimes.
 - 3 members of the juvenile justice board:
 - 1st class judicial magistrate.
 - 2 social workers (one should be female).

Punishment of juveniles

- Normal offense → <3 years in a juvenile home or rehabilitation center.
- Serious crimes → 3-7 years.
- Heinous crimes → >7 years.
- Children between 16-18 years who have committed a heinous crime e.g., rape or murder will be sent for psychiatric assessment and tried as an adult.
- Other orders:
 - Counselling.
 - Fines.
 - Special homes.
 - Community service.

Consumer Protection Act 2019

- Amendment made in 2019, with the original proposed in 1986.
- Came into action on 20th July 2020.

Redressal Commission

- District → 1 crore compensation.
- State → 1-10 crores.
- National → >10 crores.
- Appeal in Supreme Court.

Time limitation

- Case should be filed within 2 years.
- Appeal heard within 45 days (after district).
- Next appeal is heard within 30 days (after state).
- Case completion time – 3 months.
- Case completion time if there are any lab tests – 5 months.
- Appeal completion – 90 days.

Important features

- E-filing of complaints.
- E-commerce sites included.
- Misleading advertisement.
- Forum conversion to the commission.
- Time limitation increased from 30 days to 45 days.
- Central consumer protection authority established.

Rights of consumer

- Information.
- Protection.
- Assurance.
- Heard.
- Awareness.
- Redressal.

Protection of Children from sexual offense (POSCO) act-2012

- Last amendment in 2019.
- Applicable for ages < 18 years.
- Evidence of the child to be recorded within a period of 30 days and completion of trial within a period of one year, as soon as possible.

Sexual harassment

- Bullying or coercion of a sexual nature and the unwelcome or inappropriate promise of rewards in exchange for sexual favors.
- Includes:
 - Sound and gesture, and exhibiting an object.
 - Child pornography or showing child pornography.
 - Making the child exhibit a body part or showing his body part.

Sexual assault

- Act in which a person intentionally:
 - Sexually touches another person without their consent.
 - Coerces or physically forces a person to engage in a sexual act against their will.
- No penetration.
- Hormone administration.

Penetrative sexual assault

- Penetrate the penis into any orifices of a child or any object into the:
 - Vagina, urethra, or anus.
 - Applies mouth (body part) to the penis, vagina, urethra, or anus of a child.

Aggravated penetrated sexual assault.

- Sexual assault by:
 - Two or more than two people.
 - Relatives.
 - Age of child < 12 years.
 - Armed forces.
 - Insane/Institutionalized child.
 - Trusted or having authority.
 - Officer
 - Repeat offender.
- Done by:
 - Police officer.
 - Armed/Security forces.
 - Public servant.
 - Management/Staff of jail, remand home, protection home.
 - Hospital staff.
 - Staff of educational or religious institutes.
 - Gang.
- Involves:
 - Using deadly weapons.
 - Causing grievous hurt.
 - Making a child mentally ill or pregnant or HIV positive.
 - Act done on disabled children or pregnant children.
 - With an attempt to murder or during communal violence.
 - By guardian, repeatedly on the same child.
 - Child aged < 12 years.

POSCO offenses and punishment

Offense	Punishment (POSCO-2012)	Punishment (POSCO-2019)
Penetrative sexual assault	7 years to life imprisonment plus a fine.	If a child is below 16 years, 20 years to a life term plus fine.
Aggravated penetrative sexual assault	10 years to life imprisonment plus a fine.	20 years to the death penalty plus a fine. It adds two more grounds to the list for aggravated sexual assault. <ul style="list-style-type: none"> • Assault resulting in the death of a child. • During natural calamity.
Sexual assault without penetration	3-5 years imprisonment plus a fine.	Same.
Aggravated sexual assault without penetration	5-7 years imprisonment plus a fine.	Adds two more offenses: <ul style="list-style-type: none"> • During natural calamities. • Administering any chemicals or hormones for cervical maturity.
Sexual harassment	0-3 years imprisonment plus a fine.	Same.
Use of child for pornographic purposes	0-5 years imprisonment (7 years for subsequent offense) plus a fine.	Minimum 5 years imprisonment.
Storage of children for pornography	0-3 years plus fine.	Adds two more offenses: <ul style="list-style-type: none"> • Failure to destroy or delete such. • Mode for transmitting.

Human organ transplantation act (HOTA-1994)

- Transplantation of human organs and tissues act (THOTA-2014).
- Deals with removal, storage, and transplantation.
- Prevent commercial dealing.
- Human organ definition.
 - Any part of the human body (structured arrangement of tissue) that, if removed, cannot be replicated in the body.

Brain stem death declaration by doctor

- Can be done by:
 - Treating a doctor.
 - In-charge doctor.
 - Neurologist or neurosurgeon.
 - Intensivist, anesthetist, or physician.
 - Independent specialist authorized by the government.

Checklist for brain death

	CN	Center
Light reflex	2,3	MB
Vestibulo-ocular	3,6,8	MB/P
Dolls eye	3,6,8	MB/P
Corneal	5,7	P
GAG	9,10	Medulla
Apnoeic	Respiratory center	Medulla

- MB-midbrain, P- pons.

Donations type

Living donation.

- Near relatives i.e., parents, son, daughter, brother, sister, grandparents, and grandchildren.
- Non-relatives → Prior approval from any authorized committee.
- Swap transplantation between unmatched pairs.

Cadaveric donation.

- Authorized by:
 - Any donor above 18 years and of sound mind.
- Will written before death instructing for transplantation in the presence of two witnesses.
- Consent needed for legal possession of body given:
 - If there was no will.
 - Unknown dead body for more than 48 hours done by doctor or in-charge.
 - In medicolegal case requires approval from the autopsy surgeon.

Most commonly donated organs

- Heart.
- Liver.
- Thymus.
- Intestine.
- Lungs.
- Kidney.
- Pancreas.

- Most common: Kidney > Liver > Heart.

Most commonly donated tissues

- Bone.
- Cartilage.
- Cornea.
- Middle ear.
- Veins.
- Valves.
- Skin, tendon, and ligament.
- Most common: Cornea > Bone > Tendon.

Punishment

Human organ/tissue transplantation without authorization

- 10 years plus 20 Lakhs fine.
- Applicable for medical staff and paramedical staff.

Additional punishment for the doctor

- The State medical council nullifies registration.
- 1st offense → 3 years.
- Subsequent offense → Penal erasure or professional death sentence.

For commercial dealing

- 2-7 years plus a fine.

Medical certification of cause of death (MCCD)

00:59:19

- MCCD issued by a doctor.
- Death certificate issued by the registrar or sub-registrar of state government.
- Doctor's duty in MCCD:
 - Diagnose the person as dead.
 - Declare death.
 - Conclude the cause of death.
 - Certify the cause of death.

Cause of death

- Reason someone dies.
- Underlying/Primary cause.
 - Disease or injury that initiated events.
 - Example: Diabetes mellitus.

Antecedent/Intermediate cause. (Part-1)

- Occurs sometime between primary and immediate causes.
 - Example: Gangrene.
- Immediate cause.
 - Final complication due to disease or injury.
 - Most recent event that occurred before death.
 - Example: Septicemia.
- Diabetes mellitus (primary cause) → Gangrene (intermediate cause) → Septicemia (immediate cause).
- Underlying/Primary cause written in mortality statistics.

FORM NO. 4A

(See Rule 7)

MEDICAL CERTIFICATE OF CAUSE OF DEATH

(For non-institutional deaths. Not to be used for still births)

To be sent to Registrar along with Form No. 2 (Death Report)

I hereby certify that the deceased Shri/Smt./Km..... son of/wife of/daughter of resident of was under my treatment fromto and he/she died on at AM/PM.

NAME OF DECEASED					For use of Statistical Office
Sex	Age at Death				
	Age in completed years	If less than 1 year age in months	If less than one month age in Days	If less than one day, age in Hours	
1. Male 2. Female					
CAUSE OF DEATH				Interval between on set & death approx.	
I Immediate cause State the disease, injury or complication which caused death, not the mode of dying such as heart failure, asthenia etc.		(a) Due to (or as a consequences of)			
Antecedent cause Morbid conditions, if any, giving rise to the above Cause, stating underlying condition last		(b) Due to (or as a consequences of)			
II Other significant conditions contributing to the death but not related to the disease or conditions causing II		C			

If deceased was a female, was pregnancy the death associated with? 1. Yes 2. No
If yes, was there a delivery? 1. Yes 2. No

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Cause of death		Approximate interval between onset and death
I Disease or condition directly leading to death* Antecedent causes Morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	(a)
	due to (or as a consequence of)	
	(b)
	due to (or as a consequence of)	
	(c)
	due to (or as a consequence of)	
	(d)
<hr/>		
II Other significant conditions contributing to the death, but not related to the disease or condition causing it

<i>*This does not mean the mode of dying, e.g. heart failure, respiratory failure. It means the disease, injury, or complication that caused death.</i>		

Contributory conditions (Part II)

- Not related to disease but contributed to the death.
- Unfavorable conditions.



Important Information

Example

- Rupture of the myocardium – immediate cause.
 - Myocardial infarction.
 - Coronary artery thrombosis.
 - Atherosclerosis.
- Part II-Smoking, Chronic obstructive pulmonary disease (COPD), Diabetes mellitus.

RBD ACT-10(3)

- Registration of Birth and death act.
- Obligatory for registered medical practitioners (RMP) who attended a patient's last illness.
- No fee charged for the cause of death.
- Cause of death given instantly.
- Certification of cause done by RMP.

174(3) CRPC

- Police inquest.
- Police are unable to identify the cause of death and refer to the doctor to conduct a postmortem.

MCCD (4A) and Death report (2)

- MCCD form 4A.
- Death report form 2.
- Both forms are sent to the registrar or sub-registrar of the state government to assign a death certificate within 21 days.
- If a patient is already dead when they are brought to the hospital, only form 2 is sent and the doctor informs the police.
 - Post-mortem is conducted to determine the cause of death.
 - No form 4A.



Spinal Poisons

1. Strychnine Poisoning

- Caused by Strychnine derived from *Strychnos nux vomica* (Kuchila)
 - It is used to kill stray dogs, hence called **Dog-buttons**.
 - Seeds shape is concavo-convex.
 - It is odorless and bitter in taste.
 - **Fatal dose:** One crushed seed
 - Tests to identify Strychnine is.
 - Wenzel test
 - Sonenshein test
 - Strychnine is excitatory in action.



Important Information

- Wenzel test is used in case of Carbon monoxide (CO) Poisoning

Strychnine Seeds aka Dog Buttons



Active Principles

- **Strychnine:** It is a more potent than one
- **Brucine:** These two are alkaloids
- **Loganin:** It is a glucoside.

Mechanism of Action

- Acts on the anterior horn cell of the spinal cord (**Renshaw cells**)
- Complete blockade of the Ventral horn of motor neurons and postganglionic receptor site.
- Effects of glycine (**inhibitory neurotransmitter**) are inhibited in the spinal cord and brainstem.
 - Thus, the overall effect is excitatory.
 - Thus, this disease mimics the disease of Tetanus.

Two phases are present

- **Convulsion**
 - Convulsion phase is increased in this poisoning.
 - There may be 5-6 convulsions simultaneously.
 - Clonic convulsions are seen.
- **Relaxation**
 - Normally duration of the relaxation phase is **more** compared to the convulsion phase.
 - But in this poisoning, the convulsion phase is elevated.
- Cause of death is respiratory muscle spasm - **Asphyxia**.
- Consciousness will be retained.

Differentiation between Tetanus and Strychnine poisoning

- In Strychnine Poisoning
 - **All muscles are affected at the same time.**
 - External stimuli increase the convulsions.
- In tetanus, there will be **sequential muscle spasms**.

Clinical Features

- **Tonus**
 - **Opisthotonus**
 - Hyperextension of back.
 - Most characteristic feature.
 - **Emprosthotonus**
 - Hyperflexion of back.
 - **Pleurothotonus**
 - Lateral bending
- **Spasm**
 - **Risus Sadonicus**
 - Spasm of facial muscles.

Tests

- Wenzel test
- Sonneschin test

Treatment

- Avoid gastric lavage as there will be convulsions. (**Gastric lavage is Contraindicated in Convulsions**).
- Controlling seizures
- Keeping patients away from convulsion-triggering stimuli
- Acidification of the urine
- Antidote (**to control seizures**)
 - Phenobarbitone
 - Diazepam

Postmortem Findings

- Rigor mortis
 - **Mnemonic:** ST Ea L

- ST-Strychnine, Ea- Early, L- Long duration
- Early in onset and long duration
- Postmortem Caloricity
 - Body temperature increases after death due to increased muscle action.
- Putrefaction
 - Rate of putrefaction is decreased.
- Brain and spinal cord are to be **preserved**.

Important Information

Rate of putrefaction is decreased in

- **Mnemonic: SMC**
 - Strychnine
 - Metallic poisoning
 - Carbolic acid, Carbon monoxide, and Cyanide poisoning

2. Gelsemium Poisoning

- It is inhibitory in action.

Cardiac Poisons

00:12:56

Mnemonic: Queen DONAC

- **Caused by**
 - Quinine
 - Digitalis
 - Oleander (yellow, white/pink)
 - Nicotina tabacum
 - Aconite
 - Cerebra odellum

1. Aconite Poisoning

- It is also called blue rocket/ monks hood/ **meetha zher**



- Roots are conical in shape and tapered at the end with longitudinal ridges.
- **All parts are poisonous.**
- Roots and seeds are the most poisonous part.
- Roots of Aconite are generally **mistaken as Horseradish root**

Active Principles

- Aconitine
- Pseudoaconitine
- Aconin

Mechanism of Action

- Mainly acts on sodium channel (**AcoNite, Na⁺ channel action**).
- Binds to voltage-dependent sodium channels and prolongs the action leading to
 - Excitation of sensory nerves
 - Sensory nerves are predominantly affected than motor nerves.
 - Paralyze the motor ganglia of the heart.
 - Respiratory center is slowed.
 - Tachycardia followed by Bradycardia is observed.
- Cause of death is due to Cardiac arrhythmia (mostly Ventricular arrhythmia)
- **Hyperkalemia** is also seen.

Signs and Symptoms

- Tingling and numbness of mouth and throat (**most characteristic symptom**)
- **Sweet taste**
- Numbness and paranesthesia of face, perioral area, and progress to all over the body.
- Weakness of four limbs
- Twitching of muscles
- **Hippus sign:** Alternate contraction and dilation of the pupil.
- **Xanthopsia:** Visual illusion of yellow color around objects.
- Hypotension, bradycardia, ventricular ectopic, cardiac arrhythmia with AV block

Fatal Dose: 1-2 gms of the root is fatal.

Treatment

- Gastric lavage with warm saline.
- **Atropine for AV block.**
- Supportive treatment
- Correction of hyperkalemia

Medicolegal Importance

- Accidental poisoning by **horseradish root**
- One of the ideal homicidal poisonings.
- It mimics natural cardiac arrhythmia.
- Destroyed by putrefaction.

2. Oleander Poisoning

A. Yellow Oleander

- Also called **Cerebra Thevetia** or **peela kaner**.
- All parts of the plant are poisonous.
- **Active Principles**
 - Cerebrin
 - Thevetoxin A and B
 - Nerifolin

Peela kaner



B. Pink Oleander

- It is termed as **Nerium odorum** or **white oleander**.

Pink Oleander-Oleandrin, Nerin, Foli AKA



Active Principles

- Oleandrin
- Nerin
- Folinerin
- Rosagenin

Mechanism of Action of Oleander poisoning

- Action is like digitalis.
- **Inhibition of Sodium-Potassium ATPase channel** leading to
 - Brady/Tachycardia
 - AV block
 - Hyperkalemia

Treatment of Oleander Poisoning

- Gastric lavage with **warm saline**
- **Antidote: Digibind** (same as that of Digitalis)
 - Digibind binds to the Fab end of the antibody.

- For AV block - Atropine
 - For hyperkalemia - Dextrose and Insulin
- 3. Digitalis Poisoning**
- Digitalis purpurea is also called purple Fox glove.

Digitalis Purpurea



Mechanism of action

- Inhibition of Sodium-potassium ATPase channel

Treatment

- Treatment is same as **Oleander poisoning**.

4. Cerebra Odallam

- Also called are **Suicidal tree**.

Active Principles

- Cerberin
- Cerebroside
- Odollin
- Odollotoxin

Treatment

- **BHIST regime**

5. Nicotine

- Most common substance abuse in India



Important Information

- Most common illicit substance in India is Cannabis