PREP XI RR

STUDY NOTES

FORENSIC MEDICINE

14
VIDEOS

211
PAGES

PREMIUM STUDY MATERIAL

PREP XI RR

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Forensic Medicine

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1. AUTOPSY/NECROPSY/POSTMORTEM EXAMINATION/THANATOPSY

BIG QUESTION 1: What is an autopsy and what are its types based on indication and method?

Broad Answer: Autopsy, also called postmortem, necropsy, or thanatopsy, is the systematic dissection of a dead body to determine the cause, manner, and time of death. It is categorized into medico-legal (for unnatural deaths), clinical/pathological (natural disease-related), psychological (suicide investigation), virtual (CT/MRI imaging), negative (no cause found), and obscure (inconclusive gross findings). Various incisions and techniques like Virchow's or Letulle's method are chosen based on case type and disease suspicion

DETAILED QUESTIONS

Q1.1: What are the other names of postmortem?

Answer:

- **Postmortem is also known as:**
  - Autopsy
  - Necropsy
  - Thanatopsy
  - Postmortem examination (PME)

Q1.2: When and who conducted the 1st autopsy?

Answer: The 1st autopsy was conducted in 1302, by Varignana in Italy

Q1.3: Who conducted the 1st medicolegal autopsy in India?

Answer: The 1st medico-legal autopsy in India was conducted by Buckley on the body of Mr. Wheeler in Chennai

Q1.4: What are the two types of inquests in legal procedures?

Answer:

- Police inquest
- Magistrate inquest

Q1.5: Name the different types of autopsy.

Answer:

- Medicolegal autopsy
- Pathological/Clinical autopsy
- Psychological autopsy
- Virtual autopsy
- Negative autopsy
- Obscure autopsy

YOURWISH

Q1.6: What is a medicolegal autopsy, and when is it performed?

Answer:

- A medicolegal autopsy is conducted for unnatural deaths
- Performed at the request of the police or a Magistrate

Q1.7: What are the key features of a pathological/clinical autopsy?

Answer:

- Requires mandatory consent from relatives
- Mostly performed in cases of natural deaths

Q1.8: What is a psychological autopsy, and when is it performed?

Answer:

- Conducted in cases of suicide
- Not a post-mortem examination (PME)
- Involves interviews with family members of the deceased to understand the circumstances and mental state

Q1.9: How does a virtual autopsy (virtopsy) work, and where is it commonly used?

Answer:

- A visual imaging technique used mainly in developed countries
- Uses CT scan and MRI to determine the cause of death
- Also called virtopsy

Q1.10: What is a negative autopsy, and in which cases might it occur?

Answer:

- A negative autopsy is declared when no cause of death is identified despite:
  - Post-mortem examination (PME)
  - Laboratory investigations
  - Histopathological and toxicological studies
- Occurs in 2-5% of autopsies
- Common in cases such as:
  - Vagal inhibition
  - Laryngospasm
  - Epilepsy
- Represents a completely negative finding with no identifiable pathology

Q1.11: What is an obscure autopsy, and how is it different from other autopsies?

Answer:

- An obscure autopsy yields minimal or inconclusive findings that are insufficient to determine the cause of death
- Requires additional investigations such as lab tests, histopathology, and toxicology to reach a conclusion
- Characterized by minimal gross findings on initial examination

Q1.12: What are the key features of Virchow's method of autopsy?

Answer:

- A very common method used in autopsy

- Organs are removed one by one for examination
- Considered a fast and easy method

Q1.13: Elaborate on Ghon's (en-bloc) method of autopsy, and its uses.

Answer:

- Involves removal of targeted blocks of organs (Cervical, Thoracic, Abdominal, Pelvic) based on the case
- Maintains inter-organ relationships intact during examination
- Thoracic block is removed in thoracic problems
- Pelvic block is taken out in cases like sexual assaults

Q1.14: What is Letulle's (en-masses/evisceration) method of autopsy, and what are its characteristics?

Answer:

- Removal of large masses of organs together: Cervical, Thoracic, Abdominal, and Pelvic blocks
- Complete viscera are taken out (evisceration) at once
- Blood vessels and vascular supply remain intact during removal
- Used especially in cases involving minor bleeding

Q1.15: Describe the Rokitansky method of autopsy and its uses.

Answer:

- Involves dissection of organs inside the body (in situ) without removing them
- Used primarily for infectious diseases such as HIV, Hepatitis, and COVID-19
- Preferred in cases of highly transmissible diseases to reduce infection risk
- Used in infants under 1 year

Q1.16: What are the types of incisions used in medicolegal autopsies?

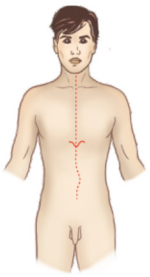
Answer:

- I- shaped incision
- Y- shaped incision
- Modified Y- shaped incision
- X- shaped incision

Q1.17: Which is the most common type of incision used in autopsy, and is it performed?

Answer:

- I-shaped incision is the most common type of incision used in autopsy
- Runs vertically from the chin to the pubic symphysis

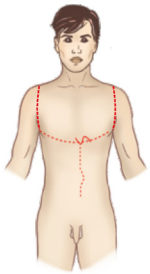


I shaped incision

Q1.18: What is the Y-shaped incision in autopsy, and what is its purpose?

Answer:

- Used primarily for cosmetic reasons, to preserve the mammary line
- Starts from the acromion process on both sides, follows along to the breasts, then down to the xiphisternum, and finally to the pubic symphysis

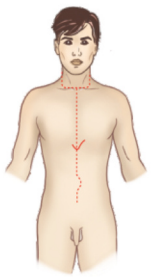


Y shaped incision

Q1.19: What is the modified Y-shaped incision used in autopsy, and how is it performed?

Answer:

- Used primarily in asphyxial deaths (e.g., hanging, drowning)
- Incision starts from the mastoid process (MP), extends to the suprasternal notch (SSN), and then down to the pubic symphysis



Modified Y shaped incision

Q1.20: What is the X-incision in autopsy, and in what situations is it used?

Answer:

- Generally not performed
- Consists of two incisions from the shoulders to the opposite iliac crests, forming an X-shape on the body
- Used primarily for cases involving deep injuries or custodial deaths

Q1.21: In a post-mortem examination (PME), which body cavity is opened first, and how does this vary with specific cases?

Answer:

- **Generally,** the **thoracic cavity** is opened first
- In specific cases:

A. Newborn • The abdomen is to be opened first.	**B. Poisoning** • In suspected cases of poisoning, the **skull** is the first cavity to be opened.
C. Asphyxial Deaths • In this, Cranium-Thorax-Abdomen-Neck **(C-T-A-N)** are opened in order.	**D. Traumatic Head Injury** • The head is the first cavity to be opened.

Q1.22: Describe postmortem dissection in case of air embolism/Pneumothorax

Answer:

- In pneumothorax cases, the chest cavity is opened first. (Thorax)
- Then puncture the pleura, if a bubble comes out, the water test is positive (the Pleura has air).
- In air embolism cases, open the pericardium, fill it with water, and puncture the ventricle.
- If a bubble comes out, the water test is positive (Pleura has air)
- Another technique used in air embolism cases, a syringe is taken (pyrogallol), and aspirates blood from the ventricle.
- If air is present in the ventricle, the color of the pyrogallol solution turns brown.

Q1.23: How are internal organs dissected during autopsy and what special techniques are used in different organ systems?

Answer:

A. Brain • Fixation is done with 10% formalin	**B. Heart** • We use the inflow-outflow technique. • Right atrium- Right ventricle, then to pulmonary artery we dissect up to the Lungs. • Left atrium-Left ventricle, then dissect up to the Aorta.

C. Spinal cord	E. Stomach PYQ: FMGE 2019
• The spinal cord can be opened anteriorly and posteriorly. • Posterior opening is considered a better technique.	• It is done by the Double Ligature Method, in both cardiac and pyloric ends. • It is opened at the greater curvature. • In cases like acid or corrosive poisoning, the maximum damage is on the lesser curvature (Magenstrasse) • To examine the lesser curvature, it opened from greater curvature by the double ligature method.

Q1.24: What is exhumation? Discuss its legal provisions, purpose, and key steps.

Answer:

Exhumation is digging out of the dead body in the presence of a magistrate.

- It is done in the presence of a magistrate, police, or doctor.
- It comes under section 176 (3) CrPC.
- After digging out of the body, a secondary autopsy is done if needed.
- Identify the site with the help of relatives or the accused.
- It is done early in the morning because the whole daylight is required.
- There is no limit for exhumation, it might continue for a few days too.
- Soil sample (500gm) from the body and control sample is also taken, to make a comparison.
- Bones and tissues are taken for chemical or toxicological analysis.
- Arsenic present in the soil can go into the dead body, this process is known as postmortem imbibition.

BIG QUESTION 2: What is the McNaughten Rule, and how does it relate to criminal responsibility in forensic psychiatry?

Broad Answer:

- The McNaughten Rule, established in 1843, states that a person is not criminally responsible if, at the time of the act, they were suffering from a mental defect that prevented them from knowing the nature or wrongfulness of the act. This rule forms the legal basis of the "insanity defense" under Section 84 IPC in India. It assesses the presence of mens rea (criminal intent) and actus reus (criminal act) in mentally ill individuals.

DETAILED QUESTIONS

Q2.1: What is the forensic significance of insanity and how is it assessed legally?

Answer:

Insane

- A person who is mentally ill
- If a person commits a crime, due to two components.
  - Mens rea
  - Actus reus

Components of Insane	Explanation
Mens rea	• Mens: Mind • Rea: Criminal • Criminal mind and intent or guilt

Actus reus	• It is a forbidden act. • If an insane person commits the crime (Actus reus). • There will be no criminal mind involvement. • If the insane commit the crime then he is not responsible for the crime.

Q2.2: Which legal rule governs the criminal responsibility of an insane person?

Answer:

- The **McNaughten Rule** is used to determine the criminal responsibility of an insane person.

Q2.3: When was the McNaughten Rule implemented, and was it based on whom?

Answer:

PYQ: NEETPG 2018 PYQ: INICET 2019, 2023

- Implemented in 1843
- Also known as the "right or wrong" test or legal test for insanity
- Based on the case of McNaughten, who was an insane person



Q2.4: What does the McNaughten Rule state?

Answer:

- McNaughten Rule states "An accused person is not legally responsible if it is proved, that at the time of committing the crime, he was suffering from such a defect of reason from an abnormality of mind, that he did not know the nature and quality of the act he was doing, or that what he was doing was wrong"
- It is based on the IPC 84

Q2.5: What does Section 84 of the IPC state regarding the criminal liability of a person with an unsound mind?

Answer:

PYQ: INICET 2020 PYQ: FMGE 2021

- IPC 84 states, "Nothing is an offense which is done by a person, who at the time of doing it, because of unsoundness of mind, is incapable of knowing the nature of the act, or that he is doing what is either wrong or contrary to law"

Q2.6: What are the major legal tests/rules for criminal insanity, and how do they differ?

Answer:

- American Law Institute (ALI) Test (1972)
- Currens Rule
- Durham Rule (Product Test)
- Irresistible Impulse Test (Hampshire Doctrine)

Q2.7: What is the American Law Institute (ALI) test for criminal responsibility?

Answer:

- Implemented in 1972
- States that a person is not responsible for criminal conduct if, due to mental disease or defect, they lack adequate capacity either to:
  - Appreciate the criminality of their conduct, or
  - Adjust their conduct to comply with the law
- Mnemonic: **AAA**

YOURWISH

- American Law
- Appreciate criminality
- Adjust conduct

Q2.8: What is the Currens Rule regarding criminal responsibility in mentally ill persons?

Answer:

- An accused is not criminally responsible if, at the time of the act, he lacked the capacity to regulate his conduct to the law's requirements due to mental disease or defect
- Mnemonic: **C-C-C**
  - **C**urrens rule
  - **C**apacity to regulate
  - **C**onduct
- Similar to Brawner's rule, but emphasizes substantial capacity to control conduct

Q2.9: What is the Durham Rule in criminal law?

Answer:

- Also called the Product Test
- States that an accused person is not criminally responsible if the unlawful act is the product of a mental disease or mental defect

Q2.10: What is the Irresistible Impulse Test (Hampshire Doctrine) in criminal law?

Answer:

- It states that an accused person is not criminally responsible, even if he knows the nature and quality of his act and knows that it is wrong, if he is incapable of restraining himself from committing the act because the free agency of his will has been destroyed by mental disease

Q2.11: What is Civil Responsibility of Insane ?

Answer:

It includes:

- Testamentary Capacity
- Holograph

Testamentary Capacity

- Testament: Will
- It is defined as the mental capacity to make a valid will
- Requirement
  - Soundmind: Compos mentis.
    → It should be certified by a doctor.
  - Age should be above or equal to 18 years.

Holography

- Writing the will with one's own handwriting.

Q2.12: Describe lucid interval

Answer:

- The insane person became sane and after some time the person again became (Normal) insane.
- Hence, this period is considered the lucid interval.

Insane
↓
Sane
↓
Insane

- In this condition, if one has committed a crime then he/she is responsible for the crime
- One can also act as a witness by providing evidence to the court.

Q2.13: What is a perception disorder and what are its types?

Answer:

- False sense of perception
- It is of two types.
  - Hallucination
  - Illusion

Q2.14: What is hallucination as a perception disorder?

Answer:

- It is the first type of perception disorder
- The person experiences a false perception without any external stimulus

Q2.15: What are the types of hallucinations and examples of tactile hallucinations?

Answer:

- Types of hallucinations:
  - **Visual** (sight) hallucination
  - **Auditory** (sound) hallucination
  - **Olfactory** (smell or odor) hallucination
  - **Gustatory** (taste) hallucination
  - **Tactile** (touch) hallucination
    → E.g., **Magnan Syndrome** (also known as cocaine bugs)

Q2.16: What is an illusion in perception disorders, and how does it differ from hallucination?

Answer:

- Illusion is the second type of perception disorder
- In illusions, an external stimulus is present, but the person misinterprets it
- Example: Seeing a rope but misinterpreting it as a snake

Q2.17: What is a delusion in the context of thought disorders?

Answer:

- Delusion a disorder, where the content of thought changes.

- False, firm, and fixed belief in something that is not a fact and that persists even after its falsity has been clearly demonstrated.

Q2.18: What are the different types of delusion? Give brief description about each of them.

Answer:

Types of Delusions	Description
Persecution	• Most common **delusion disorder.** • It is a delusion of harm or killing
Grandeur	• Other Name: Exaltation • Superiority image for yourself. • It is most common in **mania.**
Nihilistic	• Imagines he does not exist or there is no world. • It is most common in **depression.**
Infidelity	• The patient might think that his or her partner is not **loyal or unfaithful** to him. • Other Names: Othello syndrome, Morbid jealousy • It is most common in o Alcoholic patients o Cannabis abuse o Psychosis • It is more common in **males than in female**
Erotomania	• Other Name: De Clerambault's syndrome • It is a delusion of love. • More common in **females than males**

Q2.19: Which syndromes are classified as Delusion of double?

Answer:

- Capgras syndrome
- Fregoli syndrome

Q2.20: What is Capgras Syndrome? Explain with an example.

Answer:

- Capgras Syndrome can be remembered by the mnemonic **"Cafgras"**
  - o **F** = Familiar person
  - o **S** = Stranger
- It is a delusion where a **familiar person is perceived as a stranger**.
- Example: Someone standing in front of you says, "I am your brother," but you believe he is an **impostor or a double** of your brother

Q2.21: Explain Fregoli syndrome with an example.

Answer:

- Strangers are considered familiar people
- For example, A beggar is standing in front of you, but you're thinking of him as your boss

Q2.22: What are different types of phobia?

Answer:

Types

- Agoraphobia - Public/ Crowd
- Claustrophobia - Closed spaces
- Acrophobia - Height
- Nyctophobia - Darkness (night)
- Mysophobia - Germs/ Dirt
- Hydrophobia - Water
- Glossophobia - Public speaking
- Trypanophobia- injection/needles
- Arachnophobia- spiders
- Nomophobia- without mobiles
- Thanatophobia- death
- Phobophobia- fear from phobia

Q2.23: Describe impulse and its types.

Answer:

Impulse

- Sudden and irresistible force compelling a person to do some action.
- Done without any motive or forethought.
- Types
  - Kleptomania - Desire to steal things of less value.
  - Oniomania - Impulse to buy things.
  - Dipsomania - Drinking alcohol at a periodic interval
  - Pyromania - Desire to set fire to things.
  - Mutilomania - Desire to mutilate animals.
  - Trichotillomania - Plucking out your hair.

BIG QUESTION 3: What are the legal provisions for mentally ill individuals under the Mental Healthcare Act (MHC Act), 2017, and how does it relate to criminal responsibility?

Broad Answer:

- An Advance Directive is a written document by a mentally sound adult that:
  - Specifies how they wish to be treated or not treated in case of future mental illness.
  - Appoints a nominated representative to make decisions when the individual is incapacitated.
- It ensures autonomy, dignity, and legal protection for patients with psychiatric illness.
- Every healthcare provider and facility is legally bound to follow the directive unless reviewed and overturned by a Mental Health Review Board.

DETAILED QUESTIONS

Q 3.1: Differentiate between True Insanity and Feigned Insanity.

Answer:

Trait	Insanity	Feigned Insanity
Onset and motive	Gradual with no motive	Sudden with some motive

YOURWISH

Sign & Symptoms	Uniform and present whether he observed or not	Present only when consciousness being observed
Frequent examination	Does not mind	Resents for fear of detection
Facial Expression	Peculiar vacant look	No peculiarity
Mood, sleep pattern, habit	Abnormal	Normal
Predisposing factor	Present	Absent

Q3.2: Explain the criminal responsibility in special cases like somnambulism, Sleep drunkenness, delirium tremens, kleptomania, hypnosis and run amok

Answer:

Delirium Tremens (DT) • Alcohol withdrawal symptom • Seen in 2(D) to 3(T) days of withdrawal. • If a crime is committed - not responsible	**Run amok** • Chronic cannabis abuse symptom • Can develop a homicidal tendency. • If a crime is committed - not responsible
Somnambulism • Sleepwalking • If a crime is committed - not responsible	**Sleep drunkenness** • Another name: Somnolentia • Awake and drowsy or confused for long-time • If a crime is committed - not responsible
Kleptomania • Steal article of low value • Insight is present. • Liable if the crime is committed.	**Hypnosis** • Hypnotized by someone. • Both persons (hypnotizing and hypnotized) are liable

BIG QUESTION 4: Name some of the torture techniques.

Broad answer:

- Dry submarine
- EL planton
- Picana
- Cattle Prod
- Falanga/Bestinado
- Telefona
- Black slave
- Bellary
- Jackknife position

DETAILED QUESTIONS

Q4.1: What are the key international guidelines related to the medical examination and documentation of torture victims?

Answer:

- **Declaration of Tokyo:** Guidelines for medical professionals on the ethical responsibilities related to torture
- **Istanbul Protocol:** A manual for the effective examination and documentation of torture victims

Q4.2: What is dry submarina in the context of torture methods?

Answer:

- It involves **covering the victim's face with a plastic bag**, leading to **suffocation**.



Q4.3: What is "EL Planton" as a method of torture?

Answer:

- It refers to **forced or prolonged standing** as a form of torture.
- Named after a "plant" because the victim is made to **stand for long periods without rest**



Q4.4: How is Picana different from a Cattle prod?

Answer:

- Picana is a torture method where electrical stimulation is used, whereas a Cattle prod is the electrical torture of the genital area



Picana



Q4.5: What is Falanga (Bestinado) in the context of torture methods?

Answer:

- It is the beating of the soles of the feet.
- The most common method of torture.
- Mnemonic: **F for Foot, F for Falanga**



Falanga/Bastinado

Q4.6: What is Telefona as a method of torture, and how can it be remembered?

Answer:

- It involves repeated slapping on the sides of the victim's head, usually the ears.
- Mnemonic: **T for Telephone** (used at ears), **T for Telefona** (beating at ears)

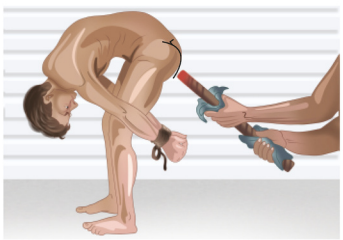


Telefona

Q4.7: Describe Black slave as a torture technique.

Answer:

- Insertion of a hot metal rod in the anus.
- Mnemonic: **B for Burn, B for Black Slave**.



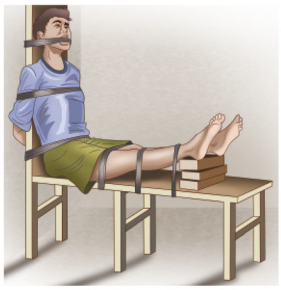
Black Slave

Q4.8: What is the torture technique in which a stick smeared with red/green chilli paste is inserted into the anus?

Answer: The torture techniques is called **Bellary**

Q4.9: What is the Quirafino (Operating Table) method of torture?

Answer: Involves hitting the abdomen.



Quirofano/Operating table

Q4.10: What is the Parrot Perch (Jack) method of torture, and how is the victim positioned?

Answer:

- The victim is suspended from a pole placed under the knees.
- The wrists and ankles are bound together, causing intense strain and pain.



Parrot's perch/Jack

Q4.11: What is crucifixion, and how does it cause death?

Answer:

- Crucifixion, also known as Palestinian hanging, involves the victim being suspended in a position where the neck is forced forward.
- This position leads to positional asphyxia, which is the cause of death.



Q4.12: What is the Jack Knife Position torture method, and how does it cause death?

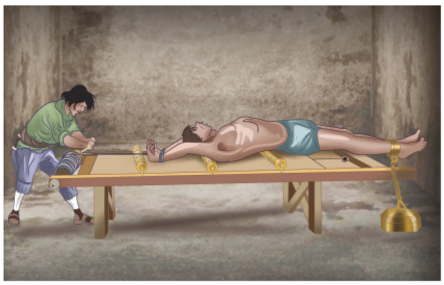
Answer:

- In the Jack Knife Position, the chest and thigh are brought close together, compressing the chest for an extended period.
- This compression leads to positional asphyxia, which causes death.

Q4.13: What does the torture method called "Belana" involve, and why is it named so?

Answer:

- It involves **crushing soft tissues** by beating the muscles of the legs and body.
- The victim's body is **moved over a rigid surface**, similar to how a rolling pin (belan in Hindi) works.
- The name "Belana" comes from the resemblance to rolling a pin over dough.



Belana

Q4.14: In which torture method is the victim beaten on the buttocks with a cane?

Answer: Canning



Caning

Q4.15: What is the torture method called "Passing on the Board," and how is it performed?

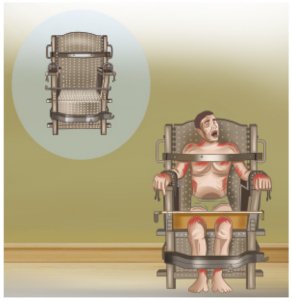
Answer: The victim is **laid down on a table**, and **boards are used to hit the body** repeatedly.



Passing on the board

Q4.16: What is the Iron or Confession Chair method of torture, and how is it applied?

Answer: The victim is **tied to a chair** and subjected to **burning or heated methods,** causing severe pain and injury.



Iron/Confession chair

Q4.17: What is the Saw Horse method of torture, and how does it affect the victim?

Answer: The victim is forced to sit or balance on a sharp object resembling a saw blade.



Sawhorse

Q4.18: What is the Chepuwa method of torture, and how is it performed?

Answer:

- The victim's **legs and hands are tightly tied using bamboo sticks.**
- **Pressure is applied** to cause severe pain.
- Mnemonic: **Chepna** (Hindi for "to press/tighten")



Chepuwa

Q4.19: What is the Wet Submarine method of torture, and how is it carried out?

Answer: The victim's face is forcibly kept submerged in a wet area, such as a water pot or bucket.



Wet Submarine

Q4.20: What are carotid restraints (sleeper holds), and how do they cause temporary unconsciousness?

Answer:

- Carotid restraints involve applying **pressure to the lateral sides of the neck**.
- This pressure **blocks the carotid arteries**, reducing blood flow to the brain.
- The resulting **cerebral hypoxia** causes **temporary unconsciousness**.

Q4.21: What is a chokehold, and how does it affect the victim?

Answer:

- Pressure is put on the frontside of the neck
- Pressure on the throat leads to choking

Q4.22: What is the “Ghotna” method of torture, and how is it performed?

Answer:

- A wooden pole is rolled up and down the front of the thighs of victim.
- One or more individuals stand on the pole, increasing pressure and causing severe pain.
- Mnemonic: **Dalghotni** (Hindi)

Q4.23: What is the La Bandera or Strappado method of torture, and what injuries can it cause?

Answer:

- The victim's wrists are bound behind the back, and the body is suspended by the wrists or back.
- This method can cause shoulder dislocation due to the unnatural suspension.
- Cause of death can be due to brachial plexus injury.

Q4.24: What is the Murcielago method of torture and how is the victim positioned?

Answer: The victim is suspended by the ankles, similar to the La Bandera method

Q4.25: What is the torture method called Dunking, and how is it used?

Answer:

- The victim is immersed repeatedly in water and taken out several times.
- This process is repeated multiple times to coerce a confession through extreme distress and fear of drowning.

2. NEW INDIAN LAWS

BIG QUESTION 1: What are the major changes in the Indian criminal justice system under the new laws (BNS, BNSS, BSA)?

Broad Answer:

- India has replaced the British-era laws IPC, CrPC, and IEA with three new legislations:
  - IPC → BNS (Bhartiya Nyaya Sanhita) - 358 sections
  - CrPC → BNSS (Bhartiya Nagarik Suraksha Sanhita) - 531 sections
  - IEA → BSA (Bhartiya Sakshya Adhiniyam)
- These new laws redefine crimes, procedures, and evidence with modern, citizen-centric reforms.

DETAILED QUESTIONS

Q1.1: What are the names of the new laws replacing IPC, CrPC, and IEA?

Answer:

- IPC → Bhartiya Nyaya Sanhita (BNS)
- CrPC → Bhartiya Nagarik Suraksha Sanhita (BNSS)
- IEA → Bhartiya Sakshya Act (BSA)

Q1.2: How many sections are there in the new laws?

Answer:

- BNS - 358 sections
- BNSS - 531 sections

BIG QUESTION 2: How does the Bhartiya Nyaya Sanhita (BNS) classify and handle key criminal topics such as responsibility, consent, sexual offences, and crimes against life?

Broad Answer: The BNS (2023) reclassifies criminal law into thematic sections for better clarity and enforcement. It outlines rules for:

PYQ: NEET PG 2019

Category	BNS
Various Definition	2 BNS
Criminal Responsibility (based on age, mental illness and intoxication)	20-24 BNS
Consent	25-30 BNS
Sexual offences	63-79 BNS
Offences related to marriage	80-87 BNS
Criminal Abortion	88-92 BNS
Offences against child	93-99 BNS
Offences affecting life (Murder, Suicide etc)	100-113 BNS
Hurt, grievous hurt etc.	114-125 BNS
Criminal force, assault etc.	128-136 BNS
False evidence	227-246 BNS

DETAILED QUESTIONS

Q2.1: What do subsections 6, 14, and 17 of 2 BNS define?

Answer:

- 2 BNS: Various definitions
  - Subsection 6 of 2 BNS: Death
  - Subsection 14 of 2 BNS: Injury
  - Subsection 17 of 2 BNS: Life

Q2.2: What are the rules of criminal responsibility based on age, mental illness and intoxication in BNS?

Answer:

Criterion	Criminal Responsibility	Bhartiya Nyaya Sanhita
<7 years	Not responsible	20 BNS
7-12 years	May/may not be responsible, depends on decision of court	21 BNS
Mentally ill	Not responsible (McNaughten rule)	22 BNS
Involuntary intoxication	Not responsible	23 BNS
Voluntary intoxication	Responsible	24 BNS

Q2.3: What are the important consent-related clauses in BNS?

Answer:

Bhartiya Nyaya Sanhita	Consent
25 BNS	Act not intended and not known to likely to cause death or grievous hurt, done by consent
26 BNS	Act not intended to cause death, done in good faith for the person's benefit by consent (e.g., surgeon doing risky surgery with consent)
27 BNS	Act in good faith for a person < 12 years of age or mentally ill by consent of the guardian
28 BNS	Consent under fear, misconception, < 12 years, mentally unsound, intoxication not valid
29 BNS	Consent for acts which are offenses is not valid (e.g., criminal abortion)
30 BNS	Act done in good faith for the benefit of a person "without consent" in an emergency.

Q2.4: How are sexual offences defined and punished in BNS?

Answer:

63 BNS	Definition of Rape • Minimum age of girl for consent for sex: 18 years
64 BNS	Punishment for rape (10 years to life)

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65 BNS	Punishment for rape in certain cases: • Less than 16 years of girl (20 years to life) • Less than 12 years of girl (20 years to death)
66 BNS	Causing death /vegetative state of the victim while committing rape (20 years-death)
67 BNS	Sex by husband during separation (2-7 years)
68 BNS	Sex by person in authority (5-10 years)
69 BNS	Sex by using deceitful means, e.g., falls promise of marriage (up to 10 years)
70 BNS	Gang rape • >18 years (20 years - life) • < 18 years (life imprisonment - death)
71 BNS	Repeat offender (life imprisonment - death)
72 BNS	Disclosure of identity of rape victim (up to 2 years)
73 BNS	Publishing any matter related to court proceedings (up to 2 years)
74 BNS	Sexual assault by criminal force (1-5 years)
75 BNS	Sexual harassment • Physical contact / request for sexual favors/ showing pornography (up to 3 years) • Sexually colored remarks (up to 1 year)
76 BNS	Removal of clothes of woman (3 - 7 years)
77 BNS	Voyeurism • 1st offense (1- 3 years) • 2nd offence (3 - 7 years)
78 BNS	Stalking • 1st offence (up to 3 years) • 2nd offence (up to 5 years)
79 BNS	Word, gesture, or act intended to insult the modesty of a woman (up to 3 years)

Q2.5: What are the offences related to marriage and their punishments?

Answer:

- **80 BNS** - Dowry death (death of women within 7 years of marriage)
- **85 BNS** - Women subjected to cruelty by husband or in-laws (Up to 3 years)

Q2.6: What are the provisions for criminal abortion under BNS?

Answer:

PYQ: NEET PG 2022

PYQ: INICET 2022

- **88 BNS:** Criminal abortion with mother's consent
- **89 BNS:** Abortion without mother's consent
- **90 BNS:** Death of mother due to abortion
- **91 BNS:** Act done with intent to prevent the child from being born alive or to cause to die after birth
- **92 BNS:** Causing the death of a quick unborn child by an act amounting to culpable homicide, e.g., hitting abdomen

BIG QUESTION 3: What are the major provisions in BNS regarding crimes against life, bodily harm, and assault?

Broad Answer: The BNS clearly defines crimes such as murder, attempt to murder, grievous hurt, and criminal force. Each crime is specifically categorized with distinct punishments to improve legal clarity.

DETAILED QUESTIONS

Q3.1: What are the major life-affecting offences in BNS?

Answer:

- 100 BNS: Definition of culpable homicide
- 101 BNS: Definition of murder
- 103 BNS: Punishment for murder
- 105 BNS: Punishment for culpable homicide not amounting to murder
- 106 BNS: Death due to negligence (Punishment up to 5 years; but for medical negligence up to 2 years)
- 107, 108 BNS: Abetment of suicide
- 109 BNS: Attempt to murder
- 110 BNS: Attempt to culpable homicide

Q3.2: What are the provisions for hurt and grievous hurt under BNS?

Answer:

- **114 BNS** - Definition of hurt
- **115 BNS** - Voluntarily causing hurt
- **116 BNS** - Definition of grievous hurt
- **117 BNS** - Voluntarily causing grievous hurt
- **118 BNS** - Hurt or grievous hurt using dangerous weapons
- **122 BNS** - Hurt or grievous hurt on provocation
- **123 BNS** - Hurt by poison
- **124 BNS** - Grievous hurt by acid (throwing or administrating, etc.)

Q3.3: What are the provisions for offenses against children as per BNS?

Answer:

- 93 BNS: Child<12 years abandoned by parents
- 94 BNS: Newborn death concealment

Q3.4: What are the provisions against criminal force and assaults as per BNS?

Answer:

- 129 BNS: Defines criminal force
- 130 BNS: Defines assault (attempt or threat to use criminal force)

Q3.5: What are the provisions against false evidence as per BNS?

Answer:

PYQ: NEET PG 2020

- 227 BNS: Perjury definition (giving false evidence)
- 228 BNS: Fabricating false evidence
- 229 BNS: Punishment for perjury (false evidence: up to 7 years)

- 234 BNS: Issuing false certificate
- 238 BNS: Disappearance of evidence of offence
- 296 BNS: Obscene acts (exhibitionism)

BIG QUESTION 4: What are the key procedural changes in the Bharatiya Nagarik Suraksha Sanhita (BNSS), especially regarding arrest, examination, summons, and inquests?

Broad Answer: The BNSS introduces important procedural changes for better administration of criminal justice. It provides clarity on crime categorization, allows medical examination of both accused and victims in sensitive crimes like rape, and formalizes inquest procedures by both police and magistrates.

DETAILED QUESTIONS

Q4.1: What is covered under 2 BNSS?

Answer:

- Provides various definitions of types of offence like:
  - Cognizable offence
  - Non-cognizable offence
  - Bailable/Non-bailable offence
  - Warrant case
  - Summon case

Q4.2: What is 33 BNSS related to?

Answer:

- Information about a crime has to be given to the police

Q4.3: What does BNSS say about medical examination of accused persons?

Answer:

- 51 BNSS: Medical exam of any arrested person (forceful examination allowed)
- 52 BNSS: Medical exam of person accused of rape (forceful examination allowed)

Q4.4: How does BNSS address victim rights in rape cases?

PYQ: FMGE 2019, 2022

Answer:

- 184 BNSS: Medical examination of the rape victim is mandatory and time-sensitive to preserve evidence

Q4.5: What are the BNSS provisions for court summons?

Answer:

- 63-71 BNSS

Q4.6: What are the types of inquests mentioned in BNSS?

Answer:

- 194 BNSS: Police inquest
- 196 BNSS: Magistrate inquest

3. JUVENILE JUSTICE ACT/POCSO ACT/HOTA

BIG QUESTION 1: What are the key features of the Juvenile Justice Act and Consumer Protection Act as applicable in medico-legal contexts?

PYQ: FMGE 2021

Broad Answer: The Juvenile Justice Act protects children under 18 years and lays down procedures for offences by or against children. The Consumer Protection Act 2019 safeguards consumer rights and allows compensation for medical negligence under defined monetary limits.

DETAILED QUESTIONS

Q1.1: What is the age limit for being considered a juvenile?

Answer: Below 18 years

Q1.2: How is the age of a juvenile decided?

Answer:

- Birth certificate
- Physical appearance
- Medical examination

Q1.3: Who are the members of the Juvenile Justice Board, and what are its functions?

Answer:

- 1st Class Judicial Magistrate & 2 social workers (1 should be female)
- Function: Punishment for cruelty against a child

Q1.4: What are the classifications of offences under the Juvenile Justice Act, and what are their corresponding penalties?

Answer:

- Normal: < 3 years
- Serious: 3-7 years
- Heinous: > 7 years
- Children (16-18 yrs) committing heinous crimes undergo psychiatric evaluation and may be tried as adults

Q1.5: When was the Consumer Protection Act 2019 implemented?

Answer:

- Originally implemented in 1986
- Amendment in 2019
- Came into action on 20th July 2020

Q1.6: What are the different levels of Consumer Redressal Commissions?

Answer:

- District forum: up to ₹1 crore
- State forum: ₹1-10 crore

- National forum: > ₹10 crore
- Appeals go to the Supreme Court

BIG QUESTION 2: Explain the provisions under the POCSO Act 2012 and define various forms of sexual offences involving children.

Broad Answer: The POCSO Act 2012 protects children <18 years from sexual abuse and exploitation. It mandates quick evidence collection and trial while defining and punishing various forms of assault. Last amendment in POSCO act was made in 2019.

DETAILED QUESTIONS

Q2.1: What is the timeline under POCSO for evidence and trial?

Answer:

- Evidence: within 30 days
- Trial: completed within 1 year

Q2.2: What constitutes sexual harassment under the Act?

Answer:

- Bullying or coercion of a sexual nature and the unwelcome or inappropriate promise of rewards in exchange for sexual favors
- It includes:
  - Sound, gesture and exhibiting objects
  - Child pornography or showing child pornography
  - Make a child exhibit a body part or show his body part

Q2.3: What is sexual assault as per POSCO act?

Answer:

- It is an act in which a person intentionally sexually touches another person without that person's consent
- Coerce or physically force a person to engage in a sexual act against their will
- No penetration
- Hormone administration

Q2.4: What is penetrative sexual assault as per POSCO act?

Answer:

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

Q2.5: What is aggravated penetrative sexual assault?

Answer:

- Assault done by: (Mnemonic: TRAITOR)
  - **T**wo or more people
  - **R**elatives
  - **A**ge < 12 years
  - **A**rmed forces
  - **I**nsane/Institute
  - **T**rusted individual of authority

  - Officer
  - Repeat offence
- Using a deadly weapon
- Causing grievous hurt
- Makes a child mentally ill or pregnant or transmits HIV
- 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 below 12 years

BIG QUESTION 3: What are the key provisions of the Human Organ Transplantation Act (HOTA), and how does it regulate authorization, transplantation procedures, living and deceased donation, prevention of organ trade, and penalties for violations?

Broad Answer: HOTA (1994) and THOTA (2014) regulates removal, storage and transplantation of organ/tissue donation, ensure ethical practice, and penalize violations. It prevents commercial dealing of organs. Any part of the human body (structured arrangement of tissue) if removed, cannot be replicated in the body

DETAILED QUESTIONS

Q3.1: What is covered under HOTA/THOTA?

Answer:

- Organ Removal
- Organ Storage
- Organ Transplantation
- Prevention of commercial dealings of organs/tissues

Q3.2: Who certifies brain stem death?

Answer:

- Brain Stem Death Declaration by Doctor:
  - Treating doctor
  - In-charge doctor
  - Neurologist or neurosurgeon
  - Intensivist, anesthetist or physician
  - Independent specialist authorised by the government

Q3.3: What are the types of donation?

Answer:

Living donation	• Near relatives - Parents, son, daughter, brother, sister, grandparents and grandchildren • Donations from non-relatives require prior approval from an authorised committee • Swap transplantation between 2 unmatched pairs
Cadaveric donation	**Authorized by:** • Donor's age > 18 years and a sound mind • Before death - Will be written before death in the presence of 2 witnesses • Consent is needed for legal possession of the body • If there is no will - consent is needed from person with legal possession of the body • Consent for transplantation from an unknown dead body for more than 48 hours is given by doctor in charge • Approval for the medicolegal case given by autopsy surgeon

Q3.4: What is the most commonly transplanted organ?

Answer: Most commonly transplanted organ: Kidney > Liver > Heart.

Q3.5: What is the most commonly transplanted tissue?

Answer:

- Most commonly transplanted tissue: Cornea > Bone > Tendon
- Other tissues: Cartilage, middle ear, veins, valves, skin, ligament

Q3.6: What are the punishments described under HOTA act?

Answer:

- Human organ or tissue transplant without authorization: 10 years and 20 lakhs
  - Applicable for doctor and medical staff
- For Doctors:
  - 1st offence - 3 years removal of registration
  - Subsequent offences - Penal erasure or professional death
- Commercial dealing: 2-7 years and a fine

BIG QUSTION 4: What is the Medical Certification of Cause of Death (MCCD), and how is its reporting process carried out?

Broad Answer: MCCD is filled by doctors to certify cause of death. It's legally submitted to the registrar via specific forms, and helps distinguish medical from unnatural deaths.

DETAILED QUESTIONS

Q4.1: What are the steps in issuing MCCD?

Answer:

- Diagnose death
- Declare death
- Conclude cause of death
- Certify cause of death

Q4.2: What are the three major types of Cause of Death (COD)?

Answer:

Cause of Death	Example
Underlying or primary COD or injury that initiated events	Diabetes mellitus
Antecedent or intermediate COD	Myocardial infarction Coronary artery thrombosis Atherosclerosis
Immediate COD • Final complication(disease or injury) • Most recent event that occurred before death	Septicemia Rupture of myocardium

Q4.3: Which form is used for MCCD?

PYQ: INICET 2021 PYQ: FMGE 2019,2021

Answer: Form 4A: Includes Parts I & II

- Part I:
  - Particulars.
  - Immediate COD.
  - Antecedent COD.
- Part II:
  - Contributory conditions.

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 from .....to ..... 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	©				

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

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

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

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Q4.4: What are contributory conditions recorded under Part II of Form 4A in the MCCD?

Answer:

- Factors that not related with the disease but contributed to death
- Example:
  - Smoking
  - COPD
  - Diabetes mellitus

BIG QUESTION 5: What are the key features of the Registration of Birth and Death (RBD) Act?

Broad Answer: Under the RBD Act (Sec 10(3)), doctors must issue MCCD without fee if they attended the last illness. For unknown cases, inquest and autopsy determine cause.

DETAILED QUESTIONS

Q5.1: Who gives MCCD under RBD Act?

Answer: The treating registered medical practitioner gives MCCD

Q5.2: What happens in unknown cause of death?

Answer:

- Police inquest
- Post-mortem
  - Autopsy doctor certifies COD

Q5.3: What are Form 4A and Form 2?

Answer:

- Form 4A: For known COD
- Form 2: For death report (used in all cases)

Q5.4: What if patient is dead on arrival?

Answer:

- Only Form 2 is given
- Post-mortem is required for COD

Q5.5: When is the death certificate issued?

Answer: Within 21 days by registrar/sub-registrar

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4. COURT OF LAW/ MECHANICAL INJURIES

BIG QUESTION 1: What are the different types of witnesses and evidence in court, and what are the associated legal terms?

Broad Answer:

In court proceedings, witnesses may be common or expert types, each with specific roles. Evidence can be direct, indirect, or hearsay. Various definitions, such as plaintiff, defendant, civil, and criminal cases, help classify the parties and nature of court proceedings.

DETAILED QUESTIONS

Q1.1: What are the types of witnesses in court, and how are they classified?

PYQ: FMGE 2023 PYQ: AIIMS 2018

Answer:

Type of Witness	Description
Common Witness	• It is a first-hand knowledge rule. • See the fact/crime
Expert Witness	• Volunteering of the statement in the court. • Examples of Expert witness o Doctor o Fingerprint expert o Chemical examiner o Firearm expert o Serologist

Q1.2: What is direct evidence according to IEA?

Answer:

- Direct evidence directly proves a fact.
- A person killed B; C saw it (Direct evidence)
- The best example of direct evidence is an Eyewitness

Q1.3: What is indirect evidence according to IEA, and what are its types?

PYQ: INICET 2022

Answer:

- The majority of evidence is indirect, such as hearsay evidence.
- **Collateral** evidence from which an inference may be drawn
- For example, A person has not seen the crime but saw a weapon in the hand of the accused
  - o **Corroborative evidence:** Seen weapon in the hand of a person
  - o **Circumstantial evidence:** Fingerprints of the accused at the crime scene
  - o **Hearsay Evidence:**
    → A person killed B, C has seen it, and he or she came out of the crime and said to D that A killed B.

→ This type of evidence is called hearsay evidence.

→ Hearsay evidence is not valid.

Q1.4: What are the legal definitions of plaintiff, defendant, civil, and criminal cases?

Answer:

Plaintiff (victim) • If someone files a case, then it is considered the plaintiff from the victim's side.	**Defendant** • If someone defends the case from the **accused side.**
Civil Case • A case between **two parties** • **Example:** o Divorce case o The case of property dispute	**Criminal Case** • Against the government. • Criminal case: **State vs A** • **Example** o Rape o Murder

Q1.5: What are cognizable and non-cognizable offenses, and how do they differ?

Answer:

Cognizable Offenses • It is an offense where the police can **arrest** a person **without a warrant** • **Example** o Murder, attempt to murder o Dowry death, Dacoity o Rape, Ragging, Robbery, grievous hurt o Rash and Negligent act, which leads to death. o Sexual offenses	**Non-Cognizable Offences** • **Warrant is necessary** to arrest a person • Example: Theft

Q1.6: What are bailable and non-bailable offenses?

Answer:

Bailable Offenses • Any offenses for which bail can be granted	**Non Bailable Offenses** • In this offense, **bail cannot be granted.**

Q1.7: What are compoundable and non-compoundable offenses?

Answer:

Compoundable Offenses • It can be settled by two parties **outside the court.** • **Example:** Adultery and property case	**Non-Compoundable Offences** • It **cannot be settled** by two parties **outside the court.**

Q1.8: What is the difference between summons cases and warrant cases?

Answer:

Summon Cases • In these cases, the punishment is **less than 2 years**	**Warrant cases** • Those cases where offense punishment is **more than 2 years.**

BIG QUESTION 2: What are the classifications of courts in India and their associated judicial roles and powers?

Broad Answer: Indian judiciary includes a range of courts from the Supreme Court to the magistrate level. These courts handle different types of offenses, like cognizable, bailable, and warrant cases. Powers of sentencing and roles in commutation are distributed among them.

DETAILED QUESTIONS

Q2.1: What are the different types of courts?

Answer:

Bigger courts include: Maximum punishment is an unlimited fine /death sentence.

- Supreme court
- High court
- Session court
- Additional session court

Q2.2: What is the punishment given by different courts?

Answer:

Additional courts	Maximum punishment	Penalty
Assistant session court	10 years	Unlimited
Chief judicial/ metropolitan magistrate (CJM/ MM)	7 years	Unlimited
1st class judicial magistrate	3 years	10,000
2nd class judicial magistrate	1 year	5,000

Q2.3: What are the key legal considerations involving juveniles and fast-track courts under the judicial magistrate system?

Answer:

- A juvenile is a child below 18 years of age.
- If a Juvenile committed a crime, a first-class Judicial magistrate.
  - JJB (Juvenile Justice Board)
- A fast-track court is equal to a session court

Q2.4: What are the rules for commutation of the death sentence?

Answer:

- If a pregnant woman is sentenced to death, then the high court may change it to life imprisonment or postpone the death sentence.
- Punishment given by the lower court, that punishment can be increased or decreased by the higher court, is known as commutation.

Q2.5: What is the power of amnesty?

Answer:

If a session court is given a death sentence, it should be confirmed by the high court.

↓

The high court may conform or change it (1 commutation power)

↓

If the high court confirms the death sentence, then purely an appellate court Supreme Court

↓

Now, this supreme court either confirms the death sentence or changes it (2nd power)

↓

Now it goes to the president, who has the power to forgive a death sentence.

↓

This power is known as the power of amnesty.

Q2.6: How is a judicial magistrate different from an executive magistrate?

Answer:

Judicial Magistrate	Executive Magistrate
These judicial magistrates make inquest in police-related death.	• Executive magistrates make inquest in o Dowry death o Exhumation o Mental asylum death • Appointed by the state government
	• It includes o District magistrate o Sub-divisional district magistrate o Additional district magistrate o Tahsildar

BIG QUESTION 3: What are the types of inquests conducted in India and their procedures?

Broad Answer: Inquests are conducted to find the cause of death. These include a police inquest and a magistrate's inquest. The process involves examination, panchnama, and application of CRPC rules.

DETAILED QUESTIONS

Q3.1: What is an inquest, and who conducts it?

Answer:

- It is any type of investigation or inquiry into the cause of death (COD)
- It is held by the investigating officer (IO)
- It would be part of CrPC

Q3.2: What are the types of inquest?

Answer:

Two types of inquests

- Police inquest
- Magistrate inquest

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Q3.3: What are the differences between a police inquest and a magistrate's inquest in India? PYQ: NEET PG 2019

Answer:

Police inquest	Magistrate inquest
Most common	CrPC for magistrate inquest is **176**
The investigating officer is **the police**	The investigating officer is magistrate
• The minimum qualification for police is: o Senior Head constable o Done in unnatural death	• The magistrate can be: o Judicial Magistrate o Executive Magistrate
The **IO**, who is a police ↓ **Investigate** the crime area and **examine the body** if it is present. ↓ Based on the evidence, they make a report known as the **panchanama (Inquest report)**	• Magistrate inquest is done in. o Mental **A**sylum o Police **B**eating o Police **C**ustodial Death o **D**owry Death o **E**xhumation o Police **F**iring

Q3.4: What are the inquests not done in India?

Answer:

- Coroner inquest
- Medical examiner system

Q3.5: What is a coroner's inquest?

Answer:

- It was present in Mumbai until 1999
- After that, it was demolished
- It was based on the jury system.

Q3.6: What is the medical examiner's system?

Answer:

- It is the best inquest system.
- It is present in the USA.

BIG QUESTION 4: What are the court procedures involving witnesses and exceptions to the evidence rule?

Broad Answer: Court proceedings include summons, oath-taking, and witness examination. Differences exist between prosecution and defence witnesses. Legal concepts like conduct money, dying declaration, and hostile witnesses are crucial in court procedures.

DETAILED QUESTIONS

Q4.1: What is a summons, and how should it be handled by a witness?

Answer:

- A summons is a document given to the witness.

- In this document, the time, date, and place are mentioned.
- After being given this form, if the witness fails to appear in court, they must pay a penalty
- Other Name: Subpoena (Sub: Under, Poena: Penalty)

Q4.2: What is the difference between a common and an expert witness in court procedure?

Answer:

- An expert witness attends the court with documents (post-mortem report, MLC)
- Common witnesses attend the court and testify.

Q4.3: What are the essential points to consider before attending a court summons?

Answer:

- First, see whether the court is civil or criminal.
  - Preference has to be given to the criminal case, like rape, murder
- If you got two summons and both are in criminal court, then,
  - Select the higher court rather than the lower court.
- If the court has the same level
  - Then attend to the summons which has been received first.

Q4.4: What is the procedure for an oath in court?

Answer:

- Refusal of the oath is punishable.
- Age limit: Below 12 years of age, an oath is not needed.
- If we believe the god, then we take the oath in the name of god.

"I do swear in the name of God"	A person who doesn't believe the god (Atheist)
• Whatever I shall speak, it will be truth. • It should be the **whole truth.** • Nothing but the truth	• **"I do solemnly affirm that."** o Whatever I shall speak, it will be the truth o It should be the **whole truth** o Nothing but the truth • False evidence is known as perjury, which is different from fabricating evidence

Q4.5: What are the types of witness examination?

Answer:

- **Chief examination:** Same-party lawyer
- **Cross-examination:** Opposite party lawyer
- **Re-examination:** Same party lawyer

Q4.6: What is the difference between prosecution and defense witnesses?

Answer: PYQ: NEET PG 2020, 2021

Examination of the witness	Prosecution witness	Defense witness
Chief examination	The same party is a public prosecutor	Defense lawyer
Cross-examination	Defense lawyer	Public prosecutor
Re-examination	Public prosecutor	Defense lawyer

Q4.7: What are leading questions, and in which part of the examination can they be asked?

Answer:

- A leading question is a question where the answer is Yes or No.
- For example: Was Ram wearing a white dress?
- Leading questions are asked only in **cross-examination.**

Q4.8: Define hostile witness.

Answer:

- A hostile witness is a witness who contradicts the statement.
- Not favoring your prosecution side
- Leading questions can be asked in the chief examination also.

Q4.9: What is conduct money, and who pays it?

Answer:

- It is a kind of Diet of Money.
- Money is paid for the witness to meet the expenses of attending the court.
- Conduct money is paid in case of civil cases by the party.
- Money can also be paid for criminal cases to expert witnesses only by the court.

Q4.10: What are the exceptions to oral testimony?

Answer:

- Documentary evidence is generally accepted following oral testimony; however, there are exceptions where only documentary evidence is valid
- The exceptions include.
  - Dying declaration (DD)
  - Expert opinion expressed in a treatise/textbook.
  - Evidence of a doctor recorded in a lower court.
  - Reports of certain government scientific experts, like chemical examiners, chief inspectors of explosives, and serologists, etc
  - Evidence given by a witness in a previous judicial proceedings
  - Public records
  - Hospital records

Q4.11: What are the differences between a dying declaration and a dying deposition?

Answer: PYQ: FMGE 2021 PYQ: NEET PG 2021 PYQ: INICET 2021,2022

Dying Declaration	Dying Deposition

• It is followed in **India**
• **Oral/written statement with 2 witness**
• The declaration can be given to
  o Magistrate
  o Doctor
  o Police
  o Any person
• Compos mentis: Sound mind
	• It is followed in the USA
	• It occurs in the presence of the Magistrate
	• Recommendations
	  o Oath
	  o Cross-examination is done (Best to protect the accused)
	  o Leading questions are asked
	• Superior

• Not Recommended o Oath o Cross-examination o Leading questions • **These are valid only when the person dies**	

BIG QUESTION 5: What are mechanical injuries, and how are abrasions classified and described?

Broad Answer: Mechanical injuries are illegal harms caused to the body, mind, reputation, or property. Among them, abrasion is the most common mechanical injury and has high medicolegal importance. Abrasions are classified based on the type of force involved and include scratch, graze, pressure, and impact abrasions.

DETAILED QUESTIONS

Q5.1: What is a mechanical injury?

Answer:

- Mechanical injury is any illegal harm to the body, mind, reputation, or property
- A wound is a breach of the natural continuity of either skin or mucous membrane.

Q5.2: What is an abrasion?

Answer:

- The most common mechanical injury
- High medico-legal importance
- Loss of epidermis (scraping of epithelium)

Q5.3: What are the features of an abrasion?

Answer:

- Abrasion is a simple injury.
- No active bleeding
- No scar

Q5.4: In which condition is an abrasion considered a grievous injury?

Answer:

- Corneal abrasion causes corneal opacity (visual restriction)
- It is a Grievous hurt

Q5.5: What are the types of abrasion based on force?

PYQ: AIIMS 2020

PYQ: INICET 2021

Answer:

Types of abrasion based on force

- Tangential force
  - o Scratch abrasion
  - o Grazed abrasion
- Perpendicular force
  - o Imprint abrasion
  - o Pressure abrasion

Q5.6: What is a scratch abrasion, and what are some examples?

PYQ: AIIMS 2018

Answer:



Scratch Abrasion

- Also known as Linear abrasion.
- It is by tangential force.
- Length is more than the width.
- Width is not significant.
- Examples
  - Fingernail abrasion
  - Thorn abrasion
  - Pin abrasion

Q5.7: What is grazed abrasion?

Answer:



- It is by sliding on rough surfaces (roads)
- Most common in road traffic accidents
- Grazed abrasion is also known as Brush-burn
- Examples
  - Grinding abrasion
  - Grave rash
  - Sliding abrasion

Q5.8: What is pressure or crushing abrasion?

Answer:



- Continuous force perpendicular to (90°) the epidermis.
- Examples
  - Ligature mark (hanging and strangulation)
  - Bite mark

Q5.9: What is imprint abrasion?

Answer:



- Also known as:
  - Impact abrasion
  - Contact abrasion.
  - Patterned abrasion.
- Form the pattern of an object or a weapon
- A perpendicular force but is caused by a rough object with an irregular surface.
- Examples
  - Tyre marks
  - Patterned Ligature mark.
    - → In most cases, ligature marks are pressure abrasions.

Q5.10: What is a scab, and what is its medicolegal importance?

Answer:

- Scab is a dry blood or lymph exudate after an abrasion.

- < 12hrs- no scab
- Color of the scab
  - Bright red scab: 12-24 hours (>12 hours)
  - Reddish brown scab: 2-3 days
  - Brown scab: 4-5 days
  - Black scab: 6-7 days
  - Scab falls: > 7 days
- Medicolegal importance: Tells about the time since injury based on the color of the scab.

Q5.11: What are the differences between Postmortem abrasion and Antemortem abrasion?

Answer:

Feature	Postmortem abrasion	Antemortem abrasion
Intra-vital reaction or congestion	Absent	Present
Site	Bony prominences	Any site
Color of abrasion	Yellowish white	Color changes
Scab	Less raised	Raised
Exudates	Less	High

BIG QUESTION 6: What is a contusion, what are its types, appearance, and key medicolegal features?

Broad Answer:

Contusion is a type of blunt mechanical injury characterized by the rupture of subcutaneous blood vessels without any breach in the skin. It is caused by blunt trauma and leads to discoloration of the skin due to blood extravasation. The injury is usually associated with swelling and tenderness. The appearance of a contusion can help estimate the age of the injury, making it important in medicolegal evaluations.

DETAILED QUESTIONS

PYQ: INICET 2022

Q6.1: What is a contusion, and how does it occur?

Answer:

- Also known as Bruise
- Force caused by blunt objects.
- Margins are irregular
- Hematoma is seen after dissection





Injury to the dermis

↓

Dermal blood vessels rupture, resulting in a blood clot

↓

Due to this extravasation, swelling or a raised area is seen

Q6.2: How does the site of injury influence the appearance and severity of a contusion?

Answer:

The appearance and the size of the contusion vary according to the site of injury:

- **Vascular and loose area**
  - Face, vulva, eyelid, and scrotum
  - Impact, force, trauma, smaller
  - The size of the contusion is bigger.
- **Bony prominences**
  - Impact, force, trauma, smaller
  - The size of the contusion is bigger.
- **Thick skin**
  - Palm and sole
  - The impact is bigger.
  - The size of the contusion is smaller.

Q6.3: How does the appearance of contusion vary based on the age of the individual?

Answer:

- In Children and old persons, the size is bigger.
- Reasons:
  - Delicate skin or subcutaneous tissue
  - Relaxed skin

Q6.4: What is the difference in contusion pattern in females when compared with males?

Answer:

- Females have more relaxed or delicate skin and subcutaneous tissue, hence the size of the contusion is bigger.

Q6.5: How does the complexion of the person influence the contusion?

Answer:

In whites

- Bruising is seen easily.
- Color changes easily.

Q6.6: How is the age of a bruise determined?

Answer:

It is based on the color of the contusion

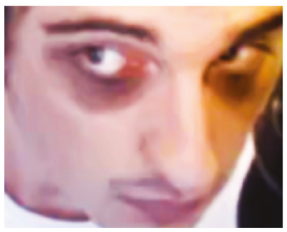
- Red, fresh color of contusion (1-2 hours)
- Violet + Indigo: Blue (Deoxyhemoglobin, few hours- 3 days)
- Brown (Hemosiderin, 4^{th} day)
- Green (Biliverdin, 5-6 days)
- Yellow (Bilirubin, 7-13 days)
- Original (Normal after 14 days)

Q6.7: What are the types of contusion?

Answer:

- Ectopic Bruise
- Patterned Bruise
- Artificial Bruise

Q6.8: What is an ectopic bruise? Give examples.


Raccoon sign

Answer:

- Also known as Migratory Bruise
- Trauma is at a different site, and the bruise is at a different site.
- Examples:
  1. In an Anterior cranial fossa fracture, the bruise is periorbital or periocular.
     → Causes: Raccoon sign, black eye, or spectacle hemorrhage.
  2. In a Middle cranial fossa fracture, the bruise is at the mastoid tip or posterior auricular area.
     → Causes Battle sign.


Battle sign

Q6.9: What is a patterned bruise?

Answer:

- Forms object pattern
- Lathi/rod/stick forms Tramline/Rail line bruise
- Pinching forms a Butterfly bruise.
- Throttling with finger-tip pulp forms a coin-shaped bruise (Six penny bruise)



Q6.10: What are the features of an artificial bruise?

Answer:

- Criminals may produce bruises artificially.
- Products used to produce the bruises:
  - Plumbago
  - Semecarpus Anacardium (Marking nut)
  - Madar/ Calotropis
- Site: Accessible parts
- Margin: Regular or well-defined.
- Shape: May be irregular
- Content: Acrid serum, redness, inflammation
- Blister with itching
- Chemical test positive for a chemical present in the object used.

BIG QUESTION 7: What is a laceration? Explain in detail its types, medicolegal importance.

Broad Answer:

Laceration is a type of mechanical injury caused by blunt force trauma, resulting in tearing of skin and underlying tissues. It includes types like split, stretch, avulsion, and cut lacerations. Identifying the type helps distinguish between accidental and homicidal injuries. Medico-legally, lacerations can suggest the nature, direction, and force of impact.

DETAILED QUESTIONS

Q7.1: What is laceration? What is its mechanism of injury?

Answer:

- Also known as Tear
- Trauma: Blunt trauma may be heavy

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Q7.2: What are the features of laceration?

PYQ: INICET 2019,2022

Answer:

- Damage: 3-dimensional injury
  - o Length
  - o Width
  - o Depth
- Margins: Irregular
- Floor: vessels, nerve, and hair bulb are crushed.
- Structures: Epidermis + subcutaneous tissue.
- Swallow tail, tearing at the end, diverging.
- Tissue bridges and tissue fragments connect each other from the margin.
- Bleeding is less comparatively due to crushed blood vessels.

Q7.3: What are the types of laceration?

PYQ: NEET PG 2021

Answer:

- Split laceration
- Avulsion
- Stretch laceration
- Cut laceration
- Tear

Q7.4: What are the features of split laceration?



Answer:

- Also known as an incised-looking laceration.
- Seen on the hard surfaces of the body.
  - o Skin is attached to the bone.
  - o Less subcutaneous tissue
  - o Examples: Scalp, Forehead, Eyebrow, Chin, Zygoma, Shin (Pretibial region), Iliac crest, Perineum, Posterior part of the elbow
- Margin: Clean cut, regular when observed with naked eyes.
- Magnifying lens: (differentiate from an incision)
  - o Crushed tissue and crushed hair bulb
  - o Bleeding is less.
  - o Tissue bridges

Q7.5: What is avulsion laceration?

Answer:



- Also known as Shearing laceration
- It is a kind of separation (when a lorry wheel runs over a limb, run-over injuries).
- Detachment of tissue: Acute angle
- 2 Categories are seen.
  - o Flaying
    - → A large area is detached.
    - → But one point is connected to the surface (skin or subcutaneous tissue)

- Degloving
  - → Skin or subcutaneous tissue comes from the limb.
  - → Like a glove

Q7.6: What is the mechanism and features of stretch laceration?

Answer:

- Force: Tangential force
- Due to overstretching of the skin or subcutaneous tissue, which is fixed.
- Forms a Flap (tearing)
- Commonly seen in compound fractures, a bony fragment comes out.
- A motor vehicle runs over.
- Kicking with the boot forms a flap (tearing)

Q7.7: What are the weapons used in cut laceration?

Answer:

- The cut is caused by a sharp weapon.
- Laceration is caused by blunt weapons.
- Weapon: Sharp-ended, heavy
  - Axe
  - Hatchet
  - Chopper

Q7.8: What are the features of cut laceration?

Answer:



- It is a cross between an incision and a laceration.
- Edges of weapon: Sharp, Heavy.
- Cuts the skin and tissue.
- **Margin:** Crushed (heavy weapon), bruised (contusion).
- Crushed tissue and hair bulb seen.
- The underlying bones are fractured.
- Gaping is more, known as a Chop wound.

Q7.9: What are the features of a chop wound with an axe, and its medicolegal importance?

Answer:

- Heel (lower) end strikes first: The Depth of the wound is greater.
- Toe end strikes first: The Depth of the wound is less.
- The direction and force of the weapon can be determined.
- Gaping is more.
- These are always homicidal in nature.

Q7.10: What is a tear laceration?

Answer:

- The most common type of laceration.
- By any irregular hard surface

- The door handle of the car
- It can be on the skin or viscous.

BIG QUESTION 8: What are the features and medicolegal importance of an incised wound?

Broad Answer:

An incised wound is a clean-cut injury caused by sharp-edged weapons like knives or blades. It is longer than it is deep and has clean, well-defined margins with little bruising. These wounds are often seen in homicidal, suicidal, or accidental contexts. The nature and location of the wound help in reconstructing the manner and direction of injury.

DETAILED QUESTIONS

Q8.1: What is an incised wound, and what causes it?

Answer:

- Also known as a Cut injury.
- Weapon: Sharp-edged, parallel to the skin surface.
  - o Knife
  - o Blade

Q8.2: What is the appearance of an incised wound?

Answer:

- Maximum dimension: Length > Breadth > Depth
- Margin: Clean cut, regular by the naked eye.
- A magnifying lens is used to see structures cut, not crushed.
  - o Vessels
  - o Nerves
  - o Hair bulb
- Hemorrhage/ bleeding is profuse

Q8.3: What is a laceration-looking incised wound?

Answer:

- Laceration-looking incised wounds in loose skin or tissue areas.
  - o Axilla
  - o Scrotum
- When a sharp object causes injury to these loose surfaces, it produces irregular margins
- Without a magnifying lens, it looks like a laceration.

Incised Wound (with Tailing)



Q8.4: What is tailing?

Answer:

- The wound is deep at the beginning and shallow (superficial) at the end
- Importance: Direction of the weapon
- Incised wound in genitalia: Homicide

Q8.5: How to estimate the age of the incised wound?

Answer:

Age of Incised Wound

- **Fresh:** Hematoma
- **12 hours:** Edges-red, swollen.
- **24 hours**
  - Endothelial cells cover edges and margins and form scabs.
  - The vascular bud begins.
- **36 hours:** Capillary network completed.
- **48-72 hours**
  - Fibroblasts are seen in the wounds.
  - The capillary bud comes inside.
- **3-5 days**
  - Fibrils are seen.
  - Collagen fibers are seen.
  - Vessels are thickened and obliterated.
- **1-2 weeks:** Formation of scar

Q8.6: What are self-inflicted suicidal wounds, and their common sites?

Answer:

- Also known as
  - Hesitational cut.
  - Trail cut.
  - Tentative cut
- Mainly incised wounds
- Found in accessible parts.
  - Forearm (wrist)
  - Neck
  - Abdomen

Q8.7: What are the features of self-inflicted wounds?

Answer:

- Suicidal in nature
- Multiple, uniform in size and depth.
- Parallel lines
- Mostly wounds: superficial
- Deep wounds cause death

Self Inflicted Incised Wound



PYQ: INICET 2022

BIG QUESTION 9: What are stab wounds? Describe their features, variations based on weapon type, special types, and medicolegal importance.

Broad Answer: Stab wounds are deeper than they are long and are caused by pointed weapons like knives. The shape and depth of the wound vary depending on the blade used. When aligned along Langer's lines, they gape less. Special types include harakiri (ritual suicide by self-stabbing in the abdomen, typically in Japanese culture) and concealed puncture wounds, which are small, deep injuries that may be overlooked during examination.

DETAILED QUESTIONS

Q9.1: What is the mechanism and weapon used in a stab wound?

Answer:

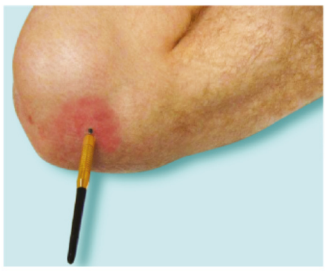
- Weapon: Sharp-edged, pointed.
  - Knife
  - Sword
- Perpendicular to the epidermal layer.
- Maximum dimension: Depth

Q9.2: What are the types of stab wounds?

Answer:

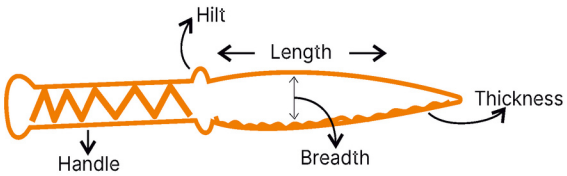
- **Puncture:** Stab on tissue or skin
- **Penetrating:** Thoracic or abdominal cavities
  - The most commonly injured organ: Liver
  - Only entry wound is seen.
  - No exit wound.
  - Withdrawal may cause taling, which is superficial damage on the side with lesser depth
- **Perforating:** Through and through
  - Entry and exit wounds are seen.
  - The entry wound is large with an inverted margin.
  - The exit wound is small with an everted margin.

Stab (Puncture Wound)



Q9.3: What are the parts of a knife?

Answer:



- Parts
  - Handle
  - Hilt
  - Blade (metallic part)
- **Depth** of injury is approximately equal to the length of the weapon.
- The length of the injury is slightly less than the breadth of the weapon.
  - This is due to **skin stretching.**
- The thickness of the weapon is equal to the breadth or width of the injury.

Q9.4: What are the various shapes of stab injury?

Answer:

Feature	Single-edged weapon	Double-edged weapon
Sharpness	One side sharp, one side blunt	Both sides sharp
Shape of injury	• Triangle/wedge • Teardrop • Fishtailing	• Spindle • Oval

Q9.5: What is fish-tailing of a wound?

Answer:

- In Fish-Tailing, the formation of the tail due to the splitting of the skin
- This splitting is by a blunt edge.

Q9.6: What are the injuries caused by the hilt of the knife?

Answer:

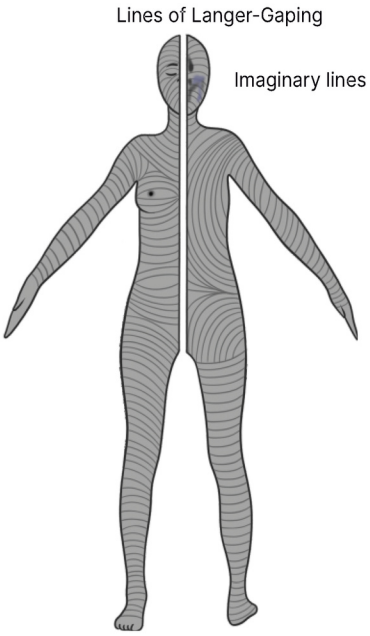
- If Hilt is present in the weapon and completely penetrates the body, it causes damage.
  - Hilt abrasion
  - Hilt contusion
  - Hilt laceration

Q9.7: What is the significance of the lines of Langer?

PYQ: INICET 2023

Answer:

- Imaginary lines
- Corresponding to collagen fibers of the body
- Gives an idea about the body of the gaping
- If a stab injury is parallel to these lines, then gaping would be less.
- If a stab injury is perpendicular to these lines, then gaping would be greater.
- Lines of Langer give shape and size to the injury.



Q9.8: What is Hara-kiri?

Answer:

- It is a stab injury
- Also known as Seppuku, common in Japan
- A sword or long-handled knife is used to commit suicide, typically striking the abdomen. This causes intra-abdominal pressure (IAP) to significantly decrease.
- Evisceration (viscera comes out)
- Leads to cardiac collapse.
- Syncope/hypotension is seen.

Q9.9: Where do concealed puncture wounds occur?

Answer:

Concealed parts of the body

- Nostrils
- Fontanelle
- Axilla
- Vagina
- Rectum/anal canal
- Inner canthus of the eye
- Nape of the neck (pithing)

BIG QUESTION 10: What are defense wounds, their types, and their medicolegal significance? Briefly mention fabricated wounds and overkilling.

Broad Answer: Defence wounds are sustained when the victim attempts to protect themselves during an attack. These are commonly found on the hands, forearms, and sometimes legs, depending on the posture of defence. Their presence indicates that the victim was conscious and attempted to resist, thus suggesting a homicidal manner of injury. They may be classified as active or passive depending on the type and location.

DETAILED QUESTIONS

Q10.1: What are defense wounds?

Answer: Defence wounds are sustained when the victim attempts to protect themselves during an attack.

Q10.2: What are the types of defense wounds?

Answer:

- Active
- Passive

Q10.3: What are the common sites of active defense wounds?

Answer:

- The most common site is the surface.
- Palmar - Grasp
- 1st web space

Q10.4: What are the common sites of Passive defense wounds?

Answer:

- Medial or ulnar aspect of the forearm
- Extensor aspect of the forearm or wrist

Q10.5: What is the medicolegal importance of a defense wound?

Answer: Medicolegal importance: Homicide

Q10.6: What are fabricated wounds?

Answer:

- Self-inflicted: Self-harm to the body.
- Self-suffering: Taking the help of others to hit your body.

Q10.7: What is overkilling?

Answer:

- Massive, Multiple injuries on the body
- Due to anger, rage
- The injury inflicted is far greater than what is necessary to cause death
- Example: Stabbing 15 times, in which stabbing less than 15 times is enough to cause death.

BIG QUESTION 11: What is Battered Baby Syndrome? Briefly explain its features and medicolegal importance.

Broad Answer: Battered Baby Syndrome is a form of child abuse, commonly seen in infants and toddlers, involving repeated non-accidental injuries inflicted by caregivers. It typically includes multiple injuries at various stages of healing, especially over soft tissue areas, and is often associated with shaken baby syndrome. Radiological findings such as metaphyseal fractures, posterior rib fractures, and skull injuries help support the diagnosis. Early recognition is vital for protection and legal intervention.

DETAILED QUESTIONS

Q11.1: What are the other names of battered baby syndrome?

Answer:

- Also called Caffey Syndrome, Caffey-Kempe Syndrome
- Maltreatment syndrome

Q11.2: What is the triad in battered baby syndrome?

Answer:

- **Mnemonic: DDD**
  - **D**iscrepancy in injuries in the body and the history given by parents.
  - **D**elay in the production of injuries and seeking medical attention.
  - **D**ifferent stages of healing injuries.
    - → Some injuries are 1 day old.
    - → Some 1 week
    - → Some 1 month

Q11.3: What are the most common injuries seen in battered baby syndrome?

Answer:

- Most common method of injury: Direct manual violence - Direct hitting
- Most characteristic lesion: A Tear inside the upper lip near the frenulum.
- Others
  - Eye injuries - Retinal hemorrhage or detachment.
  - Patterned bruises.
    - → Pinch marks- Butterfly bruises
    - → Fingertip pressure- Coin-shaped bruises or six-penny bruises.
  - Burns or scalds:
    - → Hands, legs, or feet in hot water.
    - → Glove and stocking pattern of injuries.

Q11.4: What is infantile whiplash syndrome?

Answer:

- **Shaking baby syndrome**
- Frequent shaking of the baby
- Causes **Subdural hematoma** due to rupture of bridging veins
- Retinal detachment

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- Periocular bleeding: **Dot and blot hemorrhages**
- Encephalopathy
- Skull fracture- linear fracture or fissure fracture: **Eggshell fracture**
- Multiple rib fractures
  - X-ray- Formation of a callus: **String of bead appearance.**
- Metaphyseal fracture
  - **Long bones**
  - **Corner fracture or bucket handle fracture**
- Traumatic alopecia: Subgaleal hematoma

Q11.5: What is the most common cause of death in battered baby syndrome?

Answer:

- The most common cause of death: Head injury
- Followed by blunt trauma to the abdominal organs.

Q11.6: What is the investigation done for battered baby syndrome?

Answer: A single X-ray of the whole body: Babygram

5. SEXUAL OFFENCES

BIG QUESTION 1: What are the types and classifications of sexual offences?

Broad Answer: Sexual offences can be broadly classified into four categories: natural, unnatural, sexual perversions (paraphilia), and sex-linked offences. Each type includes specific acts, legal implications, and social considerations.

DETAILED QUESTIONS

Q1.1: What are the 4 types of sexual offences?

Answer:

1. Natural (peno-vaginal route)
2. Unnatural (non-peno-vaginal route)
3. Sexual perversions (paraphilia)
4. Sex-linked offences (voyeurism, stalking)

Q1.2: Which offences are classified under natural sexual offences?

Answer:

- Mnemonic: **RIA**
- **R**ape: Forceful sexual intercourse
- **I**ncest
- **A**dultery

Q1.3: What is the legal and psychological understanding of incest in India?

Answer:

- Incest is an **asexual relationship between blood relatives**
- **Not a crime in India**; no specific IPC section addresses incest
- Associated with three psychological complexes:
  - **Electra complex:** Daughter and father (DEF)
  - **Oedipus complex:** Son and mother (O+O)
  - **Pharaon complex:** Brother and sister

Q1.4: What are the legal aspects of adultery in India?

Answer:

- Defined as **extramarital affairs**
- **Decriminalized** in India (no longer a criminal offense)
- Can be pursued as a **civil case**
- Considered a **strong ground for divorce**
  - Strong ground for divorce

Q1.5: What unnatural sexual offences are punishable under IPC-377?

Answer:

- Anal/ Greek love/ Sodomy/ Buggery
- Oral/ Mouth/ Coitus per os/ Sin of Gomorrah
- Animal sex/ Bestiality
- Lesbianism/ Sapphism/ Tribadism

Q1.6: What are the key features of anal/Greek love/ sodomy/ buggery in terms of participants and terminology?

Answer:

- It can occur between **male-male** and **male-female** partners
- **Active agent (adult):** Called **Pederast**
- **Passive agent:**
  - If a **child**, called a **Catamite** (in pederasty) PYQ: FMGE 2020
  - If an **older person**, associated with **Gerontophilia**

Q1.7: What are the key features of oral sex/ mouth/ coitus per os / Sin of Gomorrah, especially about children?

Answer:

- Often involves children (in abusive contexts)
- Fellatio: Oral stimulation of male genitalia
- Cunnilingus: Oral stimulation of female genitalia

Q1.8: What are the characteristics of animal sex/ bestiality?

Answer:

- Lower animals are involved
- Usually, human sperm is found inside animals

Q1.9: What are the key terms and roles in lesbianism (Sapphism/Tribadism)?

Answer:

- Mnemonic: **BDF**
  - **Active agent: B**utch / **D**yke
  - **Passive agent: F**emme

Q1.10: What is the punishment under IPC 377?

Answer:

- Minimum: 10 years
- Consent is necessary to avoid punishment
- If minor (<18 yrs) involved: Punishment is inevitable

Q1.11: What is the legal status of sodomy and bestiality under IPC 377 in India?

Answer:

- **Sodomy/unnatural sex between consenting adults (18+)** → Not punishable under IPC 377 (after decriminalization)
- **Bestiality** → Always punishable under IPC 377

Q1.12: What are signs in habitual passive agents in sodomy?

Answer:

- No pain/tenderness
- Shaved perianal hair
- Funnel-shaped depression of anus (loss of fat)
- Thickened and keratinized perianal skin
- Loss of mucosal rugosity
- Prolapse of rectal mucosa
- **Lateral buttock traction test**: Paradoxical dilatation during bimanual traction

BIG QUESTION 2: What are the legal definitions, punishments, and medical procedures related to rape?

Broad Answer: Rape, defined under IPC 375 and punishable under IPC 376, includes both natural and unnatural penetrative acts committed under specific non-consensual circumstances. Medical and legal protocols are governed by CrPC sections 164A, 53, 54, and the SAFE kit guidelines.

DETAILED QUESTIONS

Q2.1: What is the legal definition of rape under IPC 375?

Answer: Under IPC 375, A man is said to have committed rape if he penetrates his penis or penis-like object/ body part in:

- Vagina
- Oral cavity
- Anal canal
- Urethra

Q2.2: Under what conditions is it considered rape (IPC 375)?

Answer:

- Against her will
- Without her consent
- Consent obtained by fear of death/hurt
- Impersonation/fraud (e.g., impersonating husband)
- Intoxication or insanity
- Victim under 18 (statutory rape)
- Unable to communicate consent

Q2.3: What are the key legal notes and clarifications about rape?

Answer:

- The slightest penetration of the penis within the vulva (labia majora) or other, with or without emission of semen or rupture of hymen constitutes rape
- Under the law, rape can only be committed by a man, and a woman cannot rape a man (except in France where even a female can be charged with rape)
- Women can be charged in gang rape
- In India, there is no age limit under which a boy is considered physically incapable of committing rape
- Minimum age for consent: 18 years

- Medical proof of intercourse ≠ legal proof of rape
- Medical intervention ≠ rape (if consensual)

Q2.4: What is the punishment prescribed under IPC 376, subsection 1, for rape in India?

Answer:

- Rigorous imprisonment for not less than 10 years
- Imprisonment may extend up to life imprisonment
- The offender is also liable to pay a fine

Q2.5: What are the provisions and punishments under IPC 376, subsection 2, for serious forms of rape?

Answer:

- Applies to serious forms of rape as described below
- Punishment: Rigorous imprisonment for **not less than 10 years**, which may extend to **life imprisonment**.
- **Serious forms include rape committed by:**
  - Police officers (in police custody)
  - Members of the armed forces
  - Management or staff of the jail
  - Management or staff of hospitals
  - Relatives
  - Guardians
  - Teachers
  - During communal violence
- **Rape on:**
  - Pregnant women
  - Insane persons with physical or mental disabilities
  - People incapable of giving consent
  - Children under 18 years
- **Also includes:**
  - Repeated rape
  - Causing grievous bodily harm or endangering life

Q2.6: What is the punishment under IPC 376, subsection 3, for rape of a girl below 16 years?

Answer:

- Minimum imprisonment of 20 years
- Punishment may extend to natural life imprisonment

Q2.7: What is the burden of proof and presumption regarding consent in rape cases under Indian law?

Answer:

- The burden of proof lies always on the male accused.
- **Presumption of absence of consent:** If the victim says she did not consent, the court presumes a lack of consent unless proven otherwise

Q2.8: What is 164A CrPC and how is a rape victim medically examined?

Answer:

- Police officer can request examination within 24 hours

- Consent of the woman is mandatory
- Must be examined by/under supervision of female RMP
- Steps:
  - Ask victim to remove clothes. Examine and collect any evidence
  - Collect foreign hairs, seminal stains, and any other stains or trace evidence
  - Search for physical injuries, and a toluidine-blue contrast test is applied to the anogenital area to detect microscopic injuries
  - Take 4 swabs:
    → Smear
    → Sperm
    → DNA profiling
    → Chemical test
  - Examine in lithotomy position in good light
  - Speculum for vaginal examination; colposcope for cervical examination
  - Glaister-keene rods or hymenoscopes are used for the examination of hymen. Tearing usually occurs posteriorly at the sides, between 5 and 7 O'clock position
  - Treat STDs, injury, or pregnancy
  - Offer psychological support
  - If refused, document informed refusal

Q2.9: What is S 53(1) CrPC and how is the accused examined?

Answer:

- Request for examination must be made by an SI or above
- 54 CrPC: Accused can request examination
- General examination includes:
  - Behavior, clothes, female hair
- Genital examination:
  - Semen, sperm
  - Smegma at corona gland is and under foreskin:
    → Present only for 24 hours
    → Easily rubbed off, may show negative results
  - Papanicolaou's stain and Lugol's iodine:
    → Lugol's iodine test is positive for up to 4 days
  - Examine penis and glans for vaginal cells

Q2.10: What is the SAFE Kit and what does it include?

Answer: **SAFE** = Sexual Assault Forensic Evidence Kit used for both victim and accused. Includes:

- Bags and sheets for evidence
- Swabs for fluid collection from:
  - Lips, cheeks, thighs, vagina, anus, buttocks
- Clear glass slides
- Self-sealing envelopes for preserving the victim's:
  - Clothes, head hair, pubic hair, blood samples
- Nail pick (for scraping under nails)

- White sheet to catch debris stripped off body
- Documentation forms and labels
- Sterile water and saline

BIG QUESTION 3: What are sexual perversions (paraphilias), and how are they classified and punished?

Broad Answer: Sexual perversions, also known as paraphilias, are abnormal acts performed for sexual gratification that usually do not involve intercourse. Some are punishable under various IPC sections depending on the nature of the act and its public visibility or harm.

DETAILED QUESTIONS

Q3.1: What are the general features of sexual perversions?

Answer:

- Also known as Paraphilias
- Abnormal acts for sexual gratification
- Usually no actual sexual intercourse involved

Q3.2: What are the types of sexual perversions and their descriptions?

Answer:

- **Sadism (Algolagnia):** Deriving satisfaction from giving pain
- **Masochism:** Deriving satisfaction from receiving pain
- **Bondage:** Combination of sadism and masochism
- **Lust murder:** Sexual satisfaction derived from committing murder
- **Urolagnia/Undinism/Urophilia:** Sexual arousal from urine
- **Uranism:** Gratification by fingering, fondling, licking, or sucking genitalia of the opposite sex
- **Coprophilia:** Arousal by feces
- **Sexual oralism:**
  - Fellatio: Oral stimulation of male genitalia
  - Cunnilingus: Oral stimulation of female genitalia

Q3.3: What are exhibitionism-related perversions and their punishment?

Answer:

- **Exhibitionism:** Exposing private parts
  - IPC 294: Punishable for 3 months
  - Subtypes:
    - → **Streaking:** Running naked in public
    - → **Mooning:** Showing bare buttocks (Mnemonic: Moon is just like buttocks)
    - → **Flashing:** Brief exposure by pulling clothes aside (Mnemonic: Just like a flashlight)

Q3.4: What are necrophilic and clothing-related paraphilias?

Answer:

- **Necrophilia:** Sex with a dead body
- **Necrophagia:** Eating dead body parts
  - IPC 297: Punishable up to 1 year
  - Any kind of disrespect to a dead body comes under 297 IPC

- **Transvestism (Eonism):** Cross-dressing, usually males
- **Fetichism:** Arousal by inanimate objects (e.g., bra, underpants)

Q3.5: What are voyeurism and related behaviors?

Answer:

- **Voyeurism/Scoptophilia/Peeping Tom:**
  - IPC 354C (C for seeing a girl)
  - Watching girls bathe or change clothes
- **Mixoscopia:** Arousal by watching others have sex
- **Frotteurism:**
  - IPC 290: 3-month punishment
  - Rubbing against female buttocks or thigh in public
  - Mnemonic: 2 ne O (female) ko rub kardiya

Q3.6: What are additional paraphilias and their descriptions?

Answer:

- **Masturbation (Onanism/Ipsation):** Self-stimulation of genitalia. Punishable under IPC 290, if done in public
- **Coprolalia:** Obscene language
- **Scatalogia:** Obscene phone calls
- **Partialism:** Sexual interest in non-genital body parts
- **Klismaphilia:** Sexual gratification via enemas
- **Ecouterism:** Arousal by hearing sexual sounds
- **Nymphomania:** Excessive sexual desire in females
- **Satyriasis:** Excessive sexual desire in males
- **Dippoldism:** Teacher punishing student for sexual pleasure (Dippold, a German schoolmaster)
- **Gerontophilia:** Sex with old individuals
- **Pedophilia:** Sex with children
- **Narratophilia:** Arousal by reading erotic material
- **Somnophilia:** Arousal by an unconscious or sleeping person
- **Pyromania:** Arousal by setting fires
- **Playing the bagpipes:** Intercourse under armpits
- **Troilism:** Sex involving three individuals

BIG QUESTION 4: What are the forensic methods used to investigate sexual offences?

Broad Answer: Forensic methods in sexual offence cases help confirm and identify the biological evidence such as blood, semen, and hair. Various tests help in detecting, analyzing, and linking evidence to the suspect or victim.

DETAILED QUESTIONS

Q4.1: What are the screening tests for blood stains?

PYQ: FMGE 2021
PYQ: NEET PG 2021

Answer:

Screening Tests (based on peroxidase enzyme activity):

- Luminol spray + UV light → luminescence (for invisible/old stains)

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- Benzidine test: Blue (most sensitive)
- Phenolphthalein/Kastle-Mayer test: Pink
- Orthotolidine test: Blue-green
- Leu malachite test: Peacock blue

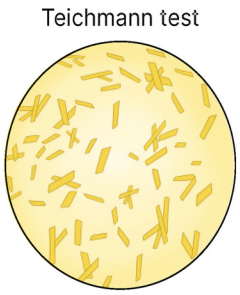
Q4.2: What are the confirmatory tests done to identify blood stains

PYQ: NEET PG 2022

Answer:

Confirmatory Tests:

- **Teichmann Test: Mnemonic:** Men are brown, Teichmann has 'man', thus 'brown rhombic dark crystals
  - Brown rhombic crystals
  - Reagents: NaCl + Glacial acetic acid (GAA)
- **Takayama Test: Mnemonic:** Takatak is pink color
  - Pink feathery crystals
  - Reagents: Glucose + Pyridine + NaOH (Mnemonic: GPS)
- **Spectroscopy:** Most specific (gives absorption bands)
- **Microscopy**
- **Precipitin Test:** Used for species identification





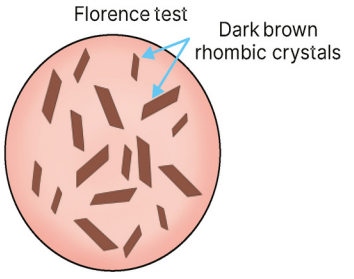
Q4.3: What are the tests and indicators used in semen analysis?

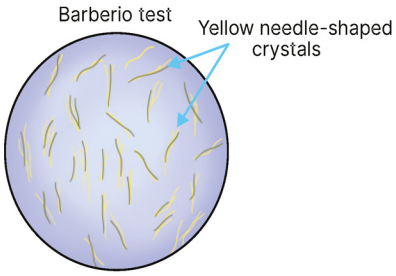
Answer:

- Found in rape/unnatural sex cases
- Composition: 10% sperm, 90% seminal fluid

Key Tests:

- **Florence Test:**
  - Detects choline crystals (dark brown rhombic)
  - Reagent: Potassium iodide
- **Barberio's Test: Mnemonic:** Barbar picks your hair with a needle
  - Detects spermine crystals (yellow needle-shaped)
  - Reagent: Picric acid
- **Fluorescence Test:** Seminal stain + UV → bluish-white color
- **Acid phosphatase test:** Positive even in aspermia
- **CPK (Creatine phosphokinase):** Detects old stains (up to 6 months)
- **Ammonium molybdate:** Detects phosphorus content in semen
- **Ag tests:**
  - Glycoprotein P30 test : Prostate-specific antigen (PSA)
  - MHS-5: Seminal vesicle-specific antigen
- **LDH isoenzyme:** Detects sperm (most specific)
- **Absolute proof:** One unbroken sperm





Q4.4: How is saliva identified in forensic analysis?

Answer:

- **Phadebas test:** Detects L-amylase (used in oral sex cases)

Q4.5: How is hair analysis performed to differentiate human and animal hair?

Answer:

Feature	Animal Hair	Human Hair
Medulla	Thick and larger	Narrow
Cortex	Thin	Thick
Medullary pattern	Continuous	Fragmented/discontinuous
Medullary index (MI)	> 0.5	≤ 0.33
Pigment	Center	Toward periphery

BIG QUESTION 5: What are key forensic identifiers and principles used in sexual offence investigations?

Broad Answer: Beyond biological fluid analysis, forensic science uses techniques like DNA fingerprinting, Locard's principle, and poroscopy to establish identity and contact between victim and offender. These methods strengthen legal evidence in court.



DETAILED QUESTIONS

Q5.1: Who is the father of DNA fingerprinting?

Answer: **Alec Jeffreys**

Q5.2: What is Locard's Principle, and how is it applied in forensics?

Answer:

- **Locard's Exchange Principle:**
  - Whenever two objects come into contact, there is always an exchange of material between them.
  - Used to link suspects to crime scenes through trace evidence.

Q5.3: What is poroscopy?

Answer:

- Study of sweat pores found on the friction ridges of fingers
- Used in detailed fingerprint analysis

Q5.4: What is the best test for blood grouping in forensic cases?

Answer: Acid elution test

6. MEDICAL JURISPRUDENCE

BIG QUESTION 1: What are the foundational legal responsibilities and ethical principles guiding medical practice in India?

Broad Answer: Medical jurisprudence is the application of law to medical practice. It outlines the responsibilities, conduct, discipline, and legal protections governing the medical profession, as well as patient-doctor relationships.

DETAILED QUESTIONS

Q1.1: What does medical jurisprudence deal with?

Answer:

- It deals with the legal responsibility of doctors.
- It is the application of law during the practice of medicine.

Q1.2: What is the Indian Medical Council Act of 1956?

Answer:

- It has now been replaced by the **National Medical Commission (NMC).**
- **First schedule**: Recognized medical qualifications granted in India.
- **Second schedule**: Recognized medical qualifications granted outside India (Foreign Medical Graduate - FMG).

Q1.3: What is medical etiquette?

Answer:

- Conventional laws of courtesy observed among medical professionals.
- It is about mutual courtesy between members of the profession.

Q1.4: What is medical ethics?

Answer:

- A set of moral principles guiding medical professionals.
- Applies to relationships:
  - Doctor-Doctor
  - Doctor-Patient
  - Doctor-State/Society

Q1.5: What is serious professional misconduct or infamous conduct?

PYQ: FMGE 2020 PYQ: AIIMS 2018

Answer:

- Also called **disgraceful or dishonorable conduct.**
- Can result in **warning notices.**

Mnemonic: 6A, B, C, D, E, F, G

- **A**lcoholism
- **A**ddiction
- **A**dvertisement (wrong/unethical)

- Association with unqualified persons
- Adultery
- Abortion (criminal)
- Bribe
- Covering: Assisting unqualified persons
- Dichotomy: Fee splitting/commission
- Euthanasia
- False certificates
- Gift-taking

Q1.6: What are the types of disciplinary control by the State Medical Council?

Answer:

- Warning: Don't repeat
- **Temporary suspension**
- **Penal erasure** (aka professional death sentence)
  - Doctor's name removed from medical register
  - Appeal to the Central Health Ministry

BIG QUESTION 2: What are the laws and procedures surrounding euthanasia in India?

Broad Answer: Euthanasia, or mercy killing, is legally and ethically debated under Indian law. Passive euthanasia is legal in India under defined conditions and must follow due process. Living wills allow individuals to pre-authorize decisions about their end-of-life care.

DETAILED QUESTIONS

Q2.1: What is euthanasia?

Answer:

- It is also called **mercy killing** or **painless death**
- Performed in **terminal and incurable diseases**

Q2.2: Which was the first country to legalize euthanasia?

Answer:

- Netherlands

Q2.3: What article of the Indian Constitution is involved?

Answer:

- Article 21: Right to life
- Euthanasia may appear to breach this right

Q2.4: What are the types of euthanasia?

Answer:

- **Active**: Giving lethal drugs (e.g., phenobarbitone, thiopentone, insulin, KCl)
- **Passive**: Legal in India (e.g., withdrawal of life support like ventilation or ICU)

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Q2.5: What are the types of euthanasia based on patient's will?

Answer:

1. **Voluntary**: With patient's will
2. **Non-voluntary**: Without ability to express will (e.g., coma)
3. **Involuntary**: Without patient's will

Q2.6: What is a living will?

Answer:

- A written document authorizing end-of-life decisions in advance
- Must be:
  - Written by a person >18 years of age
  - In sound mind
  - Signed by 2 witnesses
  - Notarized by a **first-class judicial magistrate**
  - In case of multiple wills, the **last will is valid**
  - Nominal representative can be a doctor or relative

BIG QUESTION 3: What is professional secrecy and privileged communication in medicine?

Broad Answer: Professional secrecy is the obligation of a doctor to keep patient information confidential. Privileged communication is an exception to this rule, where a doctor may disclose information under specific legal, ethical, or safety-related circumstances.

DETAILED QUESTIONS

Q3.1: What is professional secrecy?

Answer:

- Doctors are obliged to keep the patient's information confidential.
- If disclosed without consent, it is **punishable**.

Q3.2: What is privileged communication?

Answer:

- It is an **exception** to professional secrecy.
- A doctor may disclose information to concerned authorities.
- **Mnemonic: CIVIC SIN**
  - **C**rime suspected (CrPC 39)
  - **I**nfectious disease: To relatives/family
  - **V**enereal disease (e.g., HIV): Inform spouse/partner
  - **I**nterest of self: e.g., name in newspaper → consent required
  - **C**ourt of law: Must disclose when required
  - **S**ervant-employer (e.g., epilepsy in pilot → inform airline)
  - **I**nterest of patient: psychotic/suicidal → inform guardian
  - **N**egligence/notifiable disease: e.g., polio → inform health department

BIG QUESTION 4: What are the legal standards and types of consent in medical practice?

Broad Answer: Consent is a legal requirement and ethical foundation of medical practice. It ensures the patient's autonomy and must be obtained before any examination or treatment, except in a few exceptions.

DETAILED QUESTIONS

Q4.1: What is consent in medicine?

Answer:

- A legal agreement between doctor and patient
- Required under the Indian Contract Act (Section 13)
- Lack of consent may be considered **assault**

Q4.2: When is consent required and not required?

Answer:

- **Required for:**
  - Medical examination
  - Procedures like blood transfusion
  - Examination of victims
- **Not required for:**
  - Accused or prisoner examination
  - Mass immunization
  - Medicolegal autopsy
- **Special cases:**
  - **Contraception/sterilization/AI:** Consent from both partners
  - **Arrested person:** Can request medical examination

Q4.3: What are the types of consent?

PYQ: NEET PG 2022

Answer:

1. **Express consent:** Verbal or written
2. **Implied consent:** By gesture or conduct (e.g., BP check)
3. **Informed consent:** Written preferred, after full explanation
4. **Blanket consent:**
   - Single consent covering multiple procedures
   - Not valid in India
5. **Substituted consent:**
   - Given by relative or guardian when patient is incapable

Q4.4: What is full disclosure vs therapeutic privilege?

Answer:

- **Full disclosure:** Informing the patient about diagnosis, treatment, complications
- **Therapeutic privilege:** Exception to full disclosure (e.g., suicidal or psychotic patient → inform relative instead)

Q4.5: What is informed refusal?

Answer:

- The patient has the right to refuse treatment after being informed

Q4.6: What are exceptions to informed consent?

Answer:

- Emergency situations/life-threatening conditions
- Therapeutic privilege
- When patient waives right
- Mass immunization
- Medicolegal autopsy
- Convicted prisoner/accused
- **Doctrine of extended consent:** For unanticipated situations

Q4.7: What is the minimum age for consent?

Answer:

- **≥12 years:** For physical examination
- **≥18 years:** For surgery

BIG QUESTION 5: What are the legal definitions, examples, and defenses related to medical negligence?

Broad Answer: Medical negligence occurs when a doctor fails to provide the standard of care that a reasonable practitioner would under similar circumstances, causing harm to the patient. It involves civil, criminal, and tort law implications and includes various legal doctrines and defenses.

DETAILED QUESTIONS

Q5.1: What is negligence in medical practice?

PYQ: NEET PG 2019,2022

Answer:

- Failure to exercise reasonable care and skill
- Includes acts of omission or commission
- Can be civil, criminal, or a tort

Q5.2: What are the four essential components of negligence?

Answer:

1. Duty to care
2. Dereliction (breach of duty)
3. Direct causation
4. Damage to the patient

Q5.3: What are the differences between civil and criminal medical negligence?

Answer:

Criteria	Civil Negligence	Criminal Negligence
Purpose	Compensation to victim	Punishment of the guilty
Legal proceeding type	Tort or contract law	IPC sections (e.g., 304A)
Standard of proof	Preponderance of probability	Beyond reasonable doubt

Consequence	Monetary damages	Jail, fine, or both
Burden of proof	On plaintiff	On prosecution

Q5.4: What is contributory negligence and what are its limitations?

PYQ: FMGE 2022

Answer:

- A doctor's negligence contributed by the patient.
  - E.g.: The patient was not following proper treatment, no follow-up was done, or did not give a proper history.
- Defense in civil case
- Burden of proof - on doctor
- It is a partial defense.

Limitations of contributory negligence

- Last clear chance doctrine
  - Doctor missed the last chance to avoid negligence then the doctor is more responsible
- The avoidable consequences rule.
  - It is the negligence of the patient which aggravated the damage already caused by the negligence of the doctor.
  - Here, the patient is more responsible.

Q5.5: What is the doctrine of "res ipsa loquitur"?

Answer:

- Latin: "The thing speaks for itself"
- Negligence is so obvious that no further proof is needed
- Example: Leaving a surgical instrument inside the patient

Q5.6: What is vicarious liability?

Answer:

- When a higher authority is held responsible for the actions of subordinates
- Example: Hospital held liable for negligence of its staff doctor

Q5.7: What is the Bolam test?

Answer:

- Legal standard used to assess negligence
- A doctor is not negligent if they acted in accordance with a practice accepted as proper by a responsible body of medical professionals
- Bolitho test
  - It is a legal assessment.
  - Modified Bolam test.
  - The defense and its body of opinion must be reasonable, responsible, and logical.

Q5.8: What are legal defenses against negligence?

Answer:

- Contributory negligence
- Therapeutic misadventure
- Error of judgment (if honest and reasonable)

YOURWISH

- Unexpected complications
- Novus actus interveniens (new intervening act breaks the chain)

Q5.9: What are examples of negligent acts?

Answer:

- Amputation of wrong limb
- Transfusion of wrong blood group
- Leaving a mop/instrument inside the abdomen
- Misdiagnosis or delayed diagnosis due to lack of proper investigation

Q5.10: What is Borrowed Servant Doctrine?

Answer: If a surgeon borrows staff from any other department, and negligence by that department person occurs, the HOD will be responsible.

Q5.11: What is Loco Parentis?

Answer: If a surgeon borrows staff from any other department, and negligence by that department person occurs, the HOD will be responsible.

Q5.12: What is meant by Medical mal occurrence?

Answer:

- In some cases, despite good medical attention and care, there was damage.
- Example: Adverse drug reaction damage happens.

Q5.13: What is Composite Negligence?

Answer: Patients suffers injury due to the negligent act of more than one person.

Q5.14: What is Product Liability?

Answer:

- It refers to the physical agent like damage caused by an instrument.
- The burden of proof falls on manufacturers because manufacturers have created product liability.

Q5.15: What is Doctrine of Common Knowledge?

Answer:

- It is a type of Res IPSA Loquitur, but the difference is that it is only an act of omission.
  - Example: TT is not given in injury, IV fluids are not given for dehydration.

Q5.16: What is Calculated Risk Doctrine?

Answer:

- Every method of treatment employed had unavoidable risks that could lead to damage.
- If the doctor has taken reasonable care, there is still a risk.
- It is a defense in civil case.

Q5.17: What is Novus Actus Interveniens?

Answer:

- New action intervening.
- Break the chain of events, and consequences.
- Example: Y stabbed X and X got admitted to the hospital. But X was given the wrong fluid, and electrolyte by the doctor, and X died.
- For this, the doctor will be held responsible as new action has taken place.

Q5.18: What are the defenses against negligence?

Answer:

- No duty
- Duty discharged
- Therapeutic misadventure:
  - If during diagnosis, treatment, experiment, there was an unintentional or accidental complication
  - The burden of proof goes to the doctor.
  - It is used in civil & criminal cases.
- Error of judgment
- Contributory negligence (civil)
- Res judicata: If the question of negligence has been decided in court, it cannot be raised again. It is defense in civil case.
- Res indicata: Time limitation for a patient to file a case is 2 years.

BIG QUESTION 6: What are the legal standards for medical documentation and retention of medical records?

Broad Answer: Medical records are legal documents that serve as proof of care and communication between doctor and patient. Proper documentation protects both patients and practitioners and must be retained as per legal guidelines.

DETAILED QUESTIONS

Q6.1: What are the types of medical documents maintained by a doctor?

Answer:

- Clinical notes
- Investigation records
- Operation notes
- Informed consent forms
- Discharge summary
- Medicolegal documents

Q6.2: Why is medical documentation important?

Answer:

- Evidence of care and communication
- Aids in future care decisions
- Legal defense in case of negligence allegations

Q6.3: What are the legal requirements for retention of records?

Answer:

- **Indoor patient records:** 3 years (minimum)
- **Medicolegal cases:** Till final disposal of the case
- **Death certificates:** Indefinite retention
- **Outpatient records:** Varies, but advisable to retain for at least 3 years

Q6.4: What are best practices for maintaining records?

Answer:

- Write legibly and contemporaneously
- Use standard formats and abbreviations
- Do not overwrite or erase entries
- Document time, date, and signature
- Preserve both electronic and paper copies securely

BIG QUESTION 7: What are the major ethical declarations and guidelines in medical practice?

Broad Answer: Multiple global and national declarations guide medical ethics in clinical care, research, and professional conduct. These include physician oaths, research principles, anti-torture stances, and national frameworks like the ICMR guidelines.

DETAILED QUESTIONS

Q7.1: What is the Declaration of Geneva?

Answer:

- Issued by the World Medical Association (WMA)
- Serves as the modern Hippocratic Oath
- Emphasizes ethical commitment to humanity

Q7.2: What is the Declaration of Helsinki?

Answer:

- Issued by the WMA (1964; updated multiple times)
- Sets global ethical standards for **biomedical research involving human subjects**
- Key elements: informed consent, risk-benefit ratio, independent ethical review

Q7.3: What is the Declaration of Tokyo?

Answer:

- WMA guideline on **torture and other cruel treatment**
- Prohibits physician involvement in inhumane practices in custody or imprisonment

Q7.4: What is the Declaration of Oslo?

Answer:

- WMA statement on the **ethical aspects of abortion**
- Balances physician's personal beliefs with social and medical responsibilities

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Q7.5: What are the ICMR 2017 guidelines?

Answer:

- National ethical code for research involving human participants in India
- Replaced 2006 version
- Key features:
  - Ethical committee (EC) approval
  - Voluntary informed consent
  - Minimization of risk
  - Equitable participant selection
  - Post-research access and benefit sharing

Q7.6: Summary Table — WMA Declarations

Geneva	Hippocratic oath
Tokyo	Torture, Istanbul protocol
Sydney	Death
Oslo	Therapeutic abortion, abortion
Helsinki	Human experimentation
Venice	Terminal illness
Lisbon	Rights of patients
Malta	Hunger strike = Role of doctor
Washington	Biological warfare
Ottawa	ORS Child health
Hong Kong	Old Abuse

Q7.7: Summary Table — ICMR Ethical Framework

Guideline	Scope	Key Features
ICMR Guidelines 2017	Human biomedical & health research	EC approval, risk minimization, voluntary consent, post-trial benefit sharing

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7. IMPOTENCE STERILITY VIRGINITY ABORTION

BIG QUESTION 1: What are the medico-legal aspects of impotence, sterility, virginity, and reproductive issues?

Broad Answer: These conditions -including impotence, frigidity, sterility, and virginity – play key roles in legal contexts such as divorce, paternity disputes, and sexual offense investigations. They are medically assessed through physical signs and legally judged by their consequences and documentation.

DETAILED QUESTIONS

Q1.1: How is impotence defined in males?

Answer:

- Inability to achieve, maintain, or initiate a penile erection
- Also known as erectile dysfunction

Q1.2: What are the causes of impotence in males?

Answer:

- Most common cause: Psychological (anxiety, depression, stress, fear, tension)
- Honeymoon impotence: Temporary, caused by anxiety
- Common organic cause: Vasculogenic (e.g., hypertension, decreased blood flow)
- Impotence Quoad Hanc: Impotence only for a particular woman

Q1.3: What is female impotence (frigidity)?

Answer:

- Also called frigidity
- Inability to initiate or maintain sexual arousal in females

Q1.4: What is sterility and its relevance to divorce?

Answer:

- Sterility: Inability to reproduce
  - Males: Unable to beget children
  - Females: Unable to conceive
- Not a ground for divorce
- Valid grounds: Impotence after marriage, Frigidity
  - The best ground for divorce: Impotence > Frigidity

PYQ: FMGE 2020

Q1.5: What is Fecundation ab Extra?

Answer:

- Rare condition
- Conception without penetration
- Semen deposited on vulva/thighs leads to pregnancy

Q1.6: What is a Posthumous Child?

PYQ: NEET PG 2020

Answer:

- Born after the father's death
- May lead to legitimacy or paternity disputes
- Paternity disputes = Affiliation cases

Q1.7: What is a Supposititious/Fictitious/Substituted Child?

Answer:

- False child claim made for blackmail or property gain
- Methods include feigning pregnancy, using a dead fetus, or kidnapping

Q1.8: What is the difference between superfecundation and superfetation in twin pregnancies?

Answer:

Superfecundation	Superfetation
1T	2T
1 MC cycle	2 MC cycle
2 ova fertilized	2 ova fertilized (a very rare case)
2 different acts of coitus	2 different acts of coitus
Same man or different	Same man or different

Q1.9: What is Pseudocyesis?

Answer:

- AKA, False/Spurious/Phantom Pregnancy)
- Psychological or hormonal causes
- Subjective symptoms without actual pregnancy

Q1.10: What are examples of Assisted Reproduction Techniques (ART)?

Answer:

- Artificial insemination - Placing sperm in the vagina artificially.
- Surrogacy

Q1.11: What precautions should be taken in Assisted Reproduction Techniques (ART)?

Answer:

- Obtain consent from both the donor and the wife.
- The physician obtaining the sperm should be different from the one performing artificial insemination.
- A single donor should produce no more than 10 children.

Q1.12: What is surrogacy, and what are its types?

Answer:

- **Surrogacy** - A surrogate mother carries a child for another couple.
- **Types:**
  - **Altruistic surrogacy** - Only medical expenses and 36-month health insurance are provided by the couple.
  - **Commercial surrogacy** - A large payment is made to the mother (currently banned).

Q1.13: Elaborate on the Surrogacy Regulation Act.

Answer:

- The surrogate mother should be between 25 and 35 years of age, should be married, should have 1 born child, or a close relative, and should be certified that she is mentally and physically healthy. 3 attempts can be made.
- Intending couple: The male should be 26- 55 years old, and the female should be 25-50 years old.
- 5 years of marriage with infertility, Indian, no child selection certificate.
- After surrogacy, the child is legitimate.
- If one goes for commercial surrogacy, 10-year imprisonment or a 10 lakh fine, if one violates the law, 5 years imprisonment and a 5 lakh fine
- If a mistake is made by a doctor, registration will be canceled for 5 years.

Q1.14: What is virginity, defloration, and how is it examined?

Answer:

- Virginity: No experience of sexual intercourse
- Defloration: Loss of virginity (usually by rupture of hymen)
- True Virgin: No intercourse (hymen may or may not be intact)
- False Virgin: Intercourse happened but hymen still intact (hymen may be thick, elastic or fleshy)
- Hymen is not a reliable marker of virginity

Q1.15: Tabulate the difference between the signs of virginity and defloration.

Answer:

Virginity	Defloration
Hymen intact	Hymen torn (P-L) **Postero-lateral**
Labia Majora is closely apposition	Labia Majora is not so exposed
Labia minora is **pink**	Labia minora is pigmented
Posterior commissure intact	Torn
Fourchette intact	Torn
Intact fossa Navicularis	Fossa Navicularis disappears
Narrow vaginal canal with rugosity	Dilated vaginal canal
Breasts are smaller, firm, pink small areola, nipple	Breasts are large, and flabby, with large areolas

Q1.16: What is a hymen, and what's its thickness?

Answer:

- Hymen is a fold on the mucous membrane.
- It is 1mm in thickness

Q1.17: What are types of hymens?

Answer: Mnemonic: **IS VICS**

- **I**mperforate
- **S**emilunar/crescentic (most common)
- **V**ertical

- Infantile
- Cribriform
- Septate

Q1.18: What are the causes and sites of hymen rupture?

Answer:

- Causes: Sex, masturbation, surgery, trauma, foreign body invasion (e.g., sola-pith)
- Sites:
  - Hymen rupture site- Sex (Penile penetration): Postero-lateral
  - Masturbation- (finger/ foreign body): Anterior or anterior lateral

Q1.19: What is Aptae Viris in the context of sexual offences?

Answer:

- Aptae Viris refers to the practice of rendering very young girls fit for sexual intercourse.
- Method: Sola pith is inserted into the vagina, where it absorbs moisture, expands, and dilates the vagina.
- This practice has been reported among some **commercial sex workers**.

Q1.20: Why is hymen not always ruptured in child sexual assault?

Answer: Because it is deeply seated in children

Q1.21: What is the difference between hymenal tear and fimbriated hymen?

Answer:

	Hymenal Tear	Fimbriated Hymen
	It can be on any side	It is on the anterior side
Situation of notches	Extend to the vaginal wall or periphery	Don't extend to the vaginal wall or periphery
Shape and size	Asymmetrical	Bi-lateral and symmetrical,
Mucous membrane over notches	Absent	Intact
Cause	Sex, masturbation	Natural

Q1.22: What are Glaister Keen Rod and Carunculae Hymenales?

Answer:

- Glaister Keen Rod: A glass rod with a bulb at one end, inserted into the vagina and gently pulled out. The bulb is illuminated to examine the margin of the hymen.
- Carunculae Hymenales: Small, round, fleshy projections seen in women with an already destroyed hymen, usually in those habituated to coitus & after childbirth

BIG QUESTION 2: What are the clinical signs of pregnancy and the stages of lochia?

Broad Answer: Pregnancy presents with a range of signs categorized as presumptive and probable, while lochia represents the vaginal discharge following delivery. These stages help in diagnosing pregnancy and confirming recent childbirth.

DETAILED QUESTIONS

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Q2.1: What are the presumptive signs of pregnancy?

Answer:

- Amenorrhea (earliest sign)
- Morning sickness
- **Quickening:** Fluttering movements in the abdomen (seen at about 16th to 20th week)
- **Chadwick's or Jacquemier's sign:** Vaginal mucosa changes from pink to blue due to venous obstruction (seen at about 4th week)
- Montgomery tubercles in the breast
- Urinary disturbances

	Parous	Nulliparous
Uterus	Round	Triangular
External-OS	Transverse	Circular

Q2.2: What are the probable signs of pregnancy?

Answer:

- **Hegar's sign:**
  - Compressible and soft isthmus
  - Seen at about 6th week
  - Most valuable physical sign of early pregnancy
- **Goodell's sign:**
  - Softening of cervix
  - Well marked by 4th month
- **Braxton-Hicks's sign:**
  - Intermittent painless uterine contractions
  - Felt after 4 months
- **Ballottement:** Felt between 4th and 5th month
- Enlargement of the abdomen

Q2.3: What is lochia and what are its types?

Answer: Lochia refers to the vaginal discharge after childbirth and is divided into three stages:

- **Lochia rubra:** Dark red, lasts for 1 to 3-4 days
- **Lochia serosa:** Pinkish brown, lasts from 4-10 days
- **Lochia alba:** White or yellow, lasts from 10-28 days

BIG QUESTION 3: What are the medico-legal aspects of abortion and the MTP Act?

Broad Answer: Abortion refers to the premature expulsion of the fetus. Its classification, legality, and clinical features are governed by viability definitions and the Medical Termination of Pregnancy (MTP) Act, which was amended in 2021. Criminal methods and abortifacient substances also carry forensic significance.

DETAILED QUESTIONS

Q3.1: What defines abortion and what are its legal criteria?

PYQ: NEET PG 2021,2022

PYQ: FMGE 2020,2021

Answer:

- **Abortion:** Premature expulsion of the fetus

- Product of conception is expelled before viability
- **Viability:** Fetus capable of survival outside womb at 28 weeks
- **Full term:** 280 days (40 weeks)
- **Medical abortion:** Before 28 weeks
- **Legal definition:** Expulsion before full time (can be any time)

Q3.2: What is the MTP Act and its key features?

Answer:

- MTP = Medical Termination of Pregnancy Act
- Implemented: 1971, Enforced: 1972, Amended: 2021
- Consent: Required from woman (≥18 years)
- Confidentiality breach: Punishable with 1 year imprisonment, fine, or both

Q3.3: What are the indications for legal abortion under the MTP Act?

Answer:

- Contraceptive failure (social reason)
- Child malformed (eugenic reason)
- Risk to mother's life (physical/mental) (therapeutic)
- Rape (humanitarian)

Q3.4: What are the gestational limits and procedural requirements under MTP Act?

Answer:

- Up to 20 weeks: Requires 1 doctor
- 20-24 weeks: Requires 2 doctors (for rape, incest, minors, vulnerable women)
- After 24 weeks: Requires medical board (fetal abnormality)
  - Board includes: OBG, pediatrician, radiologist/sonologist, any other
- Any time: If mother's life is in danger (1 doctor can proceed)

Q3.5: Who is authorized to perform an MTP?

Answer:

- In government or approved institutions only
- Must be:
  - RMP with 25 assisted MTPs
  - Or with 6-month OBG house job
  - Or with MD/MS/DGO/DNB in OBG
  - Or with 1-year experience in OBG department

Q3.6: What are criminal abortion methods and their timeline?

Answer:

- Up to 1 month: Violent exercise
- Up to 2 months: Abortifacient drugs
- 3rd to 4th month: Mechanical interference

Q3.7: What are commonly used abortifacient drugs and their categories?

Answer:

- **Ecbolics (cause uterine contraction):**
  - Ergot (most common)
  - Quinine
  - Strychnine
  - Estrogen
- **Emmenagogues (increase menstrual flow):**
  - Borax
  - Estrogen
  - Sanguinarine
  - Savin
  - Senecio

Q3.8: What plants and toxins are used for unsafe abortions?

Answer:

- Plumbago
- Ergot
- Calotropis
- Oleander (White: Nerium, Yellow: Cerebra Thevetia)
- Lead, Copper, Mercury
- Aconite, Arbus, Arsenic

Q3.9: What forms of general violence are used in criminal abortion?

Answer:

- Trauma
- Violent exercises
- Cupping (lighted wick with mug): Causes placental separation

Q3.10: What are the causes of death due to unsafe abortion?

Answer:

- Hemorrhage (most common)
- Vagal inhibition
- Air embolism
- Fat embolism
- Amniotic fluid embolism
- Septicemia (most common delayed cause of death)

Q3.11: What is an abortion stick, and how does it work?

Answer:

- An abortion stick is a rod about 12-18 cm long, soaked with the juice of cotton or cloth.
- When inserted, it causes uterine contractions, leading to abortion.

8. FETAL/ NEWBORN/ INFANT AUTOPSY

BIG QUESTION 1: Write briefly about fetal, newborn, and infant autopsy.

Broad Answer: An autopsy of a fetus, newborn, or infant is a specialized post-mortem examination performed to determine the cause of death and to identify any underlying medical conditions or developmental abnormalities.

DETAILED QUESTIONS

Q1.1: What is the first cavity to be opened when conducting fetal, newborn, and infant autopsy?

Answer: The first cavity to be opened is the abdominal cavity, to see the position of the diaphragm

Q1.2: What is the method employed in fetal, newborn, and infant autopsy?

Answer: Rokitansky method

Q1.3: Name the methods used for opening the cranial cavity in fetal, newborn, and infant autopsy.

Answer:

- **Beneke's method:** Cranial cavity divided into two parts
- **Barr's method:** Cranial cavity divided into four parts

BIG QUESTION 2: How is Infanticide defined?

Broad Answer: Infanticide refers to the intentional killing of a child under the age of 1 year

DETAILED QUESTIONS

Q2.1: Define Neotaticide, Feticide, and Filicide.

Answer:

- **Neonaticide:** Killing a child within 24 hours of birth
- **Feticide:** Killing a fetus
- **Filicide:** Killing a child by its parents

Q2.2: Under which IPC is infanticide a punishable offence?

Answer:

- No separate IPC for infanticide
- Infanticide is punished under 302 IPC - Same for murder

Q2.3: What is the viability of a fetus?

Answer:

- Age of fetus after which fetus is capable of survival outside, i.e., 28 weeks of gestation
- Before the age of viability, it is called abortion

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Q2.4: What are the different outcomes of a fetus after 28 weeks of gestation?

Answer:

Dead born	• The fetus died inside the uterus • IUD: Intrauterine death
Stillbirth	• The fetus died during the process of delivery • In birth passages
Live birth	• The fetus came out • The expulsion of the fetus shows signs of life

BIG QUESTION 3: What is Dead born?

Broad Answer: Deadborn refers to the death of the fetus inside the uterus before 28 weeks of gestation. Also known as Intrauterine death

DETAILED QUESTIONS

Q3.1: What are the signs of Deadborn?

PYQ: NEET PG 2020

Answer:

Mnemonic - **SHORMA**

- **S**- Spalding Sign
- **H**- Hyperflexion of Spine- **Deuel's Halo Sign**
- **O**- Overcrowding of ribs
- **R**- Rigor Mortis
- **R**- Robert Sign
- **—** Mummification
- **A**- Aseptic autolysis
  - Also called Maceration



Q3.2: What is maceration, and stages of maceration?

Answer:

- Maceration is characterized by skin slippage/skin peeling, and reddening of the skin
- Stages include:
  - **Mild:** Only skin slippage
  - **Moderate:** Skin slippage + softening of organs
  - **Severe:** Skin slippage + Softening of organs + Hypermobile joints

Q3.3: What are the characteristics of mummification?

Answer:

- Intact amniotic sac with a deficient blood supply to the fetus
- Scanty amount of amniotic fluid
- No air
- Dehydrated fetus: Shrunken fetus
- Smell is odorless

Q3.4: What are the characteristics of Putrefaction?



Answer:

- The amniotic sac is not intact
- Ruptured amniotic sac
- Bacterial entry

Q3.5: What are the radiological signs of a deadborn?

Answer:

Robert Sign	• Gas o In aorta o In the pulmonary artery o In the cardiac chamber o In the umbilical artery • 12 hours after death • **The earliest radiological sign**
Spalding Sign	• 4-7 days after death • **Overriding of cranial bones** • Loss of alignment of cranial bones • Because of the liquefaction of the brain • More common in vertex presentation • Pathognomonic sign

BIG QUESTION 4: How is a Live birth defined?

Broad Answer: A live birth is defined as the complete expulsion of a fetus from its mother, after 28 weeks of gestation, that shows any signs of life after separation

DETAILED QUESTIONS

Q4.1: What are the signs of live birth?

Answer:

- Respiration
- Cry of baby
- Movements of baby

Q4.2: What are the differences in diaphragm level, chest appearance, and lung weight in a fetus with and without respiration?

Answer:

	No respiration	Respiration
Level of diaphragm	4-5 ribs	6-7 ribs
Chest	Flat	Expanded
Weight	30g 1/70 of body weight	60g 1/35 of body weight

Q4.3: Name the test performed to check live births

Answer:

- Wreden's test
- Fodere's test
- Plocquet test
- Breslau's 2nd life test
- Breslau's 1st life test

Q4.4: What is the Wreden's test?

Answer:

- Wreden's test is done to check the air in the middle ear
- The middle ear shows gelatinous tissue if there is no respiration

Q4.5: What is the Plocquet test?

Answer:

- Plocquet test is done to check the proportion of lung weight to body weight
  - Without respiration: 1/70
  - With respiration: 1/35 of body weight

Q4.6: How is Breslau's 2nd life test performed, and why is it performed?

Answer:

- Breslau's 2nd life test is done to check the air in the stomach or intestine
- Stomach/ bowel test
  - Double ligate the stomach and cut between the two ligatures
  - Place the stomach in water
  - Open the stomach inside the water
  - If air is present, Bubbles will form

Q4.7: How is Breslau's 1st life test performed, and why is it performed?

Answer:

- Breslau's 1st life test is performed to check the air in the lungs
- AKA Lung float test/ Raygat's test/ Hydrostatic test
- Specific gravity of water: 1
- Specific gravity of non-respired lung: 1.04
- Specific gravity of respired lung: 0.940
  - If the Specific gravity is less than 1→ substance floats
  - If the Specific gravity is more than 1→ substance sinks
- Another reason for a respired lung to float is the Residual volume

Q4.8: Elaborate on the differences between false-positive and false-negative Breslau's 1st life test.

Answer:

False positive	False-negative

• Respiration was absent.
• But lung pieces are floating.
  o **Putrefaction**
  o **Artificial respiration**
	• Fetus respired.
	• But still, lung pieces are sinking.
	  o Pneumonia
	  o Alveolar duct membrane.
	  o Pulmonary edema
	  o Atelectasis.
	  o Complete absorption of air by lung.

Q4.9: What are the other signs of live births?

Answer:

- Umbilical structures
  - The umbilical artery closes on the 3rd day
    → Form medial umbilical ligament
  - Vein closes 4th day
    → Form ligamentum teres
  - Cord falls by 5-6 days
- If a child is unborn
  - **Vagitus uterinus:** Intrauterine cry of the unborn child
  - **Vagitus vaginalis:** Intravaginal cry

Q4.10: What is indicated by a positive Fodéré's test in forensic medicine?

Answer: Lung weight becomes two fold, suggesting live birth.

BIG QUESTION 5: What is SIDS, and what are the autopsy results in this condition?

Broad Answer:

- Sudden infant death syndrome (SIDS) is also called crib death or cob death.
- In this condition, the infant is healthy, but an unexplained sudden death occurs
- The autopsy results are negative in this condition

DETAILED QUESTIONS

Q5.1: List the predisposing factors for SIDS.

Answer:

- Common in males
- 2 weeks to 2 years
- Common in infants <6 months
- If 1st twin has a problem, 2nd twin has a greater chance
- Usually: Early morning
- If the mother or parents are smokers or alcoholics
- Prematurity

Q5.2: What is the incidence of SIDS?

Answer: Incidence: 0.2 - 0.4%

Q5.3: What are the causes of death in SIDS?

Answer:

- Deficiency of calcium, magnesium, and selenium
- Most commonly accepted theory- prolonged sleep apnoea
- Viremia→ respiratory depression
- Cow milk allergy

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9. REGIONAL INJURIES-RTA INJURIES-ASPHYXIAL DEATH

BIG QUESTION 1: What are the types of skull fractures in head injury, and what are their features and mechanisms of injury?

Broad Answer:

- Fissured fracture
- Diastatic fracture
- Depressed fracture
- Pond or indented fracture
- Gutter fracture
- Comminuted fracture
- Ring or foramen fracture
- Motorcyclist fracture
- Battle sign
- Blow-out fracture
- Skull fractures occur when the cranial bones are subjected to trauma, and they vary in pattern depending on the force, object, and site of impact.

DETAILED QUESTIONS

Q1.1: Which is the most common skull bone to be fractured?

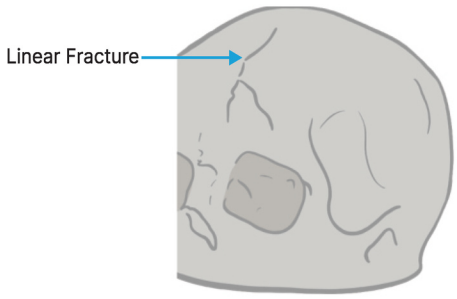
Answer:

- Temporal bone

Q1.2: Write briefly about Fissured fracture.

Answer:

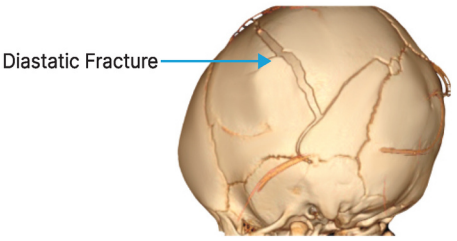
- Also known as a linear fracture
- The most common fracture of the skull
- It is seen in the autopsy



Q1.3: In whom is a Diastatic fracture seen, and what is the common suture associated with it?

Answer:

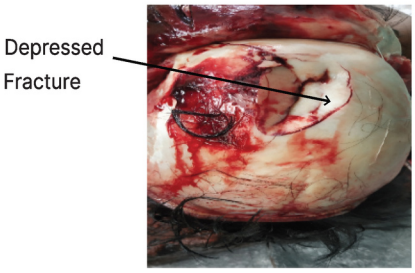
- Associated with sutural separation
- Seen primarily in young adults
- The most common suture associated with diastatic fracture is the sagittal suture



Q1.4: What is the mechanism and clinical significance of depressed skull fractures?

Answer:

- Caused by a heavy weapon or object with a small striking surface, E.g. Hammer
- The pattern of the fracture tells about the weapon
- Also known as a signature fracture or signature ala fracture
- Outer as well as the inner table is destroyed



Q1.5: What is a pond or indented fracture, and its causes?

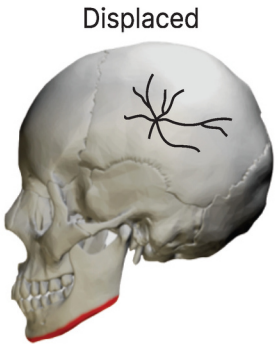
Answer:

- A dent in the skull bone is a pond fracture, also known as a ping-pong ball fracture
- Caused by the obstetrics forceps blade.
- Generally intact dura and Inner table
- Common in infants

Q1.6: What is a gutter fracture, and what are its causes?

Answer:

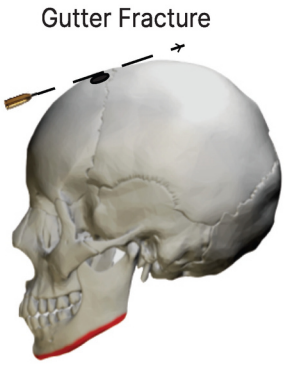
- It is a fracture in the outer table
- Caused by an oblique bullet that comes tangentially
- This is known as a glancing bullet
- Gutter formation in the outer table



Q1.7: How is a comminuted fracture formed?

Answer:

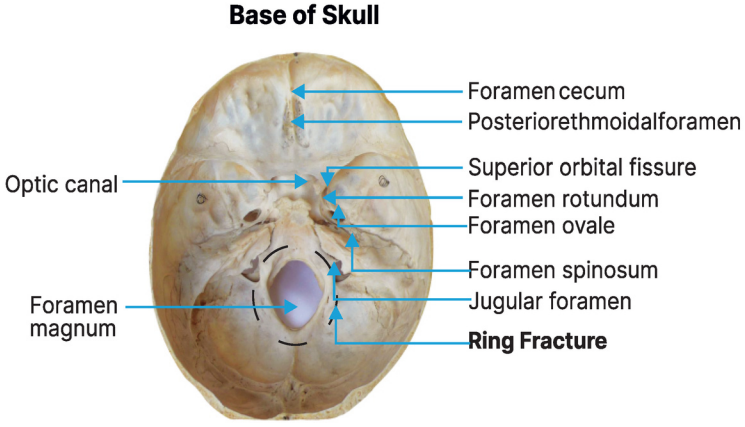
- A comminuted fracture is caused by a heavy, blunt blow
- Multiple fracture lines are formed, which intersect each other, known as spider web fractures
- Fragments are displaced



Q1.8: What is a ring (foramen) fracture of the skull?

Answer:

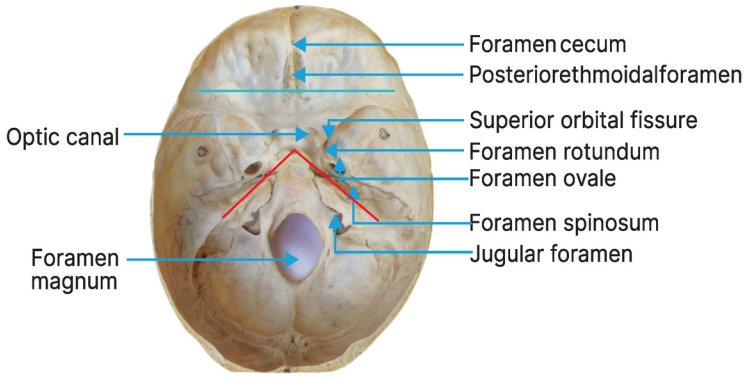
- Fracture surrounding the foramen magnum
- Seen in falling from a height or falling on feet or falling on buttocks
- This can be due to a blow on the chin or a blow on the vertex



Q1.9: What is a Motorcyclist fracture?

Answer:

- Common in people riding motorcycles
- Fracture of the base of the skull
- Force is on the skull that comes from one side to another, mostly in the temporal area



Q1.10: How is a Motorcyclist's fracture classified?

Answer:

Type 1	• Motorcyclist Fracture is a type 1 Hinge Fracture. Starts from the Petrous ridge to the Sella turcica to the contralateral Petrous ridge
Type 2	• Starts from the front area of one side, then to Sella turcica, and then to the contralateral side
Type 3	• A fracture in the coronal plane, mainly in the anterior part

Q1.11: In which type of motorcyclist fracture is the 'nodding face' sign seen?

Answer: The nodding face sign is seen in Type 1 Motorcyclist fracture

Q1.12: What is the Battle sign, and how does it occur?

Answer:

- Battle sign is a posterior auricular ecchymosis or bruise
- Occurs in a Middle cranial Fossa Fracture
- It is classified as an ectopic bruise



Q1.13: What is a Blowout fracture, and how is it caused?

Answer:

- It is a fracture of the orbital wall
- This is caused by blunt trauma
- The fracture may affect the medial wall, posterior wall, or floor of the orbit.

Q1.14: What are coup and counter-coup injuries?

Answer:

Coup	Contrecoup
Seen on the side of the impact.	Seen on the opposite side of the impact.
Common organs involved are the brain, heart, and lungs.	A common organ involved is the brain

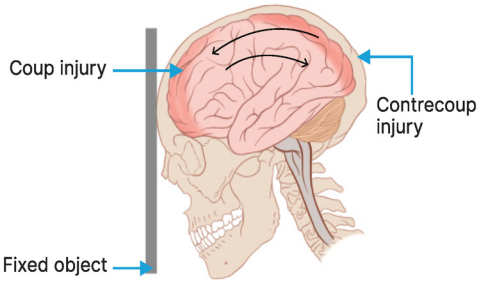
Q1.15: What is the theory of Coup?

Answer:

- Because of rotation, there is a shearing strain on the opposite side, leading to hematoma or injury
- Pressure gradient

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- Skull deformation or struck hoop theory: The most accepted theory
  - Compression at the site of injury leads to bulging on the opposite side (a compensatory mechanism), producing countercoup injury



Q1.16: If the coup is in the occipital region, where will the contre-coup injury be?

Answer:

- If the coup is in the occipital region, then the countercoup will be in the frontal region

BIG QUESTION 2: What is an intracranial hemorrhage, and what are its types, features, and mechanisms of injury?

Broad Answer:

- Intracranial hemorrhages are bleeds that occur inside the skull.
- Different types include:
  - Epidural hemorrhage
  - Subdural hematoma
  - Subarachnoid hemorrhage
  - Intracerebral hemorrhage

DETAILED QUESTIONS

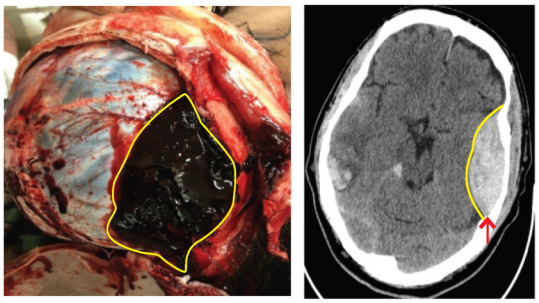
Q2.1: Write briefly about the cause, type, diagnosis, and cause of death, site, and artery involved in EDH

Answer:

PYQ: FMGE 2021

PYQ: NEET PG 2022

- Epidural hemorrhage (EDH) is also known as an extradural hemorrhage
- Middle meningeal artery damage is observed
- In NCCT, EDH is a hyperdense, biconvex, lenticular-shaped area
- EDH is caused exclusively by trauma
- It is on the temporal site. The main part is the pterion
- EDH is mainly a coup injury
- Death: The minimum amount is 100 ml, which can cause compression of the brain and respiratory failure, leading to death
- Lucid interval: EDH> SDH



Q2.2: What is a lucid interval, and what are its medicolegal implications?

Answer:

- A phase of consciousness between two phases of unconsciousness is k/a lucid interval
- If one commits a crime, they will be responsible
- In this lucid interval, one can act as a witness or write down a will
- IPC is 304A- A doctor can be charged for medical negligence if the doctor doesn't identify a lucid interval. Punishment could be 2 years and a fine

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Q2.3: What are the differences between an epidural hematoma (EDH) and a heat hematoma?

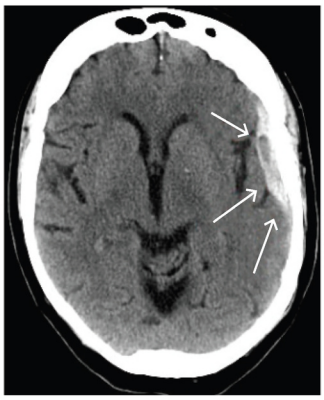
PYQ: FMGE 2021

Answer:

EDH	Heat Hematoma
Caused by trauma	Caused by heat/burn
Always unilateral	It can be bilateral
Reddish color	Chocolate brown
Due to the rupture of the middle meningeal artery	Contraction of dura mater. Due to the rupture of the Dural venous sinus, there is blood loss. Honeycomb appearance is seen.

Q2.4: What are the features, causes, and fatal volume of a subdural hematoma (SDH)?

Answer:

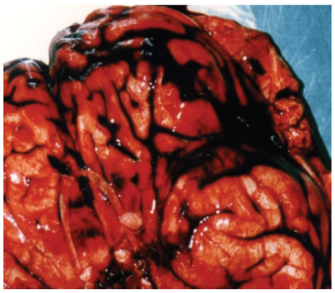


- SDH is concavo-convex (Sickle-shaped)
- It is due to the rupture of bridging veins
- This is below the dura
- It is most commonly caused by trauma
- About 100 to 150 ml is fatal
- Even minor trauma can lead to SDH
- Causes
  - Non-traumatic reason: Alcohol intake
  - Boxing injury
  - Common in children (Shaken Baby syndrome)
  - Common in elderly people

Q2.5: What are the causes, symptoms, and diagnostic methods for subarachnoid hemorrhage (SAH)?

PYQ: NEET PG 2019 PYQ: FMGE 2021

Answer:



- Location of the bleed- It is below the arachnoid
- SAH can be due to trauma/non-trauma, but is most commonly due to trauma
- Non-trauma is caused by to rupture of a berry aneurysm
- Trauma is caused by rupture of the Circle of Willis or an anterior communicating artery aneurysm.
- Thunderclap headache- The most common symptom is a severe headache and excruciating pain
- Treatment- Endovascular coiling or clipping
- Water test- To differentiate between SDH and SAH. Pour water.
  If the blood gets washed off, this is SDH. If the blood is not washed off, it is SAH

Q2.6: What is Punch Drunk Syndrome?

Answer:

- It is also known as Dementia Pugilistica / Chronic Traumatic Encephalopathy
- It is common in boxing injuries
- It becomes chronic SDH
- Short-term memory loss is noticed

Q2.7: What is the cause, site, and pathophysiology of intracerebral hemorrhage?

Answer:



- It is due to a rupture of the middle cerebral artery
- The most common cause is increased blood pressure
- The most common site is the putamen
- This is the most common non-traumatic hemorrhage

Q2.8: In which condition is Berlin's edema seen?

Answer: Berlin's edema is seen in concussion injury

Q2.9: What is Commotio cerebri?

Answer: Commotio cerebri is shearing stress in the brain, leading to numerous small, punctate hemorrhages throughout the brain.

Q2.10: What is a key histological feature of diffuse axonal injury?

Answer: Diffuse axonal injury - Axonal bulb/retraction bulb (visible after 12 hours) - transacted axon

Q2.11: What is Duret hemorrhage?

Answer: Duret hemorrhage - Hemorrhage of the midbrain and pons

Q2.12: What causes Kernohan's notch?

Answer:

- Kernohan's notch is the result of raised intracranial pressure

BIG QUESTION 3: What are the common types of injuries sustained in road traffic accidents, and what are their mechanisms and clinical features?

Broad Answer: Road traffic accidents (RTAs) are a major cause of morbidity and mortality, leading to a variety of injuries. These injuries can affect the head, chest, abdomen, spine, and extremities, each with characteristic mechanisms and clinical features. The injuries include:

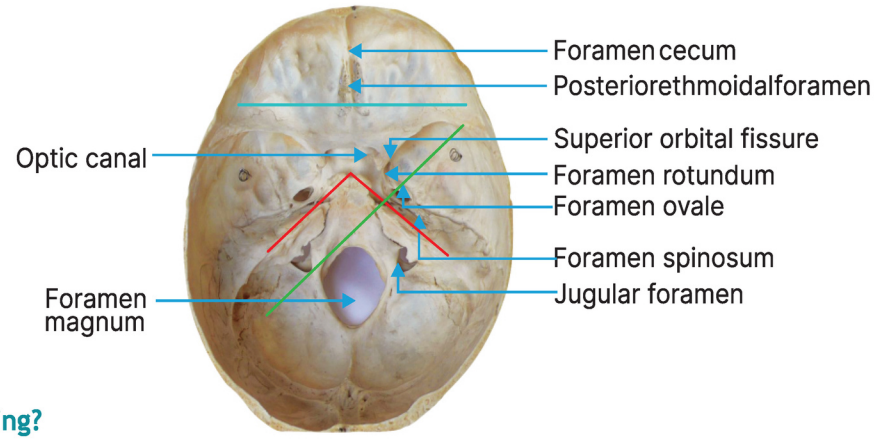
- Motorcyclist injuries
- Pedestrian injuries
- Car driver injuries
- Front seat passenger injuries

DETAILED QUESTIONS

Q3.1: What is a motorcyclist fracture, and where is it located?

Answer:

- Motorcyclist fracture is also a type of regional injury
- Site: Base of the skull (BOS)
- It is a type 1 hinge fracture



Q3.2: What is tailgating?

Answer:

- Running into a large/ heavy vehicle from the back
- Also known as Under running

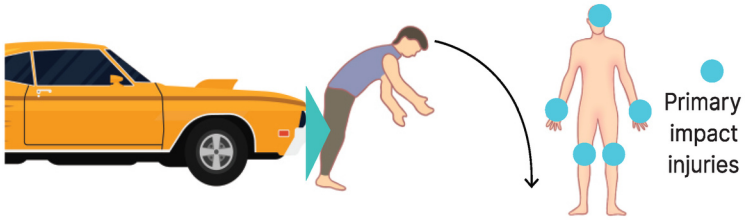
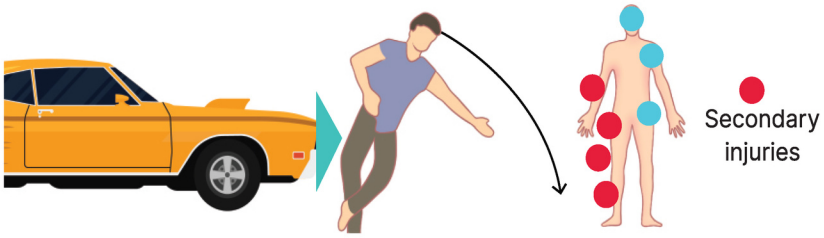
Q3.3: What are pedestrian injuries?

Answer: Pedestrian injuries are caused when a person walking or standing on the road is met with an accident

Q3.4: Classify the pedestrian injuries.

Answer:

PYQ: FMGE 2019

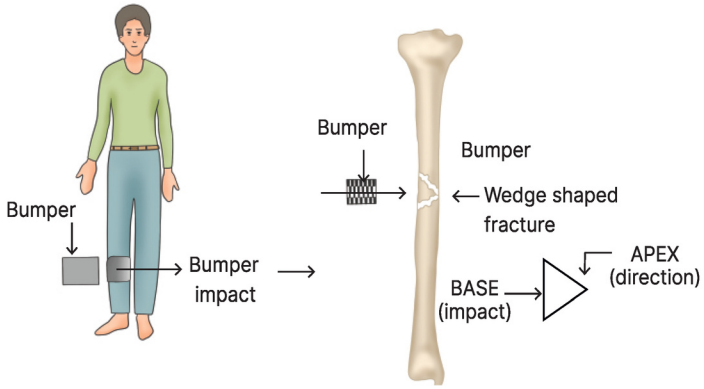
Primary Impact Injury	• Most common site: Leg 
Secondary Impact Injury	• Hitting by the same vehicle 2nd time (or 2nd contact injury) • The person moves over the vehicle 
Tertiary Impact Injury/ Secondary injuries	• Injury due to impact with an object other than the same vehicle • Objects: Road, divider, other vehicles, pole 

Q3.5: What is the most common site and type of fracture in a primary impact injury caused by a vehicle bumper?

Answer:

1. Primary Impact Injury

- Most common site: Leg.
- Adults: Leads to bumper fracture
  - o Most common: Tibia bone fracture.
  - o Mostly on the lateral side of the tibial plateau.
  - o **Wedge/triangle-shaped fracture.**
- Apex is the direction of impact (car/ vehicle)

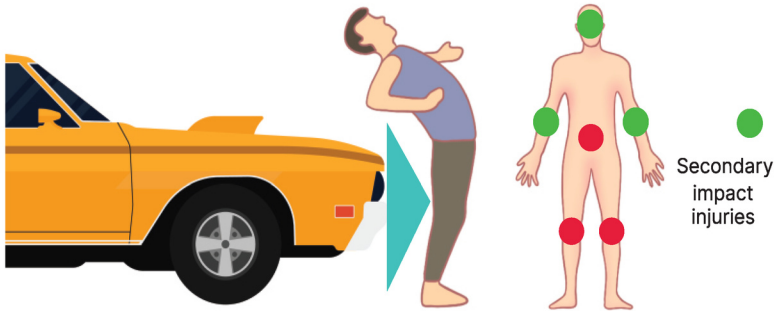


Q3.6: What causes secondary impact injuries in road traffic accidents, and what are the most common injuries seen?

Answer:

2. Secondary Impact Injury

- Cause: 2nd contact with the same vehicle.
- Victims may hit the Bonnet or Windshield.
- Possible injuries
  - o Can lead to multiple injuries.
  - o Most common: Head injuries.
  - o Other
    - → Cervical fracture or injury
    - → Skeletal injuries.



Q3.7: What causes tertiary impact injuries in road traffic accidents, and what are the common findings?

Answer:

- Cause: The victim may be thrown onto the road or dragged along the road.
- Multiple grazed abrasions and lacerations are present
- Tyre mark
- Possible injuries
  - o Most common: Head injuries
  - o Skeletal fractures

Q3.8: What are the different types of injuries sustained by car drivers in road traffic accidents?

Answer:

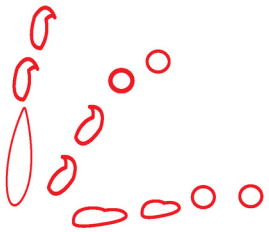
- Windshield injuries
- Neck injuries
- Steering wheel injuries
- Seat belt injuries

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Q3.9: What are the features of windshield injuries?

Answer:

- Windshield injuries lead to Sparrow foot mark (driver is ramming in the glass)
  - o Sparrow foot mark: It is a multiple, small, superficial punctate laceration.



Q3.10: What are the two types of neck injuries?

Answer:

- Whiplash injury (soft tissue injury)
- Neck fracture (cervical)

Q3.11: What is the cause of neck injuries, and which ligaments are injured?

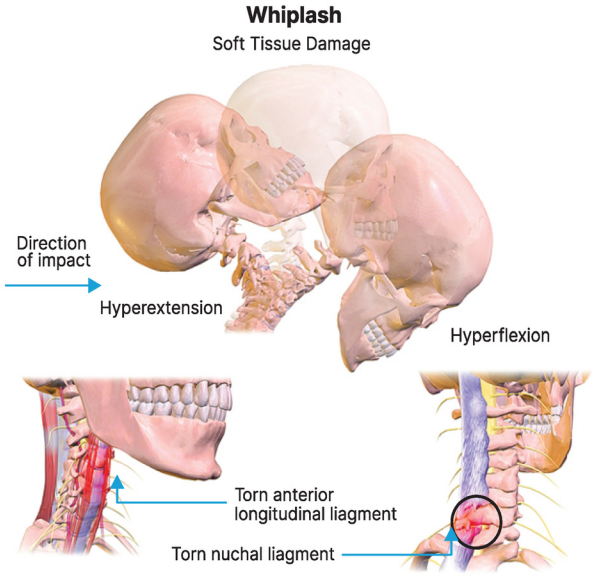
Answer:

- Cause: Violent neck movements
- The anterior longitudinal ligament and cervical ligaments are torn

Q3.12: What is the pathophysiology, site, and level of whiplash injury?

Answer:

- Pathophysiology
  - o Acceleration- Hyperextension of the neck followed by hyperflexion
    - → More common and dangerous
  - o Deceleration-Hyperflexion of the neck, followed by hyperextension
- Level: C5, C6 level
- Common site: Anterior longitudinal ligament



Q3.13: What are the sites and types of injuries associated with steering wheel impact?

Answer:

- Sternum fracture
- Ribs fracture
- Other sites: Elbow or forearm
- Chest-The most common site for Patterned Bruises

Q3.14: What are the organs involved with steering wheel injuries?

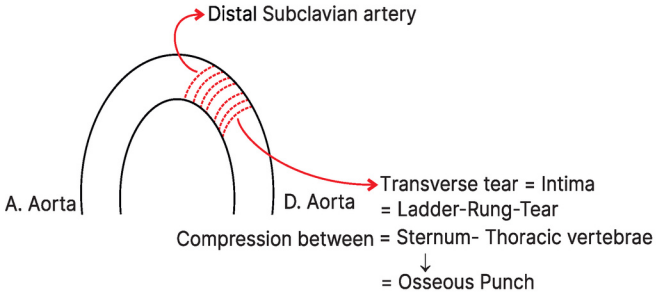
Answer:

- Lung
- Heart
- Aorta

Q3.15: What are the different types of aortic injuries caused by steering wheel impact?

Answer:

- Direct impact on the aorta shows the Torsion force
- The part involved is the isthmus (distal to the subclavian artery)
- Ladder rung tear: There will be a transverse tear in the intima of the isthmus
- Osseous punch: There will be compression between the sternum and thoracic vertebrae
- Deceleration injury - Stretching or straining of the aorta



Q3.16: What are the three categories of injuries seen in seat belt syndrome, and what are their common features?

Answer:

PYQ: FMGE 2019

- Seat belt syndrome = Seat belt sign + Intra-abdominal injuries + Vertebral injuries

Seat belt sign (Patterned bruise)	• In drivers, it starts from the right shoulder • In the front passenger seat, it is from the left shoulder
Intra-abdominal injuries	• Common site: Mesentery(most common)
Vertebral injuries	• Distraction (separation of the joint) o If only lap belt-Hyperflexion of the spine (lumbar vertebra)

Patterned bruise



Q3.17: What is a Chance/Fulcrum fracture?

Answer:

- Chance/ Fulcrum fracture: Distraction on posterior side + Compression on anterior side → Posteroanterior fracture of vertebra (transverse fracture)

Q3.18: What injuries are common to both drivers and front seat passengers in a car accident, and which injury is exclusive to the driver?

Answer:

- All driver injuries are seen in the front seat passenger (except the steering injury)
- Windshield (sparrow foot sign, dicing injury)
- Whiplash injury (cervical injury, soft tissue injury)
- Seat belt injury (patterned bruise in the front passenger, starts from the left shoulder)
- Instead of a steering injury, a dashboard injury is seen

Q3.19: What are the typical injuries seen in a dashboard injury, and which nerve is most commonly affected?

Answer:

- 3P's: Patella fracture/ Posterior cruciate ligament injury/ Posterior dislocation of the hip
- The most common nerve injury is the Sciatic nerve

BIG QUESTION 4: What are the different types of asphyxial deaths, and what are their mechanisms, characteristic features, and medico-legal significance?

Broad Answer:

- Asphyxia = Pulselessness/Hypoxia
- Asphyxial death is a term used to describe death caused by a lack of oxygen to the body's tissues and organs

DETAILED QUESTIONS

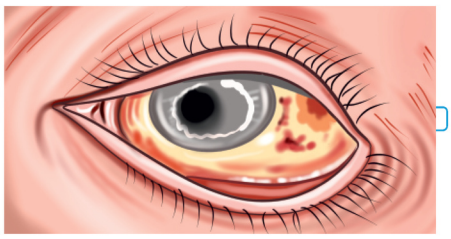
Q4.1: What are the signs of asphyxia and what are their characteristics?

Answer:

- Signs of asphyxia: Triad- CPC (C: Cyanosis, P: Petechial hemorrhage, C: Congestion)

1. Cyanosis	• Peripheral • M/c seen in the Nail bed, Ear, and Nose. • Reason: Deoxy Hb > 5gm%.
2. Petechial Hemorrhages	• Pinpoint hemorrhages. • Size: 0.1-2 mm • Reason: Asphyxia causes increased capillary pressure, resulting in damage to capillaries and venules. • Common sites: Eyelids, Conjunctiva, Forehead, Visceral Pleura, and Peritoneum.
3. Congestion	• Visceral congestion. • The liver, lungs, and heart are involved. • Mechanism: increased permeability of capillary.

- Other Findings
  - Right Ventricular Enlargement
  - PM fluidity of blood



Tardieu Spot in Eye

Q4.2: Why is neck dissection performed last during post-mortem examination in asphyxial deaths, and what is the significance of the Bayard spot?

PYQ: NEET PG 2020

Answer:

- Incision: modified Y incision
- Neck dissection should be done last to obtain a bloodless field
- This is to avoid Prinsloo & Gordon Artifact (hemorrhage on the anterior aspect of the cervical spine, Posterior to the trachea and Esophagus)
- Also known as Bayard Spot
  - It is a Petechial hemorrhage
  - It is mainly seen in the Visceral Pleura
  - Mechanism: Acute rise in Venous pressure

Q4.3: What are the types of asphyxial deaths?

Answer:

- Hanging
- Strangulation
- Suffocation

Q4.4: What are the key features and mechanisms of death in hanging?

Answer:

- The most common asphyxial method
- Suspension of the body with a Ligature that encircles the neck
- Constricting Force: Weight of the body

Q4.5: What are the types of hanging?

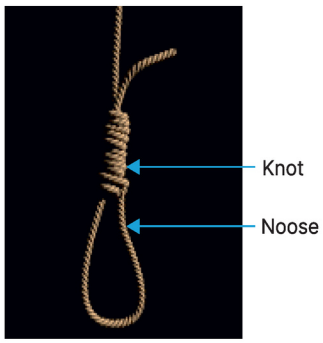
Answer:

- Suicidal: Most common
- Homicidal: Rare
  - o This method is known as lynching (A group of people hang someone)
- Accidental: Not very common
- Judicial: It is the method of the death penalty in India.

Q4.6: How is hanging classified based on the position of the knot?

Answer:

- Typical: If the position is on the Occiput
- Atypical: It is the position of the knot at any place other than the occiput



Q4.7: What are the different types of suspension in hanging, and how much pressure is needed to cause death?

Answer:

Complete	Incomplete
• No part is touching the ground • Constricting Force: Entire body weight	• Also known as Partial hanging • Some parts of the body touch the ground • Constricting Force: Weight of the head (around 4-5 kg)

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

Q4.8:What are the causes of death in hanging?

Answer:

- M/c Cause of Death: Asphyxia, venous congestion (in hanging)
- Others:
  - o Carotid artery damage leads to cerebral anoxia
  - o Reflex vagal inhibition
  - o Fractures or dislocation of vertebrae

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- Delayed cause:
  - HIE (m/c cause)
  - Aspiration Pneumonia
  - Laryngeal Edema
  - Infections

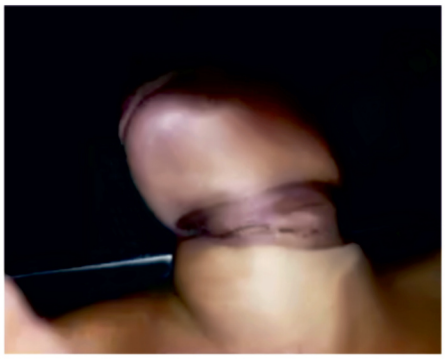
Q4.9: Elaborate on the differences between fixed and running knots

Answer:

Fixed-knot	Slip Knot
• The ligature mark is oblique • Incomplete	• The ligature mark is transverse • It could become complete

Q4.10: What are the PM findings in Hanging?

Answer:



Hanging Ligature mark

- 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 up to the thyroid & in 10% at the level of the thyroid, the remaining 5% below the thyroid
- Complete/incomplete depending on the Knot.
  - Classical Triad: CPC (C: Cyanosis, P: Petechial hemorrhage, C: Congestion)
- Facial congestion occurs in partial hanging due to venous blockage, while the arterial supply remains intact
- PM staining: Seen in the upper limb & lower limb, known as the glove-stocking pattern

Q4.11: What is the appearance of a ligature mark on dissection in a case of hanging?

Answer: Pale, White, Glistening parchment, like when you dissect a Ligature Mark

Q4.12: What is Amussat's sign, and in which type of hanging is it commonly seen?

Answer:

- Amussat's sign is seen when you have a long drop
- Common judicial hanging
- There is a horizontal or transverse tear in the carotid artery

Q4.13: What is Simon's hemorrhage, and where is it typically located in the body?

Answer: Simon's Hemorrhage: Hemorrhage into the outer layer of the intervertebral disc of the lumbar and lower thoracic vertebrae (below the anterior- longitudinal ligament)

Q4.14: What causes dribbling of saliva in antemortem hanging?

Answer:

- Dribbling of Saliva is the most common finding of AM hanging (died due to hanging)
- It is due to stimulation of the Pterygopalatine Ganglion (submandibular gland)
- The opposite side of the knot

Q4.15: What is La Facies Sympathique, and what causes it in antemortem hanging?

Answer:

- La Facies Sympathique is an important finding of AM hanging
- It occurs due to stimulation of the cervical sympathetic chain by a knot
- On the same side of the knot, the eye remains open & the pupil dilated

Q4.16: What type of neck fracture is seen in hanging, and where does the hyoid bone typically fracture?

Answer:

- Fracture of the hyoid bone is seen in hanging
- At the junction of inner 2/3rd & outer 1/3rd
- This fracture is known as abduction or outward or anteroposterior compression fracture

Q4.17: What is sexual asphyxia (Kotzwainism), and what are the typical findings in such cases?

Answer:

- Accidental hanging
- Pressure on the carotid artery causes cerebral ischemia, leading to erotic hallucination
- If orgasm is there, you will release the pressure.
  - If it becomes persistent pressure, it leads to accidental death
- Common in young males
- Finding: The person will be in the bathroom, naked, with some pornographic material and semen discharge

Q4.18: What is judicial hanging, and how does it lead to death?

Answer:

- Death Penalty in India
- Hangman Knot:
  - The ideal site is below the chin, submental.
  - In India, the site is the lateral side (sub-aural) at the angle of the mandible
- Causes hyperextension of the neck, leading to Hangman's fracture
- Leads to Brainstem damage, causing instantaneous death

Q4.19: What is strangulation?

Answer:

- Strangulation is only the constriction of the neck & no suspension
- Mostly homicide > Accidental

Q4.20: What are the different types of strangulation, and how are they classified based on the method used?

Answer:

- Ligature
- Manual:
  - Throttling: Strangulation by hand
  - Palmar strangulation: Strangulation using the palm
- Mugging: Strangulation using the bend of the Elbow/Forearm
- Bansdola: Strangulation using a Bamboo Stick
- Garroting: K/a Spanish windlass
  - Judicial strangulation in Spain and Turkey
  - Homicidal





Garrotting

Q4.21: What are the causes of death in ligature strangulation?

Answer:

- A- Asphyxia
- C- Cerebral Anoxia
- V- Vagal inhibition leading to cardiac arrest
- F- Fracture

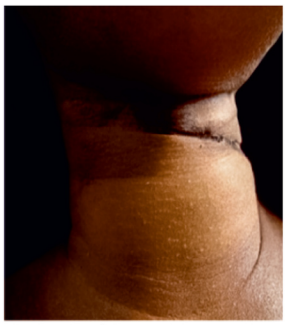
Q4.22: What are the external and internal PM findings in ligature strangulation?

Answer:

External	• Ligature marks are generally transverse and complete or below the level of the thyroid cartilage • Peri-ligature injuries and hemorrhages are seen • The classical triad of asphyxia(CPC) is more prominent • Face: congested • Petechial hemorrhage- present on the face • Subconjunctival hemorrhage is present & bleeding from the nose and mouth can be seen • Signs of Struggle: injuries on the body
Internal	• On dissection: Hematoma, Hemorrhage, bruising in neck tissue, glands, and muscle • 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



Victim lying on the floor showing sharp ligature mark



Front side of the nect showing thin, sharp and partial ligature mark (5mm width)

Q4.23: What are the key features and forensic significance of throttling?

Answer:

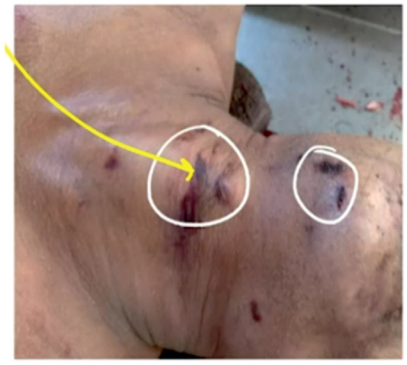
- Always Homicidal
- Thyroid fracture & hyoid bone fracture (30-50% cases) is present

Q4.24: What are the external and internal PM findings in throttling?

Answer:

External findings	• Abrasion of the nail, neck semilunar, cross-centric over the neck (important finding) • Bruises: Oval, round-shaped because of fingertip pressure. These are known as Sixpenny Bruises (like coin shapes) • Face congested, Petechial hemorrhage, and Subconjunctival hemorrhage present • Bleeding from the mouth and nose • CPC

Internal findings	• On dissection of the neck, Bruises/contusions of different neck muscles are present • A hyoid fracture is an example of an adduction fracture or inward compression • Cricoid fracture is very rare but specific



Q4.25: In which form of neck compression is hyoid bone fracture most commonly seen?

Answer: Hyoid fracture is most common in throttling > hanging > Ligature strangulation

Q4.26: In which type of strangulation is thyroid cartilage fracture most commonly observed?

Answer: Thyroid fracture is most common in Ligature strangulation

Q4.27: What is suffocation, and how does it differ from other forms of asphyxial death?

Answer:

- Suffocation is a blockage of the airway without neck compression and suspension
- The purest form of asphyxia with CPC is always present

Q4.28: What are the methods of suffocation?

Answer:

- Smothering
- Choking
- Gagging
- Café coronary
- Traumatic asphyxia/Perthe's syndrome
- Positional asphyxia
- Overlaying
- Burking
- Wedging

Q4.29: What are the postmortem findings of smothering, and what is its usual manner of death?

Answer:

- Smothering is the blockage of the mouth and nose
- PM findings: CPC, Abrasion (face, semilunar, crescentic), contusion (mouth & lips), laceration (tear in frenulum of lip)
  - o After dissection of this contusion, there will be a hematoma or hemorrhage
  - o It is always homicidal







Smothering

YOURWISH

Q4.30: What is choking, what commonly causes it, and how is it managed?

PYQ: NEET PG 2020

Answer:

- In choking, the airway is blocked using any object
- Common in children
- Example: By coin
- Most of the time, accidental
- The Heimlich maneuver can be used for choking

Q4.31: What is gagging and what is its typical manner of death?

Answer:

- Gagging is a form of asphyxia that results from forcing a gag, such as rolled-up cloth, paper, etc., deep into the mouth or oropharynx
- Always Homicidal

Q4.32: What is Café Coronary, and how does it lead to sudden death during meals?

Answer:

- Termed by Roger Haugen
- Café Coronary: Healthy individuals experiencing an abrupt collapse during meals without any evident signs of asphyxia, respiratory distress, or neurological symptoms
- Intoxication can lead to swallowing food as a bolus, causing mechanical asphyxia in the larynx/pharynx
- Death occurs due to reflex vagal inhibition, inducing cardiac arrest, as intoxicated individuals have suppressed cough reflexes.

Q4.33: What is traumatic asphyxia (Perthes' syndrome), and what is the characteristic postmortem finding?

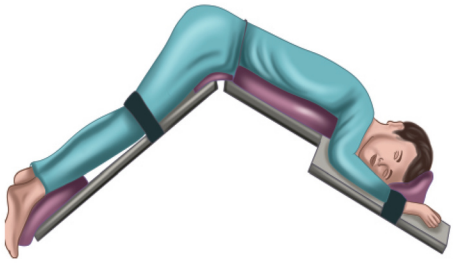
Answer:

- Due to trauma→ Chest fixed & not to respirate.
- Seen in an earthquake leading to building collapses, Stampede
- Masque ecchymotique: Line of Demarcation (Cyanosed above the line and pale below the line)

Q4.34: What is positional asphyxia, and in which body positions is it commonly seen?

Answer:

- Jack-knife position/Inverted Crucifixion
- The cause of death is positional asphyxia



Q4.35: What is overlaying?

Answer:

- **Example:** A mother sleeping beside a child comes over the child, then the face is occluded, leading to smothering. This is known as overlaying

YOURWISH

Q4.36: What is Burking, and how is it carried out as a method of homicide?



Answer:

- William Hare and Burk introduced the term "Burking," which refers to a method of homicide involving traumatic asphyxia and homicidal smothering
- It entails sitting on the chest and smothering the victim

Q4.37: What is wedging, and what is its most common manner of death?

Answer:

- If any child comes between 2 surfaces & not able to breathe it is called Wedging

Q4.38: What is drowning and what are the types of drowning?

Answer:

- It is the immersion of the body in water or liquid
- Most common is accidental > suicidal > Homicidal
- Types include:
  - Wet Drowning / Typical Drowning / Primary Drowning
  - Dry drowning
  - Hydrocution
  - Near/Delayed/Secondary Drowning/Post-Immersion Syndrome

Q4.39: What happens in wet or typical drowning, and how does the amount of water aspirated affect the cause of death?

PYQ: AIIMS 2020

Answer:

- In Wet Drowning, the 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 the water going into the lungs are more (10/12 ml/kg), there are two types:
  - Freshwater drowning
  - Sea / Saltwater Drowning

Q4.40: What are the differences between Freshwater drowning & Sea / Saltwater Drowning?

Answer:

Freshwater Drowning	Sea / Saltwater Drowning (contains Na, Mg, Cl)
• Hypotonic fluid → Pulmonary Capillaries → Hemodilution. • To neutralize fluid, RBCs are lysed and liberate K^+ causing **Hyperkalemia.** • Hyperkalemia causes VF → Cardiac arrest. • The fatal period is 5 min.	• Hypertonic fluid → Pulmonary Capillaries → Hemoconcentration • Pulmonary Edema present • There will be Hyponatremia. • Can cause bradycardia & cardiac arrest. • Respiratory distress because of edema. • The fatal period is 10 min

Q4.41: What is dry drowning, and how does it differ from typical drowning?

Answer:

- In dry drowning, the water doesn't enter the lung, but it causes reflex laryngospasm (due to V cord Spasm)
- It is an atypical Drowning

Q4.42: What is hydrocution, and how does cold water lead to sudden death in this condition? PYQ: NEET PG 2021

Answer:

- Also known as Submersion or immersion syndrome, cold water drowning
- Shock 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

Q4.43: What is secondary or delayed drowning, and what are the common complications leading to death?

Answer:

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

Q4.44: What are the key external and internal postmortem findings in antemortem drowning?

Answer:

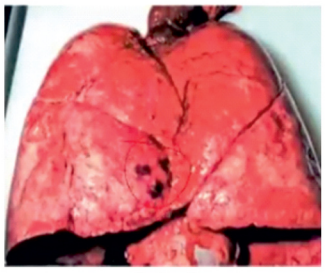
- AM Drowning: Died in Water

PYQ: INICET 2022, 2023

External	• Cadaveric Spasm (m/c sign): Clenched hand with grass particle. Indicates struggling in the water. After death, the hand remains spasm o Water → airway → mucoid froth (water + mucus + air) o This effect is known as a churning effect • Features of froth include fine, white, leathery, tenacious and copious secretion from nose and mouth • Froth without mucus is seen in deaths such as snake/opium poisoning, electric shock, epilepsy death and pulmonary edema
Internal	• Lungs are Voluminous with Rib Marking o Emphysema Aquosum is seen in conscious people • Froth is present because there is mucus (Frothy water) • Lung shows marble appearance (alveoli ruptured, damaged, thin) o 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 • Subpleural hemorrhage o Mainly because of forced expiration → Alveoli ruptured o Mainly on the anterior lower lobe at the margin • Mud particles & water are present in the stomach & small intestine • Mud particles in the Trachea is also a specific finding


Cadaveric spasm




Paltauf

Q4.45: What is PM drowning?

Answer: PM drowning is when a person dies outside and body is then put into water

Q4.46: What are the important diagnostic signs used to confirm antemortem drowning during autopsy?

Answer:

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	• Weight of both lungs + weight of pleural effusion / Weight of spleen • If >14.1%, it suggests AM drowning

Q4.47: What are the non-specific findings seen in both AM and PM drowning?

Answer:

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). 

Q4.48: What are diatoms, and how are they used to confirm a case of drowning?

Answer:

- Diatom is a unicellular algae found in water.
- There are two types:
  - Oligo halophilic in freshwater
  - Poly halophillic in seawater

- Diatoms have a silica wall, resist putrefaction, and can enter the body through water, penetrating pulmonary capillaries
- Detection is best in bone marrow (Best bone: Femur) and spleen
- An acid digestion test using nitric acid is conducted, and diatoms, due to their silica covering, remain intact
- The presence of diatoms is suggestive of accidental drowning

Q4.49: What is Gettler's test, and how does it help differentiate between freshwater and seawater drowning?

Answer:

- The chloride ion test for heart chambers involves comparing concentrations between the left and right sides
- A difference of over 25% suggests AM drowning
- In freshwater drowning, the right side concentration is higher, while in seawater drowning, the left side concentration is higher
- Not useful in Putrefaction, Patent Foramen Ovale or Dry Drowning
- High serum strontium and magnesium in the left ventricle indicate Seawater Drowning

10. THERMAL INJURY

BIG QUESTION 1: What are the core features and forensic significance of hypothermia and how is it identified postmortem?

Broad Answer: Hypothermia occurs when the core body temperature falls below 35°C, leading to bradycardia, hypotension, respiratory depression, and eventual loss of reflexes and consciousness. Postmortem findings include bright pink lividity, Wischnewski spots (necrosis in gastric mucosa), pancreatic fat necrosis, and adrenal lipid depletion. Two unique behaviors seen in hypothermia victims are paradoxical undressing and the "hide and die" phenomenon, which may simulate sexual assault or homicide, making hypothermia a critical differential in forensic death investigation.

DETAILED QUESTIONS

Q1.1: What is the body temperature threshold for hypothermia?

Answer: Hypothermia occurs when the body temperature falls below 35°C.

Q1.2: What are the signs of Hypothermia?

Answer:

- Clouding of consciousness
- Disorientation
- Loss of Reflexes
- Respiratory rate, heart rate, and blood pressure become low

Q1.3: What are the postmortem findings in hypothermia?

Answer:

- Skin becomes **pale**
- **Postmortem lividity**: Bright pink
- **Wischnewski spot**: Necrosis of stomach mucosa (blackish-brown)
- **Fat necrosis** of the pancreas in 50% of cases
- **Lipid depletion** in the adrenal gland
- **Internal organs**: Congested

Q1.4: What are the localized effects of cold?

Answer:

- Trench foot
  - It is also known as immersion foot.
  - It is caused due to a moist, cold.
  - It occurs in soldiers, sellers, and people in the trenches.
  - Mechanism: The area becomes red, cyanosis, pulsations are absent, necrosis and gangrene.
  - It is seen at 5 to 8°C



- If the hands are immersed in cold places, it is known as trench hands.
- Frostnip-frostbite
  - o It is caused due to a dry cold

Q1.5: Differentiate between frostnip and frostbite

Answer:

Frostnip	Frostbite
• It is the first effect produced by dry cold	• It is the second effect produced by dry cold
• It has a nonfreezing effect	• It has a freezing effect
• It is a superficial injury	• It can be a superficial as well as a deep injury
• It is non-permanent damage	• It could be permanent damage
• The mechanism is vasoconstriction	• A mechanism is a form of ice crystals (because frostbite is seen at a freezing temperature of -2.5°C, so that will cause a freezing effect, and there will be the formation of ice crystals, which will produce ischemia as well as gangrene)
	• The most common sites are the nose, ear, and face
	• Skin becomes hard and black in two weeks
	• It is always an antemortem injury
	• Treatment: Rewarming is done at 42-44° C, protection from cold, and if infection is present, then antibiotics and anti-tetanus treatment



Q1.6: What are the types of heat injury?

Answer:

PYQ: FMGE 2021 PYQ: AIIMS 2020

Heat cramp	Heat exhaustion	Heat stroke
• It is also known as a miner's cramp or fireman's cramp	• It is also known as heat syncope or heat prostration	• It is also known as sunstroke or thermic fever or heat hyperpyrexia
• Due to increased sweating, there is loss of electrolytes (sodium and potassium) and water which leads to muscle cramps in the hands, legs, and abdomen.	• Increase in heat causes excessive sweating and there will be loss of electrolytes and fluid (because of this there will be decreased **venous return** and it will cause decreased **cerebral Perfusion**)	• High body temperature more than 104°F/45°C, resulting in cessation of sweating as the thermoregulatory center is stopped
• It is common in people working in miners and fire industries.		• Mechanism- thermo regulatory center stopped and the hypothalamus stopped working. • Pupil- constricted • Sweating- stopped (anhidrosis).

• Treatment- fluids, and electrolytes are given.		

Q1.7: What is the minimum temperature and exposure time required to cause a local heat injury?

Answer:

- 44 °C for up to 5-6 hours
- 65 °C for up to 45 seconds

Q1.8: Differentiate between dry heat and moist heat.

Answer:

Dry Heat	Moist Heat
• K/a Flame burn • Singeing of hair • Blackening of skin + • Blisters +/- • Line of redness +	• K/a scald • Liquid/ Steam • Splashing • Skin: Sodden and bleaching • Line of redness present with vesicles • Charring, Singneing and ulceration are absent • Scalding can occur through clothes • Clothes worsen the damage

Q1.9: How can you define scald?

Answer:

- Scald is a liquid or stem over the body more than 60°C
- Liquid or stem temperature more than 70°C, it is called whole thickness scald.



BIG QUESTION 2: What are the core forensic differences between antemortem and postmortem burns, and how are they relevant in medicolegal investigation?

Broad Answer:

- Antemortem burns show vital reactions such as redness, blistering with proteinaceous fluid (albumin, chloride), and elevated levels of CO-Hb and cyanide due to inhalation of smoke while alive. Soot in the trachea is a hallmark finding. In contrast, postmortem burns lack vital signs—no redness, no enzymatic reaction, and blisters contain only air or clear fluid. These differences are crucial in determining whether the person was alive during the burn, which influences the ruling of **homicide**, **suicide**, or **accidental** death.

DETAILED QUESTIONS

Q2.1 What are the findings present in corrosive or chemical burns?

Answer:

- Ulcerated patches which are free from blisters
- Hairs are not signed
- Red line of demarcation absent
- Show distinct coloration of skin

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Q2.2: What are the different classifications of burns?

Answer:

Dupuytrens	Herbas	Wilson	Modern classification
1° 2° 3° 4° 5° 6°	1° 2° 3°	Epidermal Dermo epidermal Deep burn	Superficial burn Deep burn

Q2.3: Give Wilson classification of burns

Answer:

	Epidermal	Dermo epidermal	Deep
Pain	Present	Present (Most painful)	Painless because nerve endings are damaged
	1°-2° dupuytrens	3°-4° dupuytrens	5°-6° dupuytrens

Q2.4: What is necklacing in forensic medicine?

Answer:

- It is a homicidal burn, used in South Africa

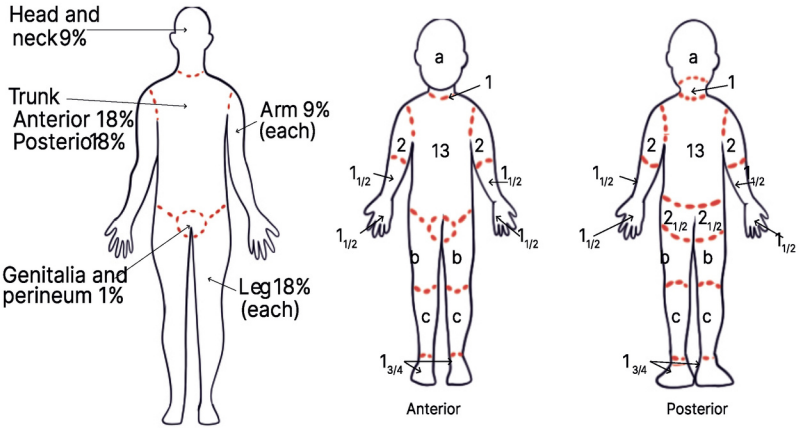
Q2.5: Describe the Rule of 9 in detail. How does it help in burn management?

PYQ: FMGE 2021

PYQ: NEET PG 2022

Answer:

- For total body surface area, Rule of 9 also known as Wallace rule is used.
- Adult
  - Head and Neck: 9%
  - Upper limb: Left 9% + Right 9%
  - Chest: Anterior 9% + Posterior 9%
  - Abdomen: Anterior 9%+ Posterior 9%
  - Lower limb: Right: anterior 9% + posterior 9%
  - Lower limb: Left: anterior 9% + posterior 9%
  - 1% is for genitalia and Perineal.
  - 11 × 9 i.e., 99%. + 1 %
- In children till infant age:
  - The head and neck are big and are 18%.
  - The lower limb is 13.5 for the right lower limb, and 13.5 for the left lower limb



Q2.6: What is the relative percentage of body surface area (%BSA) affected by growth for the head, thigh, and lower leg at different ages?

Answer:

Body part	Age				
	0 yr	1 yr	5 yr	10 yr	15 yr
a = ½ of head	9½	8½	6½	5½	4½
b = ½ of 1 thigh	2¾	3¼	4	4¼	4½
c = ½ of 1 lower leg	2½	2½	2¾	3	3¼

Q2.7: What are the differences between the Rule of 9 and Lund & Browder chart? When is each used?

Answer:

- Rule of 9: Used for adults, quick estimation.
- Lund and Browder chart: Preferred in children due to body proportion variation.

Q2.8: Where is the rule of palm used?

Answer: It is used for patchy burns.

Q2.9: What is the Parkland formula, and how is fluid resuscitation planned in burn cases?

Answer:

- Crystalloid (Ringer lactate) is the Fluid of choice.
- 4 ml/ kg Iv fluid is given (half of the fluid is given in 1st 8 hrs and remaining half is given in the next 16 hrs, total duration is 24 hrs

Q2.10: Discuss the causes of death in burn cases with timeline and most common causative agent.

Answer:

- Immediate: Asphyxia, Carbon monoxide intoxication Asphyxia
- Early- within 48 hrs: hypovolemic shock, In 3-4 days acute renal failure
- Late: 4-5 days septic shock
- Overall MCC: Septic shock
- Bacteria: Pseudomonas

Q 2.11: What are the postmortem findings in burn cases?

Answer:

- Smell: Kerosene/petroleum /chemicals
- Rigor mortis, livor mortis, Algor mortis - sometimes these are not appreciable.
- Crowfeet sign - some area of the face will be spared from burn

	Antemortem	Post -mortem
Lines of redness	Present	Absent
Vital Reaction	Present (periphery +, center -)	Absent
Enzymatic reaction	Present (periphery +, center -)	Absent

Blister	Albumin protein + chloride	Air + thin fluid
CO-HB	Elevated Level	Normal level
Cyanide	Increased level	Normal level
Carbon particle /soot particle	Carbon particle in trachea (most characteristic)	Absent
Curling ulcer	Most common site is 1st part of duodenum	Absent

Q2.12: Describe pugilistic attitude. How is it formed and what is its forensic significance? PYQ: NEET PG 2023

Answer:



- It is also known as boxing attitude, fencing attitude or heat stiffening.
- It is a contraction of muscles that causes a specific posture.
- It is seen when the temperature gets more than 65°C
- Above this temperature coagulation and denaturation of muscle protein occurs.
- It can be mistaken as the rigor mortis.

Q2.13: What is a heat rupture? How is it identified and distinguished from traumatic wounds?

Answer:



- It is mainly due to dehydration, coagulation of skin
- Skin and underlying tissues are ruptured.
- Areas: Extensor, fleshy, joint area is involved.
- Blood vessels and nerves are intact
- Bleeding, bruise, vital reactions are absent
- It can be mistaken as incised wound / lacerated wound

Q2.14: Define heat hematoma. How is it differentiated from epidural hematoma?

Answer:

- Found in the cranial cavity due to rupture of dural venous sinuses from heat
- Location: Above dura mater
- Appearance:
  - o Chocolate brown color
  - o Honeycomb structure
- Mimics extradural hematoma (trauma)
- Differentiation is key in fire deaths to avoid misdiagnosis of trauma

Q2.15: What are thermal or heat fractures? How is it different from traumatic fractures?

Answer:

- Fractures caused by intense heat, especially in skull and long bones
- Also called street or avenue fractures when in long bones
- May cross suture lines, unlike trauma fractures
- No surrounding hemorrhage or vital reaction
- Important to differentiate from blunt force trauma

Q2.16: What are puppet organs in forensic pathology?

Answer: Internal organs are shrunken, firm and fixed

BIG QUESTION3: How does electrocution cause death and what are the characteristic forensic findings seen in such cases?

Broad Answer: Electrocution causes death mainly by ventricular fibrillation or respiratory failure (brainstem or diaphragm involvement). AC is more dangerous than DC due to tetanic muscle contractions. Characteristic forensic findings include early rigor mortis, Joule burns (entry wounds), crocodile flash burns, and bone pearls (molten calcium phosphate). Holding-on spasm, myoglobinuria, and entry/exit wounds help confirm the diagnosis and trace the current path.

DETAILED QUESTIONS

Q3.1: Write a few basic facts regarding electrocution.

Answer:

- **AC vs DC:** Alternating current (AC) is 4-5 times more dangerous than direct current (DC) because it causes tetanic contraction.
- **Fatality factors:** Depends on voltage and amperage (ampere is more important).
- **Holding-on spasm:** Tetanic spasm can cause prolonged contact, increasing injury.
- **Judicial electrocution:** Still practiced in some states of the USA.

Q3.2: Describe the mechanism of electrocution and causes of death.

Answer:

- Mechanism: Current disrupts cardiac/respiratory centers
- Most common cause of death: Ventricular fibrillation
- Other causes:
  - Respiratory failure (brainstem or diaphragm involvement)
  - Rhabdomyolysis → myoglobinuria

Q3.3: In electrocution, which tissue is most resistant, and what is considered the most dangerous current pathway?

Answer:

- **Most resistant tissue:** Dry skin
- **Most dangerous circuit:** Entry at the **right hand** and exit at the **left foot** (current passes through the heart).

Q3.4: Elaborate on he postmortem findings in electrocution.

Answer:

- Rigor mortis comes early
- Local hemorrhages and tears of muscles.
- Pit-like defects in the superficial surface of hair are caused by the arching of the current.
- Due to electrodes or wires, the molten metal that is the current path goes deep into the soft tissue
- Molten calcium phosphate from bone, called bone pearls or wax drippings, is detected in radiological investigations
- When electricity goes into muscles ,it causes rhabdomyolysis and myoglobinuria.

YOURWISH

Q3.5: What is a Joule burn? How is it identified and what is its forensic importance?

Answer:



- It is seen in low voltage electrocution and with firm contact.
- It is an entry wound
- It is known as joule burn. After touching wire, electricity goes inside the body and heat is produced in the body and because of the heat it is an endogenous burn.
- It can be of oval shape or round shape.
- It is like a crater, the central area is depressed or compressed and the peripheral area is raised. Mechanism is coagulation of dermis and elongation

Q3.6: Differentiate between types of electric burns based on contact and voltage.

Answer:

Loose contact with high voltage

- It produces multiple pitted/punched out burns known as crocodile flash burns.

Loose contact with air gap

- It produces an exogenous burn known as flash burn or spark. (Patchy area)

Q3.7: Explain lightning injuries, their mechanism, and typical forensic features.

Answer:

- It is an electric discharge from clouds.
- It is mainly direct current but is more dangerous because this direct current has high voltage.
- It is accidental
- It is known as keraunographic marking
- It is known as filigree burn.
- It is also known as arborescent marking and lichtenberg margin.
- The most common site is shoulder flings
- Its mechanism is denaturation of RBC which causes hemoglobin staining of the blood.
- It has an erythematous and branching tree pattern I (ferning)
- It is seen for up to 24 hours.



Q3.8: Explain the Spencer theory of lightning.

Answer:

- Direct effect is because of high voltage
- Superheated air of lightning produces burn
- Expanded and compressed air
- Sledge-hammer effect: Air is compressed in front of lightning injury

Q3.9: What other injuries or effects are caused by lightning?

PYQ: NEET PG 2023

Answer:

- Flame effect: Burn on the body
- Blunt trauma: Heat Injury or other organ injury

11. BALLISTICS

BIG QUESTION 1: What are the fundamental concepts and components of forensic ballistics in relation to firearms?

Broad Answer: Forensic ballistics is the scientific study of the motion and effects of projectiles (like bullets or lead shots), especially in relation to crimes involving firearms. It includes the structure and classification of firearms, their ammunition, types of ballistic analyses, and specific features like rifling, choke mechanisms, and cartridge construction.

DETAILED QUESTIONS

Q1.1: Who is considered the father of ballistics, and what is the definition of ballistics?

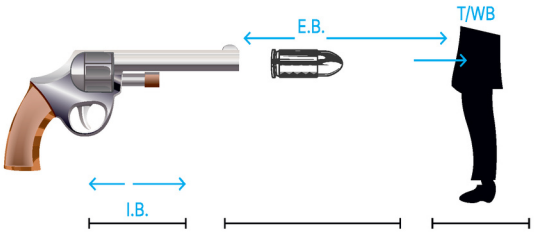
Answer:

- Father of Ballistics: Calvin Goddard
- Ballistics: Study of projectile motion (e.g., bullets, lead shots)
- Forensic Ballistics: Study of the firearm (weapon), ammunition (bullet + explosives), and wound.

Q1.2: How is ballistics classified based on the path of the projectile?

Answer:

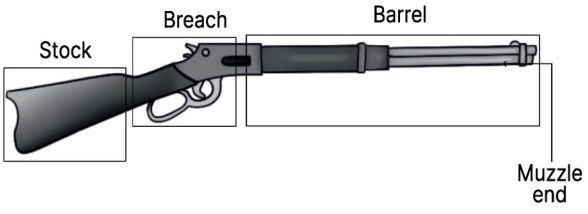
Proximal (internal) Ballistic	Study of the projectile in firearm weapons.
Intermediate (exterior) Ballistic	Study of the motion of the projectile - gun barrel till the time it hits the target.
Terminal Ballistics	Penetrate their target.
Wound Ballistic	Penetration in living tissue.



Q1.3: What are the components of a rifle, and how is rifling useful?

Answer:

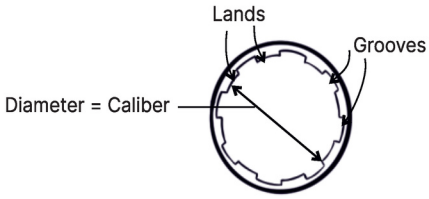
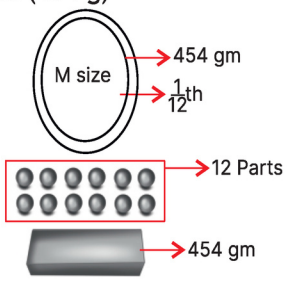
- Parts of a Rifle: Breach, barrel, stock, muzzle
- Rifling: Grooves and lands in the barrel
- Advantages of Rifling:
  - Spin and rotation of bullets
  - Increased range and accuracy
  - It checks the wobbling effect
  - Gyroscopic stability
  - Enhances wounding power
  - Increased kinetic energy (KE = ½ mv²)





Q1.4: How are firearms classified?

Answer:

Feature	Rifled Firearm	Smooth Bore Firearm
Barrel Condition	Grooved (lands and grooves)	Smooth
Projectile in cartridge	Bullet	Pellets (lead shots)
Range	High	Low
	Caliber/Gauge: Distance between two opposite lands 	Bore/Gauge: Number of balls/pellets of equal size/weight in a pound of lead (454 g) 
Example	Rifle	Shotgun

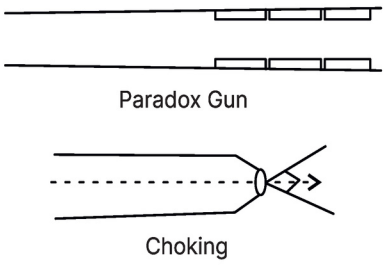
Q1.5: What is the function of a helixometer?

Answer: It is used to examine the inner surface of a firearm barrel

Q1.6: What is a Paradox gun and choking?

Answer:

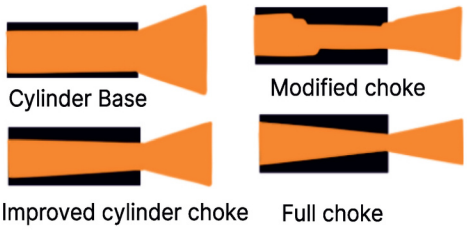
- Choking: The muzzle end of a shotgun is constricted to:
  - Lessen the rate of speed of the shot
  - Increases the velocity of pellets
- Paradox Gun: It is a shotgun in which a part of the barrel towards the muzzle is rifled



Q1.7: What are type types of choking?

Answer:

Unchoked or cylindrical base	Its range is 25 yards
Improved cylindrical choke	Its range is 30 yards.
Modified cylindrical choke	Its range is 35 yards.
Full choke	Its range is 40 yards.



Q1.8: What are the effective ranges of different firearms?

Answer:

- Shotgun: 50-60 yards (smooth bore)
- Revolver: 200 yards
- Pistol: 400 yards

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- Military Rifle: 1000-3000 yards
- Air Gun: 40 yards (no tattooing/blackening/singeing; uses air compression)

Q1.9: What are the components of a cartridge?

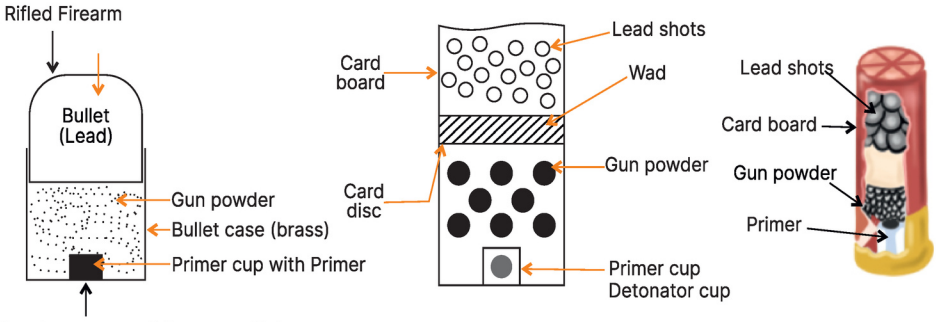
Answer:

- **Primer** - Ignites the propellant.
- **Propellant** - Gunpowder that produces gas to propel the projectile
- **Projectile:**
  - In **rifles:** Bullets
  - In **smooth-bore firearms:** Pellets
- The cartridge is **loaded within the firearm.**

Q1.10: What are the components of a cartridge in different firearms?

Answer:

Rifled Firearm Cartridge	Smooth Bore Firearm Cartridge
• Bullet (Lead) • Gunpowder (Propellant) • Bullet Case (Brass) • Primer Cup	• Pellets • Primer/Detonator cap • Gunpowder • Cardboard discs (Wad)



- Revolvers don't eject cartridges on firing

Q1.11: What is the function of the wad in a shotgun cartridge?

Answer:

- Present in shotgun
- Separates projectile from propellant
- Seals air
- Acts as a piston and lubricant

Q1.12: How are lead shots classified?

Answer:

- Based on composition:
  - Soft: Composed of lead
  - Hard: Composed of lead and antimony
  - Steel: Composed of steel
- Based on size:

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- Dust shot (smallest)
- Birdshot
- Buckshot (largest)

Q1.13: What is the primer made of, and what is its function?

Answer:

Primer Composition (Mnemonic: BLAST):

- **B:** Barium nitrate
- **L:** Lead peroxide
- **A:** Antimony
- **S:** Styphnate/Sulphide
- **T:** Tetrazine

Function of Primer:

- The detonator explodes when the trigger is pulled
- Flame ignites gunpowder
- Pressure builds up and expels a projectile

BIG QUESTION 2: What are the different types of gunpowder, and how is gunshot residue detected in forensic ballistics?

Broad Answer: Gunpowder types vary based on their chemical composition and the volume of gases they produce. Gunshot residue (GSR), composed of primer and gunpowder components, can be detected by various forensic tests, each designed to identify specific elements like lead, antimony, and barium.

DETAILED QUESTIONS

Q2.1: What are the types of gunpowder and their composition?

Answer:

Type	Composition	Characteristics
Black Gunpowder	**Mnemonic: POCSO** • P - Potassium Nitrate (75%) • C - Charcoal (15%) • S - Sulphur (10%)	• Produces more smoke and has less power • 1 gm → 3000-4000 cc gas • Used in traditional firearms
Smokeless Gunpowder	• Nitrocellulose (single base) • Nitrocellulose + Nitroglycerine (double base) • Nitrocellulose + Nitroglycerine + Nitroguanidine (triple base)	• Less smoke, more power • 1 gm → 12000-13000 cc gas • Used in modern firearms
Semi-Smokeless	• 80% black + 20% smokeless powder	• Designated as FG, FFG, FFFG, etc.

Q2.2: What does the designation FG, FFG, FFFG mean in black powder?

Answer:

- Represents the fineness of gunpowder
- The higher the number of F, the greater the fineness and the higher the power

Q2.3: What are the main components of gunshot residue (GSR)?

Answer: Primer, Gunpowder, and Lead

Q2.4: What are the different tests used to detect GSR?

Answer:

Test	Elements Detected	
Harrison & Gilroy	Antimony, Barium, Lead	
Atomic Absorption Spectrometry	Antimony, Barium, Copper, Lead	Flameless detection
Neutron Activation Analysis	Antimony, Barium, Copper	
Dermal Nitrate Test/Paraffin Test	Nitrates and Nitrites	Obsolete
SEM-EDXA (Scanning electron microscopy energy dispersive X-ray analysis)	Detailed elemental analysis of GSR	Most specific test

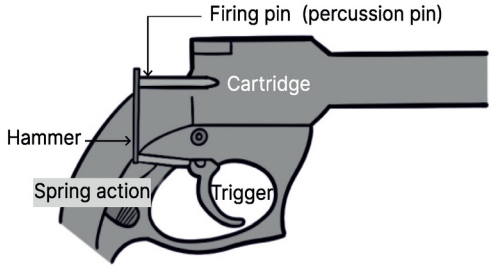
BIG QUESTION 3: What are the types of bullets, their effects, and the sequence of events during firearm discharge?

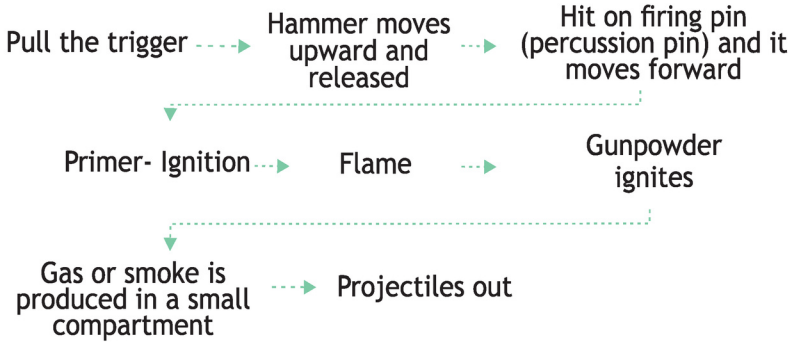
Broad Answer: Bullet behavior and damage depend more on velocity than mass. Bullets come in various types—each with distinct designs and forensic implications. The firing sequence involves mechanical and chemical steps, starting from pulling the trigger to the bullet exiting the muzzle.

DETAILED QUESTIONS

Q3.1: What is the correct sequence of events in firearm discharge (firing mechanism)?

Answer:





Q3.2: What is the primary factor determining bullet damage?

Answer:

- Damage depends on:
  - Velocity > Mass
- Large, round bullets have greater damage

Q3.3: How should bullets be collected at a crime scene?

Answer: Picked by hand to prevent artifacts or distortion of forensic evidence

Q3.4: What are the types and features of bullets?

Answer:

Souvenir bullet/ sleeping bullet	It is a retained bullet in the body or skin. Surrounding the bullet there will be fibrosis; it is composed of lead. So, it will cause lead poisoning, which is known as Plumbism.
Frangible bullet	It divides into multiple components. Composed of Iron and copper.
Tumbling bullet	Rotates end-to-end.
Duplex bullet	Two bullets in a cartridge.
Tracer bullet	Pathways can be traced as it liberates illuminating Substances.
Incendiary bullet	Contains phosphorus. It catches fire.
Yawning bullet	Slow and irregular bullet.
Tandem bullet	If two bullets are coming out, it is called tandem also known as **piggyback bullets.**
Plastic or Baton bullet	It is composed of polyvinyl chloride and used in riot control.
Poison bullet	Curare, resin. Any type of poison in a bullet is known as a poison bullet.
Ricochet bullet	• If a bullet is deflected from any intermediate object and goes into your body. • Critical Ricochet angle is **30 degrees.** • Spin and rotation lost, so no abrasion collar. • Burning, blackening, and tattooing all are absent.
Round nose tip bullet	Round Tip
Sharp nose bullet	Sharp pointed Tip
Fully jacketed bullet	Copper jacket
Semi-jacketed bullet	• Nose is not jacketed, expanded inside tissues • Two types of Semi-jacketed bullets are: o Dum-Dum bullets o Hollow pointed bullets • This causes more external damage due to expansion

Q3.5: What is the Kennedy phenomenon?

Answer:

- Surgical alteration of gunshot wounds
- During post-mortem, it is difficult to identify the entry and exit of wounds and range of wounds

Q3.6: What is the Rayalaseema phenomenon?

Answer: Implantation of bullets in stab wounds to mislead the investigation

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BIG QUESTION 4: What are the effects of firearm discharge on the human body, and how can range and wound characteristics be interpreted?

Broad Answer: When a gun is fired, multiple elements like flame, smoke, unburnt gunpowder, and projectiles cause different external effects on the body. These effects help forensic experts determine the range of fire and the type of weapon used. Additionally, wound margins show specific patterns like grease collar and abrasion collar that provide clues about the direction and nature of the fire.

DETAILED QUESTIONS

Q4.1: What are the components discharged from a gun and their effects?

PYQ: AIIMS 2019

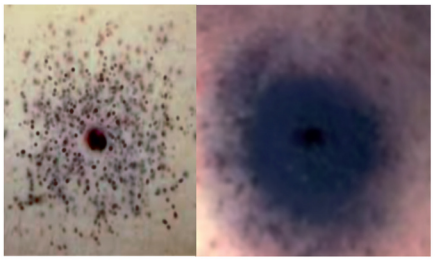
Answer:

Component	Effect
Flame	Causes burning of hair, singeing, or charring
Smoke	Smoke is deposited in the surrounding skin and causes blackening or smudging around the wound
Unburnt gunpowder	It impregnates and leads to tattooing/stippling/peppering as powder embeds in skin
Projectile	Bullet (rifle) Lead shot and Wad (shotgun)

Q4.2: How do you differentiate between blackening and tattooing?

Answer:

- Blackening (smudging) can be wiped off using a wet cotton cloth
- Tattooing (stippling) is impregnated in the skin and cannot be wiped off



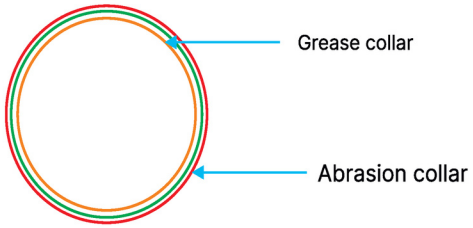
Tattooing Blackening

Q4.3: What is the difference between a grease collar and an abrasion collar?

Answer:

Feature	Grease Collar	Abrasion Collar
Cause	Bullet grease	Bullet spin and rotation
Specificity	More specific	Less specific
Location	Inner side of entry wounds of rifles	Outer side of entry wounds of rifles
		• Gives an idea about angulation o Perpendicular entry: Round collar o Oblique entry: Oval collar • It can be present in exit wounds if attached to a surface • Absent in palm and soles, as the bullet isn't spinning

- Present an entry wound
- Usually seen in rifles



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Q4.4: What are the characteristics of different types of contact wounds? PYQ: FMGE 2023

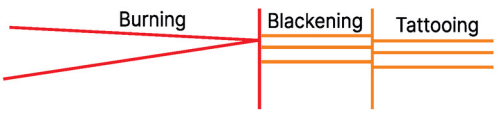
Answer:

Type	Features
Close/Tight Contact	• Circular entry would • Muzzle impression • Blackening/ Burning/ Tattooing inside • Blood and tissue may enter the barrel (Back spatter) • Round in shape
Loose Contact	• Smoke layer is formed (Corona) • Round in shape
Bone Contact	• Blowback phenomenon • Wound becomes stellate/cruciate due to energy & expanding gases rupturing the skin over bone 

Q4.5: What are the maximum ranges at which flame, smoke, and tattooing effects are seen for rifle vs shotgun?

Answer:

Effect	Rifle	Shotgun
Flame (Burning)	Up to 7 cm	Up to 15 cm
Smoke (Blackening)	Up to 30 cm	Up to 45 cm
Tattooing (Gunpowder)	60-90 cm	60-90 cm



BIG QUESTION 5: What are the distinguishing features of firearm entry and exit wounds, and how can bullet trajectory and identification be determined in forensic ballistics?

Broad Answer: Forensic evaluation of gunshot wounds helps in differentiating entry from exit wounds, assessing range of fire, and analyzing bullet and firearm characteristics. Techniques like examining metal fouling, primary/secondary markings, beveling of the skull, and fracture lines (Puppe's rule) are crucial for determining bullet type, weapon class, and sequence of fire.

DETAILED QUESTIONS

Q5.1: What are the key differences between entry and exit wounds in rifled firearm injuries?

Answer:

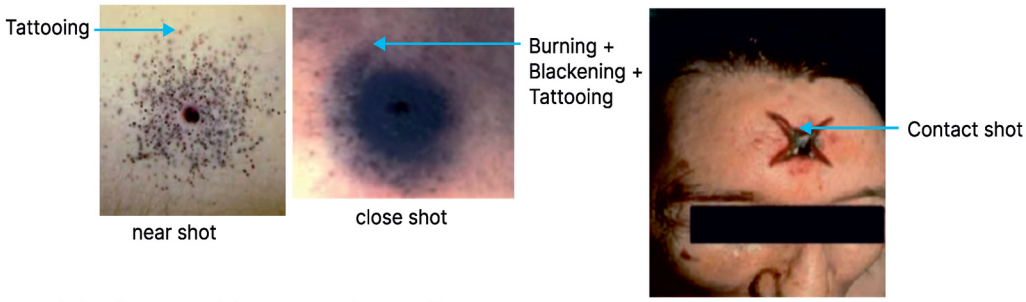
Character	Entry Wound	Exit Wound
Size	Small	Large
Margins	Inverted V	Everted Λ
Abrasion and Grease Collar	+	-
Burning + Blackening + Tattooing	+	-
Bleeding	Less	More
Cherry red color (due to CO + Hb)	**+ (maybe)**	-
Fat and soft tissue expulsion	-	+

Q5.2: How can the range of fire be determined using contact characteristics?

Answer:

PYQ: NEET PG 2019,2022 PYQ: INICET 2021 PYQ: FMGE 2021

Feature	Contact	Close Shot	Near Shot	Distant Shot
Muzzle impression	Present	Absent	Absent	Absent
Shape of wound	Stellate	Circular	Circular	Circular
Burning / Blackening / Tattooing	All present inside the track	All present	Only tattooing	Absent
Grease/Abrasion collar	Present	Present	Present	Present



Q5.3: What is metal fouling, and how is it formed?

Answer:

Metal fouling refers to tiny lesions around the entry wound due to metal fragments from:

- Surface of the bullet
- Interior of the barrel

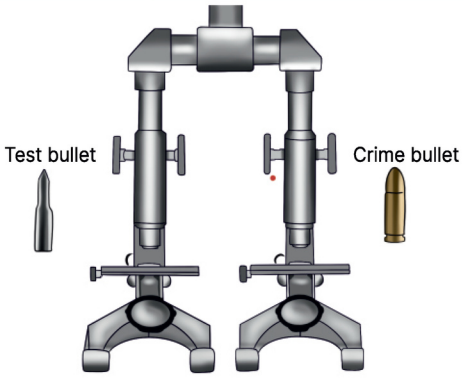
Q5.4: What are bullet fingerprints, and how are they classified?

PYQ: AIIMS 2018

Answer:

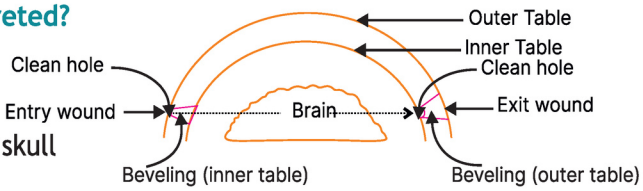
Primary marking	Secondary marking
• Rifling of barrel	• Irregularity inside the barrel
• Gives the model of weapon or gun.	• Cleaning, Manufacturing defects Rare and tear inside
• Provides class characteristic	• Provides individual characteristic
• According to Land/ groove	• Microscopic marking
• Gross marking	• If striations are present: **A comparison microscope** is used.

• Cherry red color (due to CO + Hb)	• If same striations, same brand bullets
• Fat and soft tissue expulsion	



Comparison microscope

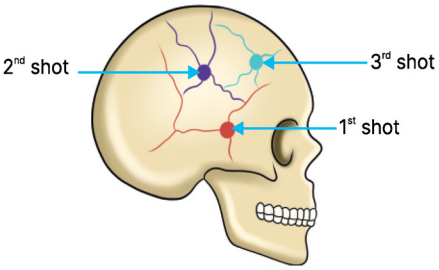
Q5.5: What is beveling in skull wounds, and how is it interpreted?



- Beveling is a cone-shaped erosion of bone
- It is always seen at the exit point of table
  - At entry point: Beveling is towards the inner table of the skull
  - At exit point: Beveling is towards the outer table

Q5.6: What is Puppe's Rule, and how is it used?

Answer:



Puppe's Rule helps determine the sequence of bullet wounds on the skull:

- 1st fracture line appears normally
- 2nd fracture line never crosses the 1st
- 3rd fracture line never crosses the 1st and 2nd

Q5.7: What is a Kronlein Shot?

Answer:

- Range: Close
- Skull: Burst open
- Brain: Eviscerated (expelled out of skull)

BIG QUESTION 6: How are shotgun injuries identified and interpreted in forensic ballistics, and what are their key patterns at various ranges?

Broad Answer: Shotgun wounds display distinct injury patterns depending on the range of fire, pellet dispersion, and presence of burning, blackening, and tattooing. Contact, close, near, intermediate, and distant range wounds can be differentiated by wound morphology, pellet dispersion, muzzle imprint, and presence of wad lesion.

DETAILED QUESTIONS

Q6.1: What is the travel distance of gunpowder and dispersion pattern of lead shot/pellets in a shotgun?

Answer:

Parameter	Distance
Gunpowder travel	60 to 90 cm

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Blackening, burning, tattooing	Up to 1 meter
Dispersion starts (intermediate)	>2 meters
Complete pellet dispersion	>4 meters
Wad lesion	Up to 2 meters

Q6.2: What are the wound characteristics at various shotgun firing ranges?

Answer:

Characteristic	Contact Shot	Close Range (1m) O	Near Range (1-2m) R	Intermediate-Range (2-4m) S	Distant Range (>4m)
Entry wound appearance	Stellate/ cruciate	Circular **(O)**	**Rat-hole (nibbled margin)**	**Satellite (large multiple palettes)**	Individual palettes
Muzzle impression	+	-	-	-	-
Blackening/ Burning/ Tattooing	Inside the track	All	**Only tattooing**	-	-



Contact shot Intermediate shot



distant rage(individual pellets)

Q6.3: What is the difference between Billiard Ball Effect and Balling/Welding?

Answer:

- Both are atypical patterns of Shotgun injury

Feature	Billiard Ball Effect	Balling/Welding
Definition	Dispersion of shot pellets in a highly scattered pattern	Lead shots stick together, form a mass Will give the appearance of a satellite
Dispersion	Very high	Very low
Range	Short range	Long range

Q6.4: How does choking of the shotgun affect pellet dispersion at increasing distances?

Answer:

Range (in meters)	Cylinder (cm)	Half Choke (cm)	Full Choke (cm)
5 meters	20 cm	13 cm	8 cm
10 meters	50 cm	30 cm	25 cm

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15 meters	60 cm	40 cm	35 cm
20 meters	75 cm	50 cm	45 cm

BIG QUESTION 7: What are the types of blast injuries, their mechanisms, and associated forensic implications?

Broad Answer: Blast injuries can be categorized into primary, secondary, tertiary, quaternary, and quinary types, depending on the mechanism of injury. Each type affects specific organs and produces characteristic patterns. Injuries are further influenced by the environment of detonation—air, water, or solid—and are essential in forensic evaluation.

DETAILED QUESTIONS

Q7.1: What are the types of blasts and examples?

Answer:

Type of Blast	Medium	Example
Air blast	Air (midair)	Bomb detonation in open space
Underwater blast	Liquid/water	Explosives in ponds/rivers
Solid blast	Solid surface	Mine blast

Q7.2: What are the products of a blast?

Answer:

- Airwave/ blast wave/ shock wave: Air compression
- Flying missiles/ projectiles/ objects: Flying pieces, needles, and other sharp objects may hit people
- Lifted and thrown around: Person may hit ground, tree, etc
- Miscellaneous: Building collapse, burns, and fumes may cause injury

Q7.3: Which organs are most commonly affected in different blast settings?

Answer:

- Air blast:
  - Tympanic membrane > Lungs
- Underwater blast
  - Nothing mentioned: GIT
  - Head below water: Tympanic membrane
  - Head above water: GIT

Q7.4: What are the hallmark injuries of primary blast injury?

Answer:

- Caused by shock wave and air compression
- Hollow organs are most affected:
  - Ear → Tympanic membrane rupture (most common)
  - Lungs → Most fatal injury
  - GIT → Vomiting, melena, perforation

Q7.5: What are the characteristics of secondary blast injury?

Answer:

- Caused by flying projectiles (e.g., nails, shrapnel)
- Marshall's Triad:
  - Punctate abrasion
  - Punctate contusion
  - Punctate laceration

Q7.6: What are tertiary blast injuries?

Answer:

- Due to throwaway effect from wind
- Victim may collide with objects (walls, trees)
- Causes skeletal fractures or blunt injuries

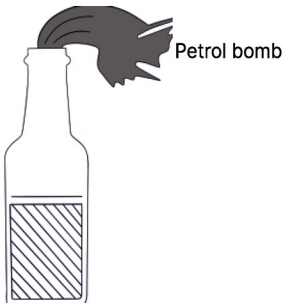
Q7.7: What are quaternary and quinary blast injuries?

Answer:

Type	Cause	Examples
Quaternary	Miscellaneous (non-blast elements)	Building collapse cause traumatic asphyxia Burn/ Fire/ Flame injuries
Quinary	Environmental contaminants	Chemicals (chlorine, savin), radiation (nuclear), biological agents (viruses, bacteria)

Q7.8: What are incendiary bombs and Molotov cocktails?

Answer:

Bomb Type	Contents	Effect
Incendiary bomb	Phosphorus and Magnesium	Catches fire
Molotov cocktail/Petrol bomb	Half of the bottle is filled with petrol 	Rag is present for ignition

12. IDENTIFICATION

BIG QUESTION 1: What is Corpus Delicti in forensic science, and how is race and ancestry determined using skull and body indices?

Broad Answer: Corpus Delicti refers to the body or substance of a crime, and it includes the presence of a crime, motive, and evidence, such as the dead body or crime scene traces. Race and ancestry estimation in forensic anthropology is aided by skull measurements such as the Cephalic Index and body indices like Brachial, Crural, and Intermembral Index.

DETAILED QUESTIONS

Q1.1: What is Corpus Delicti, and what are its components?

Answer:

- Corpus Delicti means the "body of the crime" or essence of the offense.
- It includes:
  - o Crime itself
  - o Reason or motive behind the crime
  - o Source of evidence, such as:
    - → Dead body
    - → Crime scene evidence
    - → Primary and secondary evidence

Q1.2: What is the racial classification based on ancestry?

Answer:

Race	Examples
Negroid	Africans and Aryans
Mongoloid	Japanese
Caucasoid	Europeans and Chinese

Q1.3: How is the Cephalic Index used to determine race?

Answer:

- Cephalic index is an index of the skull bone

$$\text{Cephalic Index} = \frac{\text{Breadth of skull bone}}{\text{Length of skull bone}} \times 100$$

Q1.4: What are the types of skull based on the cephalic index?

Answer:

Dolichocephalic	Mesaticephalic	Brachycephalic
• Value: 70-74.9 • Negros, Pure Aryans	• Value: 75-79.9 • Indians, Chinese, and Europeans • **Mnemonic:** M-ICE	• Value: 80-84.9 • Mongol • Brachycephalic is due to Early fusion of the coronal suture

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Q1.5: What are other body indices used in race and limb proportion assessment?

PYQ: FMGE 2020

Answer:

- **Brachial Index**
  - $\frac{\text{Length of Radius}}{\text{Length of Humerus}} \times 100$
  - Upper limb index.
- **Crural Index**
  - $\frac{\text{Length of Tibia}}{\text{Length of Femur}} \times 100$
  - Lower limb index.
- **Cephalic Index:** Skull bone index
- **Intermembral Index**
  - $\left(\frac{\text{Length of Humerus + Radius}}{\text{Length of Tibia + Length of Femur}}\right) \times 100$

BIG QUESTION 2: How is ancestry, dental morphology, and sex determined in forensic anthropology?

Broad Answer: Forensic anthropology utilizes morphological features of the orbit, palate, teeth, hair, and sex chromatin studies to determine race and gender. Key distinctions include orbital shape, dental traits like Carabelli cusp or taurodontism, hair structure, and sex chromatin bodies like Barr body and Davidson body.

DETAILED QUESTIONS

Q2.1: What are the orbital and palatal shapes used to distinguish races?

Answer:

Part	Negro	Mongol (Gol = Round)	Caucasian (C 3rd letter, 3 for Tri)
Orbit	Square	Round	Triangle
Palate	Rectangular	Round	Triangle

Q2.2: What are the distinguishing dental features among races?

Answer:

Negro	Mongol (PE S T)	Caucasian (C C)
More cusp	• **PE** - Premolar Enamel pearl • **S** - Shovel-shaped incisor • **T** - Taurodontism (Bull tooth) • Congenital absence of 3rd molar can be present	Carabelli Cusp (maxillary molar)

Q2.3: How is hair analyzed in race identification?

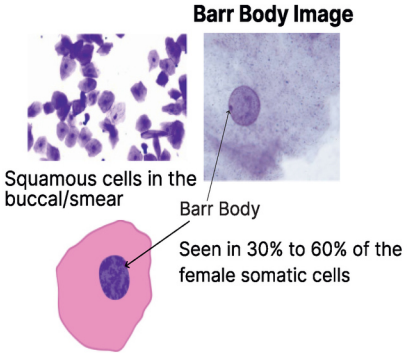
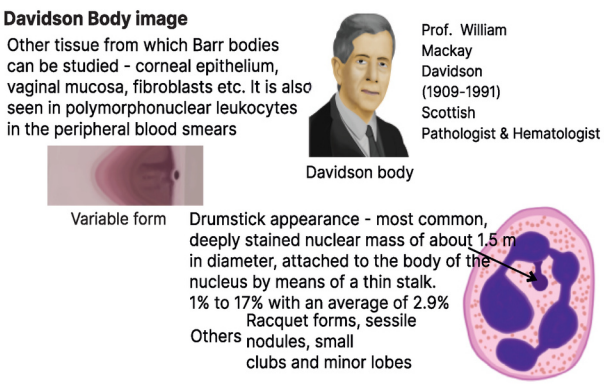
Answer:

Feature	Negro	Mongol (Gol = Round)	Caucasian
Cross section	Elliptical	Cylindrical/ Round	Round to oval
Medulla	Fragmented	Non-fragmented	Fragmented
Cuticle	Absent	Thick	Medium

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Q2.4: What are Bar and Davidson bodies, and how are they used in sex determination?

Answer:

Bar Body	Davidson Body
• It is a plano-convex nuclear mass. • Present in somatic cells (buccal mucosa, saline, hair follicle) • It is an inactivated X chromosome. (X-1) • Female 20-80%. • Male 0-4%	• Blood sample is taken. • Present in 6% of Female Neutrophils. • Drumstick appearance. • Absent in males. • Better indicator compared to Bar body.
	

Q2.5: What are the methods used to detect sex chromosomes?

Answer:

Feulgen Reaction	Quinacrine Reaction
• Used for the X chromosome. • **Stain:** Acriflavine • **End point:** Yellow color	• Used for the Y chromosome.

BIG QUESTION 3: How is the sex of skeletal remains determined in forensic anthropology?

Broad Answer: Sex determination from skeletal remains is done using Krogman's criteria, which includes the entire skeleton, pelvis, skull, and long bones. Among these, the pelvis is the single best bone for sex identification. Several skeletal features-including bone robustness, sciatic notch angle, and cranial morphology-differentiate male from female skeletons. Indices such as ischio-pubic index, corpobasal index, sacral index, and Ashley's rule are used for quantification.

DETAILED QUESTIONS

Q3.1: What is the Krogman Table and its accuracy in sexing skeletal remains?

Answer:

Part	Accuracy
Entire skeleton	100%
Pelvis and skull	98%
Pelvis alone: Single best bone	95%
Skull alone	90-92% (Go for 90%)
Long bones alone	80%

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Q3.2: What are the general skeletal differences between males and females?

Answer:

Characteristic	Male	Female	
Bones	Large Heavy	Small Light	
Prominence (Muscles) Ridges	More prominent	Less	**Exception** Frontal eminence Parietal eminence
Glabella	More prominent	Less prominent	
Supraorbital ridge	More prominent	Less prominent	
Zygomatic Arch	More prominent	Less prominent	
Orbits	Square	Round	
Forehead	Steeper	Vertical	
Palate	Large U Shape	Parabola Small	
Angle	Less	More	
Sub Pubic	70-75°	>90°	
Mandible	>125° Less obtuse	<125° More obtuse	
Shape	Square	Round	
Obturator foramen	Oval	Triangular	
Chin	Square	Round	
Chilotic Line (M S)	Sacral part is more prominent	Pelvic is more prominent	
Index (Value)	Less	More	
Sciatic notch (Best index)	144	166	
Sacral index	Less	more	
Sternal index	Less	more	
Washburn Ishio-Pubic Index Length of pubic /Length of Ischium	<95	>95	
Corpobasal (Breadth of 1st sacral vertebrae / Breadth of base of sacrum) ×100	More	Less	
Chilotic Line Index	More	Less	
Pelvis (inlet)	Heart shape	Oval	
Shape	Deep funnel	Flat Bowl	
Greater Sciatic notch (Best parameter)	Small, Narrow, and deep	Wide, large, and shallow	
Ischial Tuberosity	Inverted	Everted	
Preauricular sulcus Tertiary sexual character	Less frequent or very rare	More frequent	
Sacrum	Long and narrow	Short and broad	

Q3.3: What is Ashley's rule used in skeletal sexing?

Answer:

- Used in sternum bone
- Sternum length in males >149 mm
- Sternum length in females <149 mm

Q3.4: What is Hyrtl's Law?

Answer:

- The body is longer and more than twice the length of Manubrium in males
- Shorter and less than twice the length of manubrium in females

BIG QUESTION 4: How is the age of a fetus or a growing child estimated in forensic medicine?

Broad Answer: Fetal and child age estimation is done using body length (Crown Heel Length), Rule of Hasse, Modified Morrison's Rule, appearance and fusion of ossification centers, and closure of fontanelles and skull sutures. Different bones and their fusion timings help assess age in both prenatal and postnatal stages with gender-based variation (females fuse earlier by 1-2 years).

DETAILED QUESTIONS

Q4.1: How is fetal age estimated using body length?

Answer:

- Length: Crown heel length

Rule	Applicable Months	Formula
Rule of Hasse	1-5 months	Age (months) = √(Length in cm)
Modified Morrison's rule	6-10 months	Age (months) = Length (cm) / 5

Month	CHL (cm)
1	1
2	4
3	9
4	16
5	25
6	30
7	35
8	40
9	45
10	50

Q4.2: What are the key ossification centers seen during intrauterine life?

Answer:

Timing	Ossification Centers
5-6 weeks	Clavicle (first bone to ossify)

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5 months	Calcaneum
7 months	Talus 2nd and 3rd pieces of sternum
9 months	Capitate Cuboid Femur
Full Term	Upper end of tibia

Q4.3: What is the age of fusion of carpal bones?

Answer:

- Carpal bone fusion: Lateral to medial
- Proximal Carpal Bone Fusion:
  - Mnemonic: **S**he **L**ooks **T**oo **P**retty

Bone	Age
Scaphoid	5 yrs
Lunate	4 yrs
Triquetral	3 yrs
Pisiform	12 yrs (last to appear)

- Distal Carpal Bone Fusion:
  - Mnemonic: **T**ry **T**o **C**atch **H**er

Bone	Age
Trapezium	6 yrs
Trapezoid	6 yrs
Capitate	
Hamate	

- Female ossification center fuses 1-2 years earlier as compared to males

Q4.4: What is the fusion sequence of iliac crest, inner end of clavicle, tri-radiate cartilage of acetabulum and ischial tuberosity?

Answer:

1. Tri-radiate cartilage of acetabulum: 13-15 years
2. Iliac crest: 18-20 yrs
3. Inner end of clavicle: 21 yrs (medial end of clavicle 22-25 yrs)
4. Tuberosity ischial: 22 yrs

Q4.5: What is the difference in fusion of upper limb and lower limb?

Answer:

Upper Limb	Age	Lower Limb	Age
Shoulder	18	Hip	17-18
Elbow	16	Knee	18
Wrist	18	Ankle	16-17

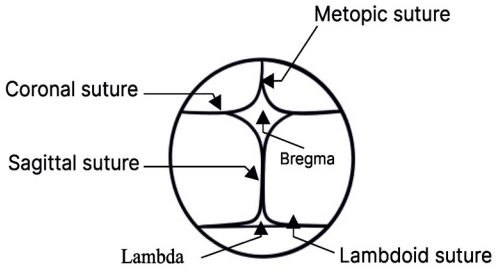
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Q4.6: What is the timing of skull fontanelle closure and skull suture fusion?

Answer:

- Fontanelles

Fontanelle	Closure Time
Anterior (Bregma)	18-24 months
Posterior (Lambda)	3 months
Sphenoidal (Anterior lateral)	2 months
Mastoid (Posterior lateral)	12-18 months



- Sutures

Suture Part	Fusion Age
Metopic	9 months (first to fuse)
Sagittal (Posterior 1/3)	30-40 yrs
Sagittal (Anterior 1/3)	40-50 yrs
Sagittal (Middle 1/3)	>50 yrs
Coronal (Upper half)	50-60 yrs
Coronal (Lower half)	40-50 yrs
Lambdoid (Upper half)	50-60 yrs
Lambdoid (Lower half)	60-70 yrs
Basiocciput with Basisphenoid	18-21 years
Squamotemporal	80 years (last to fuse)

Q4.7: What are the ossification and fusion timings of the sternum and other bones?

Answer:

- Sternum
  - o Appearance:
    - → Manubrium & 1st piece: 5 months IUL
    - → 2nd & 3rd piece: 7 months
    - → 4th piece: 1 year
    - → Xiphoid: 3-4 yrs
  - o Fusion:

Parts	Fusion Time
Manubrium & 1st piece	40-60 yrs
1st & 2nd piece	25 yrs
2nd & 3rd piece	20 yrs
3rd & 4th piece	15 yrs
4th & Xiphoid	40 yrs

- Other bones:
  - Sacrum becomes a single bone by 20-25 years
  - The two halves of the mandible fuse by 2 years
  - Greater Cornu of Hyoid fuses with the body by 40-60 years

BIG QUESTION 5: How is dental development and dentition used for age estimation in forensic medicine?

Broad Answer: Dental development plays a key role in age estimation using eruption patterns of temporary, mixed, and permanent dentition. Eruption sequences, number of teeth, and dental formulas aid in assessing the developmental stage. Various nomenclature systems like Universal and FDI help in identifying teeth precisely.

DETAILED QUESTIONS

PYQ: FMGE 2020

Q5.1: What are the numbers and timelines for eruption of temporary (deciduous) teeth?

Answer:

Feature	Detail
Total	20 teeth
Eruption starts	6 months (Lower central incisor)
Eruption completed	24 months (2 years)

Molar	Premolar	Canine	Incisor	Incisor	Canine	Premolar	Molar
2	0	1	2	2	1	0	2
2	0	1	2	2	1	0	2

Tooth	Age of Eruption
Incisor	6 months
1st Molar	12 months
Canine	18 months
2nd Molar	24 months

Q5.2: What is mixed dentition and when does it occur?

Answer:

Feature	Detail
Age range	**6 to 11 years**
Number of teeth	20 temporary + 4 permanent
Significance	Transition stage to full permanent dentition

Q5.3: What is the dental formula for permanent human teeth?

Answer: Permanent teeth (total 32)

Molar	Premolar	Canine	Incisor	Incisor	Canine	Premolar	Molar
3	2	1	2	2	1	2	3
3	2	1	2	2	1	2	3

Q5.4: What is the sequence of eruption of permanent teeth?

Answer:

- Age of eruption (mnemonic: Mummy Is In Pain Pappa Can Make Medicine)

Tooth	Eruption Age	Quantity
Molar 1	6 years	4
Incisor 1	7 years	4
Incisor 2	8 years	4
Premolar 1	9 years	4
Premolar 2	10 years	4
Canine	11 years	4
Molar 2	12-14 years	4
Molar 3	17-25 years	4 (Wisdom teeth)

- 1st permanent eruption in 6th year
- The last molar is a wisdom tooth
- From 6 years of age, 4 temporary will decrease and 4 permanent will increase

Q5.5: What is the difference between successional teeth and superadded teeth in humans?

Answer:

Successional	Superadded Teeth
• Permanent in place of temporary • 20 teeth 3 2 1 2 2 1 2 3 2 0 1 2 2 1 0 2 2 0 1 2 2 1 0 2 3 2 1 2 2 1 2 3	• No replacement • Added on extra • 12 molars

Q5.6: What other methods are used to estimate age using the teeth?

Answer:

- Stack formula
- Boyde's method
- Gustafon method
- Dalitz method
- Lamendin method

Q5.7: What does the Stack formula estimate, and what parameters does it use in infants?

Answer:

- The Stack formula is used to estimate age in infants.
- It uses the weight and height of the tooth for the calculation.

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Q5.8: What is Boyde's method, and how is it used to estimate age in neonates?

Answer:

- Boyde's method estimates age in terms of days, specifically in neonates.
- It is based on counting striations (incremental lines) developed in the enamel of teeth.
- These incremental lines are visible under an electron microscope.
- By counting the number of these lines, it is possible to calculate the number of days after birth.

Q5.9: What is the Gustafson method of age estimation, and what are its key characteristics?

Answer:

- Gustafson method is an obsolete method of age estimation and is not commonly used now.
- It is applied for estimating age in individuals older than 25 years.
- Most commonly used on anterior teeth (incisors).
- Molars are considered unsuitable for this method.

Q5.10: What is the Dalitz method of age estimation and what criteria does it use?

Answer:

- The Dalitz method is a modification of Gustafson's method for age estimation.
- It uses the following criteria:
  - Paradentosis (periodontal disease changes)
  - Attrition (wear of the teeth)
  - Secondary dentine formation
  - Transparency of the root of the tooth

Q5.11: What is the Lamendin method of age estimation and what are its key features?

Answer:

- The Lamendin method is considered a better method for age estimation.
- It is commonly used in postmortem cases.
- The method uses two main criteria:
  - Paradentosis (periodontal disease changes)
  - Transparency of the root of the tooth

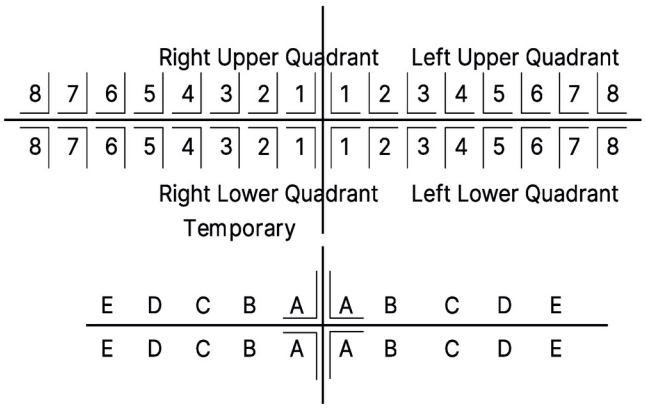
Q5.12: What are the important criteria of the Gustafson method?

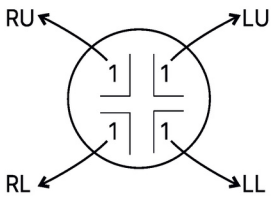
Answer:

- 6 x-ray criteria (Mnemonic: **SCRIPT**)
  - **S**econdary dentine (2nd best)
  - **C**ementum Apposition
  - **R**oot Resorption
  - **A**ttrition
  - **P**aradentosis
  - **T**ransparency of the root of tooth (Best)

Q5.13: What is Zsigmondy's method of dental charting?

Answer: Palmer notation/Zsigmondy's method:





Q5.14: What is Haderup's System of dental charting?

Answer:

+8	+7	+6	+5	+4	+3	+2	+1	+1	+2	+3	+4	+5	+6	+7	+8
-8	-7	-6	-5	-4	-3	-2	-1	-1	-2	-3	-4	-5	-6	-7	-8

- + for upper teeth
- - for lower teeth

Q5.15: What is Universal Method of dental charting?

Answer:

- Universal/Cunningham's method:
- Permanent 1-32

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

- Temporary: A-J K-T

A	B	C	D	E	F	G	H	I	J
T	S	R	Q	P	O	N	M	L	K

Q5.16: What is most commonly used & most accepted method of dental charting?

Answer:

- Fédération Dentaire Internationale (FDI)
- Most commonly used worldwide and most accepted method
- For permanent teeth: Prefix 1 2 3 4 added
- For temporary teeth: Prefix 5 6 7 8 added

1 Right upper								2 Left upper							
18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
4 Left lower								3 Left lower							

- For temporary 5 6 7 8 prefixes added

5 Right upper					6 Left upper				
55	54	53	52	51	61	62	63	64	65
85	84	83	82	81	71	72	73	74	75
8 Left lower					7 Left lower				

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Q5.17: What is the modified Federation Dentaire International (FDI)?

Answer:

Modified FDI

1								2							
18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
38	37	36	35	34	33	32	31	41	42	43	44	45	46	47	48
3								4							

BIG QUESTION 6: What is the medicolegal importance of age and how is stature estimated from bones?

Broad Answer: Age plays a crucial role in determining legal responsibility, consent validity, employment rights, criminal liability, and marriage eligibility. Stature estimation from bones aids in forensic identification using regression formulas like Karl-Pearson and Trotter-Glessor.

DETAILED QUESTIONS

Q6.1: Which is the best bone to decide stature?

Answer: Femur

Q6.2: What are the medicolegal implications of different age groups in India?

Answer:

< 1yr	• Below of 1 year is infant • Killing an infant is infanticide • Same IPC as murder
< 7yr	• Below 7, no one is a criminal.
7 -12 yrs	• Can be responsible for a crime if attended maturity. • A psychiatrist should decide it.
< 12yrs	• Below 12, no oath required. • Consent is not valid • Consent from guardian or parents • > 12 years can give consent for physical examination.
< 14 yrs	• <14 Cannot work in the factory according to the Factory Act • 14-18 years can work in non-hazardous factories for fixed hours with a fitness certificate and a maximum of 6 hrs.
< 16 yrs	• <16 yrs. kidnapping age of boy.
< 18 yrs	• <18 yrs. kidnapping age of girl. • Below 18 child is known as juvenile. PYQ: FMGE 2020 • At 18, you become a major • License in 18 • Marriage age for girls is 18.
21 yrs	• Major in courtship above 21 yrs. • The marriage age for boys is 21.

Q6.3: Which regression formula are used and what is their value for different bones?

Answer:

- Karl and Pearson's formula
- Trotter and Glessor formula

Bone	Multiplication Factor
Femur	3.7
Tibia/Fibula	4.5
Humerus	5.3
Ulna	6.1
Radius	6.5

(Add 0.8 to 3.7 to get the Multiplication factor of Tibia and soon)

(Add 0.4 to get the value of Radius)

- If the length of the femur is given as 30 cm
  - 30×3.7= 111 cm is the stature

Q6.4: What tool is used to estimate length of bones?

Answer: Hepburn osteometric board



Q6.5: Which formula is used to estimate stature from bony fragments?

Answer:

- Steele's formula
- Bidmos formula

BIG QUESTION 7: What are the various scientific methods of personal identification in forensic medicine?

Broad Answer: Personal identification is crucial in forensic investigations. Scientific methods like fingerprinting, poroscopy, cheiloscopy, palatoscopy, and superimposition are commonly used. Among these, fingerprinting is the most reliable and universally accepted method.

DETAILED QUESTIONS

Q7.1: What is the most reliable method of identification?

Answer:

- Fingerprinting (Dactylography)
  - Best method
  - Based on Galton's system
  - World's 1st fingerprint bureau: Kolkata, 1897
  - First used by: William Herschel (1858)
  - Not inherited, not same in identical twins (Quetlet's rule)
  - Formation: Begins at 12-16 weeks of gestation, complete by 24 weeks

Q7.2: What are the types and patterns of fingerprints?

PYQ: FMGE 2020

PYQ: NEET PG 2021

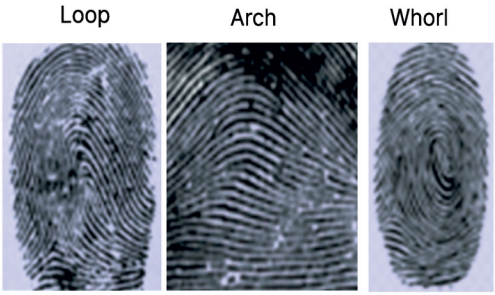
Answer:

- Types of fingerprints:

- Visible
- Latent (chance)
- Plastic

- Patterns of fingerprints: Mnemonic- **L**ove **W**ife **A**nd **C**hildren

Pattern	Features	Direction of ridges
Loop	Common (70% population) Like hairpin Ridges come towards each other	1 delta, 1 core
Whorl	Just like a circle	2 deltas, no core
Arch	Diverges Resembles mountain	No delta, no core
Composite	Least common (1-3% population)	Mixed pattern



- **Note:** Ridges coming towards each other is core & ridges coming from 3 directions its delta.

Q7.3: What is the minimum number of comparison points required for fingerprint identification, and what is the typical depth of a histological section?

Answer:

- Minimum comparison points: 10-12 (varies from state to state)
- Histological section depth: up to 0.6 mm

Q7.4: What conditions alter or erase fingerprints?

Answer:

Alteration in fingerprint	Conditions
Permanent loss	Leprosy Radiation Electric burn
Complete loss of pattern with atrophy	Celiac disease
Incomplete ridge atrophy	Dermatitis
Ridge alteration	Scleroderma Eczema Acanthosis Nigricans
Pattern retained, but the change in the distance between ridges	Acromegaly Infantile paralysis Rickets
No fingerprint syndrome	Adermatoglyphia Baird syndrome Zinsser-Cole syndrome

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Q7.5: How are latent fingerprints visualized?

Answer:

Surface	Reagent/Method
Fabric	5% Silver nitrate ($AgNO_3$)
Paper	Iodine vapor / Osmium tetroxide
Glass	SEM (Scanning Electron Microscope)

Q7.6: What is Poroscopy pores and who discovered it?

Answer:

- Poroscopy: Study of sweat pores on fingerprint ridges
- Discovered by: Edmond Locard
- Each mm has 9-18 pores; individual-specific

Q7.7: What is Palatoscopy/Rugoscopy?

Answer:

- Study of rugae of hard palate
- Discovered by: Alan
- Hard Palate: Anterior $1/3^{rd}$ of the hard palate contains rugae
- Rugae are individually unique for each person
  - Primary Rugae: 5-10 mm length
  - Secondary Rugae: 3-5 mm length
  - Tertiary Rugae: 0-3 mm length

Q7.8: What is Cheiloscopy and its types?

Answer:

- Study of lip prints
- Classified by: Suzuki
- Stains used: Aqua print, Cyanoacrylate
- Types: Mnemonic- **SFIRU**
  - Complete and partial **S**traight groove
  - **F**orked groove: Branched groove
  - **I**ntersecting groove
  - **R**eticular: Reticular pattern
  - **U**ndetermined (any pattern)

Q7.9: How are tattoo marks identified?

PYQ: FMGE 2021

Answer:

- Dyes: Mnemonic- **VIP Car**
  - **V**ermilion
  - **I**ndigo
  - **P**ersian blue
  - **C**innabar
  - **C**admium
  - **C**obalt

- Tattoo ink lodges in depth of dermis and regional lymph nodes
- Can be detected by regional lymph node biopsy
- Old tattoo: Infrared rays
- Faded tattoo: UV rays
- Case: Sydney Shark Arm Case

Q7.10: What is a Podogram?

Answer:

- Study of footprints
- Used in maternity hospitals and for crime scene tracking

Q7.11: What is the Superimposition Technique?

Answer:

- Screening test, Skull, and Superimposition
  - Photograph of skull bone
  - Photo of face
  - Anatomical landmark

BIG QUESTION 8: What is Anthropometry and what are its 4 components of identification?

Answer:

- Anthropometry (also called Bertillon system / Portrae Parle) was introduced by Bertillon.
- 4 criteria for identification:
  - Body Marks - Tattoo, scars etc.
  - Body Measurements - Anthropological analysis
  - Descriptive Data - Skin color, eye color, etc.
  - Photographs - 4 photos of the individual taken

DETAILED QUESTIONS

Q8.1 What is the timeline of scar healing, and how do the characteristics change over time?

Answer:

Duration	Features
6 days	Reddish blue, firm, starting union (angry)
2 weeks - 2 months	Pale, vascular, soft, tender
6 months	Brown, tough, glistening, mild tenderness
> 6 months	White, tough, non-tender

Q8.2 What is the Frontal Sinus pattern and its importance in identification?

Answer: Used in identification for individuals >15 years, if X-ray facility is available

Q8.3 What is Concealed Sex?

Answer:

- A person hides their real sex for criminal intentions (fraud, marriage, etc.)
- Case: Colonel Victor Barker

Q8.4 What are the important cranial sutures and their approximate fusion ages?

Answer:

Suture	Fusion Age
Pterion	~65 years
Masto-occipital	~80 years
Squamo-temporal	>80 years (last to fuse)

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13.TOXICOLOGY

BIG QUESTION 1: What is toxicology, and what are the ideal homicidal and suicidal poisons?

Broad Answer: Toxicology is the study of poisons and toxins, including their sources, effects, and applications in forensic medicine. Founders like Orfila and Paracelsus laid the groundwork for modern toxicology. Within forensic toxicology, certain substances are labeled as "ideal" homicidal or suicidal poisons due to their specific properties that make detection difficult and mimic natural disease.

DETAILED QUESTIONS

Q1.1: What is toxicology?

Answer: Toxicology is the study of poisons.

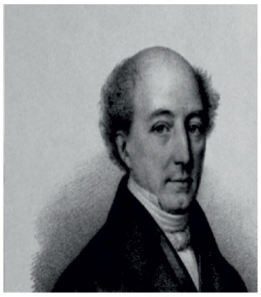
Q1.2: What is toxinology?

Answer:

- Toxinology is the study of living toxins
  - Plant toxins, virus toxins, and bacterial toxins.

Q1.3: Who is the founder of modern toxicology?

Answer: Founder of modern toxicology - Orfila (Spanish toxicologist)



Orfila

Q1.4: Who is the father of modern toxicology?

Answer: Father of modern toxicology - Paracelsus



Paracelsus

Q1.5: What are the ideal homicidal poisons?

Answer: An ideal homicidal poison is **Thallium.**

- Most commonly used homicidal poison:
  - Arsenic
  - Aconite

Q1.6: What are the qualities of an ideal homicidal poison?

Answer:

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- Cheap and easily available.
- Highly toxic
- Colorless, odorless, and tasteless.
- Causes a slow and gradual death.
- Signs and symptoms should resemble natural diseases.
- No antidote, no Post-mortem changes.
- Rapidly destroyed in the body.
  - Should not be detected by a doctor

Q1.7: What are the ideal suicidal poisons?

Answer: An Ideal Suicidal poison is cyanide.

- Most commonly used Suicidal poisons:
  - Organophosphate
  - Opioids
  - Sometimes, Barbiturates

Q1.8: What are the features of an ideal suicidal poison?

Answer:

- Cheap and easily available.
- Highly toxic
- Tasteless
- Capable of producing painless death.

BIG QUESTION 2: What are the legal responsibilities of a doctor in poisoning cases, and how do NDPS and Drug & Cosmetic Rules apply?

Broad Answer: Doctors play a crucial role in documenting and reporting poisoning cases, including informing authorities in accordance with CrPC provisions. Additionally, the handling and regulation of drugs and toxic substances are governed by specific laws, such as the NDPS Act (1985) and the Drug & Cosmetic Rules (1945), which categorize and control various substances based on their nature and use.

DETAILED QUESTIONS

Q2.1: What are the legal duties and responsibilities of the doctor in a case of poisoning?

Answer:

- Documentation:
  - MLC
  - Post-mortem report
- Preservation of Sample and Evidence.

Q2.2: Under what legal section is a doctor obliged to inform the police in cases of poisoning?

Answer: 39 CrPC

Q2.3: What are the situations in which a doctor must inform the police during poisoning cases?

Answer:

- Homicide: Must inform.
- Suspicious (Suspicion of poisoning): Must inform.
- Attempt of suicide (the person confesses): Not mandatory to inform.
- Any suspicion of suicide: Must inform.
- Patient death due to complications or during treatment: Must inform.
- Dead on arrival: Must inform.
- Dying declaration arrangement.
- A patient with a sound mind wants to give o give a dying declaration.
  - o It can be arranged by a doctor.

Q2.4: What is the NDPS Act, and what drugs are included?

Answer:

- Narcotic drugs and Psychotropic substances are used.
- Implemented in 1985
- Mnemonic: Last Minute Point COPY
  - o L - LSD
  - o M - MDMA (ecstasy)
  - o P - Phencyclidine
  - o COPY
    - → Cocaine
    - → Cannabis
    - → Opioid
    - → Poppy

Q2.5: What are the punishments under NDPS?

Answer:

- If the Possession of the drug is in a small quantity:
  - ○ Punishment: 6 months or a 10,000 fine or both.
- If possession for commercial use - 10-20y +1-2 lakh fine.
- Consumption: Rigorous 6m+20k
- Cultivation: 10y Rigorous imprisonment +1 Lakh fine.

Q2.6: What are the important schedules according to the Drug and Cosmetic Rule?

Answer: Drug and Cosmetic Act - 1940 → Implemented in 1945

Catergory	Description
Schedule C	Biological drugs
Schedule E	Poisons
Schedule F	Blood, sera, vaccines
Schedule G	Hormone
Schedule H	Prescribed by RMP
Schedule J	Drugs not to be advertised: AIDS/ blindness/ diabetes mellitus
Schedule X	Drugs for abuse

BIG QUESTION 3: What are the important aspects of toxicological analysis, including special preservation, characteristic smells, poisons causing PCT necrosis, and stomach mucosal changes?

Broad Answer: In suspected poisoning, specific biological materials are collected, preserved, and analyzed for toxic substances. Some poisons require special preservation methods, and certain toxins emit characteristic smells that aid diagnosis. Particular substances are known to cause proximal convoluted tubule necrosis. Additionally, some poisons produce distinct color changes in the stomach mucosa, which serve as important forensic clues.

DETAILED QUESTIONS

Q3.1: What is toxicological analysis, and when is it done?

Answer:

- Also known as chemical analysis.
- Done during post-mortem

Q3.2: What are the viscera used in a toxicology report?

Answer:

- The stomach and its contents
- Small intestine (30 cm of its proximal part and its content).
- Liver around 500 g with the gallbladder.
- One-half of each kidney.
- Half of the spleen.

Q3.3: What are the other samples taken?

Answer: Apart from the viscera ,

- 100 ml of blood
- 100 ml of urine

Q3.4: What are the preservatives used in toxicology?

Answer:

- **For blood**
  - Sodium fluoride
  - Potassium oxalate
- **For urine**
  - Toluene
  - Thymol
- Most commonly used preservative**: Sodium chloride**
- Ideal preservative**: Rectified spirit** (90 percent ethanol)

Q3.5: What are the contraindications of rectified spirit?

Answer: Mnemonic: PAPPA does not consume ethanol

- P - Phenol
- A - Alcohol
- P - Phosphorus
- P - Para aldehyde
- A - Acetic Acid

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Q3.6: What are the special samples preserved in different types of poisoning?

Answer:

Sample	Poison
Muscle (skeletal muscle of the buttock)	Used when the body is putrefied.
Body fat	Endrin, DDT
Bone, hair, and nail	Heavy metals
Lungs	Gaseous poisons or volatile poisons
Bile and gallbladder preservation	• Glutathione • Barbiturate • Opioids • Nicotine • Alcohol
Spinal cord	Strychnine
Brain	Cerebral poison or Organophosphate
CSF	Alcohol
Heart	Aconite

Q3.7: What are the characteristic smells seen in poisoning?

PYQ: FMGE 2021, 2022

Answer:

1. Fruity/sweet smell	• Ethanol • Chloroform
2. Acrid smell	• Paraldehyde • Chloral hydrate
3. Rotten eggs smell/sewer gas smell	H_2S
4. Rotten fish smell	Aniline
5. Kerosene odor smell (due to aromax)	Organophosphate
6. Fishy or musty smell	• Aluminum phosphide • Zinc phosphide
7. Bitter almonds smell	Cyanide
8. Burnt rope smell	Cannabis
9. Shoe polish smell	Nitrobenzene
10. Garlic	• Arsenic • Phosphorus • Prathion • Tellurium • Thallium

Q3.8: Which poisons are known to cause PCT necrosis?

Answer:

- P- Phenol (another product is Lysol)
- C- Carbon

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- T- Tetrachloride
- PCT is caused by mercury.

Q3.9: What are the changes observed in the stomach mucosa in different poisonings?

Answer:

Stomach appearance	Poisonings
Slate color	Mercury
Blackening	Sulphuric acid
Yellow	Nitric acid (due to xanthoproteic reaction)
Buffed white	Carbolic acid
Blue/green	Seen in CuSO4
Green	Ferrous sulphate
Blue	Amytal
Pink	Soneryl
Brown	Cresol
Gray, white/yellow	Phosphorous

BIG QUESTION 4: What are the indications, equipment, fluids used, specific considerations, and complications of gastric lavage in poisoning cases?

Broad Answer: Gastric lavage is used for decontamination in poisoning, ideally within a few hours. It involves inserting a gastric tube, using specific fluids based on the type of poison, and being cautious about complications. Additional modifications are made for heavy metal poisoning or corrosive ingestions.

DETAILED QUESTIONS

Q4.1: What is Gastric lavage? What are the tubes used?

Answer:

- Stomach wash
- Tubes used
  - Ryles tube - Child.
  - Ewald/Boas tube - Adult

Q4.2: What is the ideal time to perform a gastric lavage?

Answer: Within 3 hours.

Q4.3: What is the tube commonly used for gastric lavage?

PYQ: INICET 2023

Answer: Ewald/ Boas tube (total length is 150 cm and marked at a point 50 cm from the tip)

Ewald



Q4.4: What is the ideal gastric lavage tube?

Answer: Lavacutor tube.

Q4.5: What are the fluids used in gastric lavage?

Answer:

- Warm water (35°C)/normal saline: Most common.
- Potassium permanganate (1:5000)
  - Used in higher concentrations in opium poisoning.
- Sodium bicarbonate (5%)
- Tannic acid (4%)
- Sodium or potassium iodide (1%)
- Calcium lactate (1-3%)

Q4.6: What is the most common route of poisoning for which gastric lavage is done, and what are the exceptions to this?

Answer:

- Gastric lavage is done mostly for oral poisoning.
- Exceptions:
  - Morphine
  - Cocaine
  - Amphetamine
  - Barbiturate

Q4.7: How is gastric lavage done for heavy metal poisoning?

Answer:

- We give specific chemical antidotes in gastric lavage.
- Gastric lavage fluid is freshly prepared.
  - Ferric oxide - Arsenic.
  - Sodium Formaldehyde Sulphoxylate - Mercury
  - Potassium Ferrocyanide - Copper

Q4.8: What are the contraindications of gastric lavage?

Answer:

- **Absolute contraindications**
  - Corrosive
    → Exception: Corrosive, where gastric lavage is done, is Carbolic acid
- **Relative contraindication**
  - **C** - Convulsant, comatose patient.
  - **V** - Volatile poison = Kerosene = Aspiration pneumonia → Esophageal varices
  - **P** - Advanced Pregnancy
  - **H** - Heart disease, hypothermia, and hemorrhagic diathesis.

BIG QUESTION 5: What are the various antidotes used in poisoning, and what are their types, principles, and specific indications?

Broad Answer: Antidotes are agents used to counteract the effects of poisons. They may act by neutralizing the poison, preventing its absorption, or enhancing its elimination. In clinical practice, antidotes can be broadly classified as universal antidotes, coma cocktails, specific antidotes (including chelating agents), and certain cases where hemodialysis is contraindicated. Their selection depends on the type of poison, route of exposure, and clinical condition.

DETAILED QUESTIONS

Q5.1: What are the components of the universal antidote used in gastric lavage?

Answer: **Mnemonic: Universally, ATM is present**

- A - Activated charcoal
- T - Tannic acid
- M - Magnesium oxide
- The ratio of A:T: M = 2:1:1

Q5.2: What are the mechanisms of action of universal antidotes in gastric lavage?

Answer:

- **Activated Charcoal**
  - Adsorbs the poison on the surface
  - It is an example of a physical and mechanical antidote
  - Dose: 1gm/1kg of body weight
- **Tannic Acid**
  - Causes the precipitation of alkaloids
- **Magnesium Oxide**
  - Causes the oxidation of alkaloids

Q5.3: What is the coma cocktail, and when is it used?

Answer:

- ***Mnemonic: DNB 1***
  - D - Dextrose
  - N - Naloxone
  - Vitamin B1 - Thiamine
- Dextrose helps in a coma due to Hypoglycemia.
- Naloxone helps with opioid-induced coma.
- Thiamine is used in alcohol-induced coma.

Q5.4: What are the antidotes used in different poisonings?

Answer: PYQ: INICET 2023 PYQ: FMGE 2021, 2022, 2023 PYQ: NEET PG 2019

Poison	Antidote
Paracetamol	N- Acetyl cysteine
Methanol	• Ethanol - a better antidote • Fomepizole
CO Poisoning	Hyperbaric oxygen

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Benzodiazepine	Flumazenil
Opiates	Naloxone, Naltrexone, or Nalmefene
Organophosphorus	• Atropine • Oxime
Cyanide	• Amyl nitrate • Sodium Nitrite • Sodium Thiosulphate • All these are called triple antidotes or Lilly's antidotes.
Thallium	Prussian blue
Methemoglobinemia	Methylene Blue

Q5.5: What are chelating agents?

Answer:

- Chelating Agents form chemical complexes with heavy metals.
- Examples:
  - British Anti-Lewisite (BAL)
  - EDTA (Ethylenediaminetetraacetic Acid)
  - DMSA- 2-3- Dimercaptosuccinic Acid
  - Penicillamine
  - Deferoxamine

Q5.6: What are the features of BAL?

Answer:

- British Anti-Lewisite (BAL): Another name **is Dimercaprol.**
- It is a peanut oil suspension.
- It has two unsaturated sulfhydryl groups that combine with the metals and prevent its union with the SH of the respiratory chain.
- The complex is stable and easily excreted in the urine.
- BAL is administered in a Deep intramuscular injection.
- Used in arsenic, lead, copper, mercury, thallium, and antimony poisoning.
- Contraindicated in Cadmium and Iron Poisoning, also in Liver Failure and G6PD-deficient Individuals.

Q5.7: What are the uses and contraindications of EDTA?

Answer:

- Used in lead poisoning (DMSA is preferred)
- Contraindicated in mercury poisoning

Q5.8: What are the uses and contraindications of Penicillamine?

Answer:

- It is used in copper.
- Contraindicated in arsenic.

Q5.9: What is the chelating agent used in iron toxicity?

Answer:

- Deferoxamine
- Also given in heavy radioactive metals

Q5.10: What are the contraindications to hemodialysis in poisoning cases?

Answer:

- Kerosene
- Benzodiazepine
- $CuSO_4$
- Chloroquine
- Heroine
- Organophosphate
- Digitalis

BIG QUESTION 6: What are the key features of arsenic poisoning, its mechanism of action, clinical manifestations, diagnosis, and post-mortem findings?

Broad Answer: Arsenic poisoning occurs due to exposure to arsenic compounds, which interfere with cellular metabolism. Its mechanism of action involves inhibition of critical enzymes, leading to multi-organ dysfunction. Clinically, it presents with acute gastrointestinal symptoms or chronic dermatological and neurological features, depending on the duration and dose of exposure. Diagnosis involves detecting arsenic in biological samples, often confirmed through toxicological analysis. Post-mortem findings typically show gastrointestinal damage, fatty liver, and characteristic changes in internal organs, helping confirm the cause of death in suspected cases.

DETAILED QUESTIONS

Q6.1: Which forms of arsenic are poisonous and which are non-poisonous?

Answer:

- Metallic arsenic is non-poisonous
- Arsenic trioxide: Poisonous compound
  - Colorless, odorless, tasteless, used as a homicidal poison
  - Other names:
    - → White arsenic: **Used in AML 3**
    - → Sankhya
    - → Somalkar

Q6.2: What are the other important compounds of arsenic?

Answer:

- Copper arsenite: Scheele's green
- Copper acetoarsenite: Paris green
- Arsine: Gas, Garlicky smell

Q6.3: What is the mechanism of action of arsenic?

Answer:

- It combines with the sulfhydryl groups of mitochondrial enzymes

- Inhibits the respiratory chain
- Target tissue: Vascular endothelium
  - Increases permeability
  - Causes edema
  - Causes GI hemorrhage

Q6.4: What are the features of arsenic poisoning?

Answer: ***Mnemonic: ARSENIC***

- Aldrich Mees lines- also known as Reynolds's line: Seen in nails
- Aphrodisiac property
- Red velvety mucosa
- Raindrop pigmentation
- Rashes (fading measles)
- Subendocardial hemorrhage/ Sheehan hemorrhage
- Excessive hyperpigmentation of palms and soles
- Neuritis: Sensory > Motor
- Iron oxide: Antidote
- Mimics Cholera

Q6.5: What is the fatal dose of arsenic?

Answer: 100-200mg (0.1-0.2 g)

Q6.6: What are the signs and symptoms of acute arsenic poisoning?

Answer:

- **Fulminant type**
  - Dose ingested: Massive
  - Direct action: Heart muscle
  - Cause of death: Shock
- **Gastroenteric type:**
  - Most common
  - Resembles cholera (in cholera, purging → vomiting → throat pain)
  - Throat pain → vomiting → purging
  - Tenesmus

Q6.7: How is arsenic poisoning diagnosed?

Answer:

- Urine sample: More reliable (50 micron/24 hours)
- Samples: Hair and nail (pubic hair) are preferred for keratin, and bone.
- **Tests not done:**
  - Marsh
  - Reinsch test
  - Gutzeit test
- **Tests done:**
  - Neutron activation analysis
  - Atomic absorption spectroscopy

Q6.8: What are the treatment options for arsenic poisoning?

Answer:

- Gastric lavage with warm saline
- Freshly prepared hydrated ferric oxide
- DMSA (succimer) is superior to BAL

Q6.9: What are the postmortem findings seen in arsenic poisoning?

Answer:

- Rigor mortis: Late, long
- Stomach mucosa: Red, velvety/ strawberry mucosa
- Multiple hemorrhages in the mucosa: Flea bitten appearance
- White particles in the stomach
- Subendocardial hemorrhage: Sheehan hemorrhage

Q6.10: What are the disadvantages of arsenic as a homicidal poison?

Answer:

- Arsenic is a good homicidal poison
- Only disadvantage: it resists putrefaction

Q6.11: What is arsenophagism, and how does it affect tolerance to arsenic?

Answer:

- Arsenophagists are individuals who habitually ingest arsenic.
- They may use arsenic as an aphrodisiac to increase libido.
- These individuals can tolerate up to 300 mg of arsenic without showing toxicity.

Q6.12: What is Aldrich-Mees' line, and in which conditions is it observed?

Answer:

- Aldrich-Mees' lines are transverse white lines seen on the nails.
- They are associated with arsenic poisoning.
- Also seen in:
  - Thallium poisoning
  - Chronic renal failure
  - Chemotherapy
- Alopecia is also a feature of arsenic poisoning.



Q6.13: What vascular effects are seen in arsenic poisoning?

Answer:

- Occlusion and sclerosis of blood vessels occur.
- This can lead to peripheral ischemia and peripheral gangrene.
- It is classically referred to as Blackfoot disease.

Q6.14: What types of malignancies are associated with chronic arsenic exposure?

Answer: Squamous cell carcinoma (SCC) > Basal cell carcinoma (BCC).

Q6.15: What are the neurological features of arsenic poisoning?

Answer:

- Neuropathy: Mainly sensory > motor
- Resemble GB syndrome

BIG QUESTION 7: What are the features, investigations, and treatment of lead poisoning?

Broad Answer: Lead poisoning occurs due to exposure to various toxic lead compounds. Chronic lead poisoning presents with distinct clinical features affecting multiple systems. Diagnosis is confirmed by characteristic lab investigations, and treatment involves chelating agents. Understanding both the toxic sources and classical signs is essential for identification and management.

DETAILED QUESTIONS

Q7.1: What are the poisonous compounds responsible for lead poisoning?

Answer: Metals and salts are both poisonous.

- Lead acetate (sugar of lead) - most common.
- Lead Sulfide - Surma (eyeliner) - least common.
- Lead tetroxide (vermilion) - Sindoor (but mercuric sulfide is more).
- Tetraethyl lead - Encephalopathy (common), used as an anti-knock agent in petrol.
- Lead carbonate - Seen in paints.

Q7.2: What are the common routes of exposure in lead poisoning?

Answer:

- **Inhalation:** Most common, pipes, plumbers, and paints (adult).
- **Ingestion:** Pipes, plumbers, and paints (children).
- **Skin:** Chemical factories.

Q7.3: What are the features of lead poisoning?

Answer: Also known as Plumbism/ saturnism

Mnemonic: A B C D E F G

- A - Anemia
- B - Basophilic stippling, Burtonian line.
- C - Colic and constipation.
- D - Drops (wrist drop).
- E - Encephalopathy, common in toddlers.
- F - Facial pallor (the earliest and most consistent sign).
- G - Gout (decreases uric acid excretion).

Q7.4: What is the significance of facial pallor in chronic lead poisoning?

Answer: **Facial pallor (circum-oral)**

- Cause: Vasospasm
- Most specific
- Earliest sign

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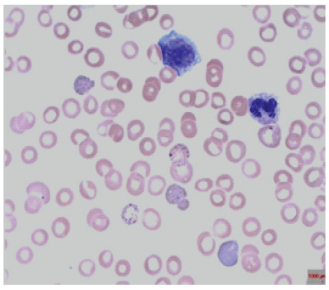
Q7.5: What type of anemia is seen in chronic lead poisoning, and which enzymes are involved?

Answer:

- **Type:** Microcytic-hypochromic.
- **Enzymes inhibited**
  - Ferrochelatase
  - ALA dehydratase
  - Coproporphyrinogen oxidase.
- **Blood picture:** Microcytic-hypochromic

Q7.6: What is Basophilic stippling?

Answer:



- Also known as punctate basophilia
- Accumulation of ribosomes in RBC
- Blue dot in RBCs
- Due to the inhibition of enzyme 5-Pyrimidine nucleotidase (PNN)

Q7.7: What is a Lead line?

PYQ: FMGE 2020

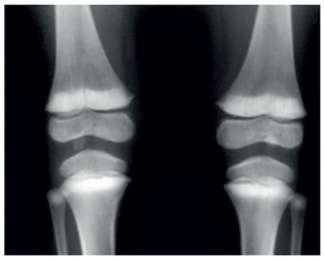
Answer:



- 50-70% of cases
- Seen in gums.
- Common in caries teeth **(bacteria form H2S gas + Lead = Lead sulfide)**
- Takes 1 week to develop.
- Burtonian lines (blue)
- Burtonian lines are also seen in Ag, Bi, Cu, and Fe poisoning (more specific in lead poisoning).

Q7.8: What is lead osteopathy?

Answer: Also known as bone-line



- Seen among children.
- Deposition of Ca^{2+} in growing bones
- Presents as a radiopaque dense band.
- It takes 4 weeks.
- Inhibition of osteoclastic activity

Q7.9: What are the GI manifestations of chronic lead poisoning?

Answer:

- Late presentation is seen in 85% of cases.
- Occurs at night.
- Type of spasmodic pain relieved by pressure.
- Another name: Painter's Colic/ Devonshire Colic

Q7.10: What are the features of lead palsy?

Answer:

- Dry bellyache
- Late manifestation
- Seen in 10% of cases
- Common in adults
- Common peroneal nerve - Foot drop
- Radial nerve - Wrist drop

Q7.11: What are the neurological manifestations of chronic lead poisoning?

Answer:

- Encephalopathy
- Seen in almost all cases.
- Associated with tetraethyl lead.
- Mostly in children
- 85% have permanent brain damage.
- 25% of deaths.

Q7.12: What are the reproductive symptoms seen in lead poisoning?

Answer:

- Amenorrhea
- Dysmenorrhea
- Abortion
- Sterility

Q7.13: How does lead poisoning affect uric acid metabolism?

Answer: Lead decreases the excretion of uric acid → Results in saturnine gout.

Q7.14: What are the investigations used to diagnose lead poisoning?

Answer:

- **Blood**
  - **Blood samples are more important.**
  - Increased lead and ALA
  - >5 microgram/ 100 ml means lead exposure.
  - >40 micrograms - signs and symptoms are seen.
  - 35-50 microgram/ 100 ml zinc protoporphyrin.
- **Urine**
  - Urinary ALA (amino levulinic acid) >5 microgram/ liter.
  - Urinary coproporphyrin >150 microgram/ liter.
  - Urinary Lead 0.25 milligram/ liter.
- History/ clinical features/ blood picture
- Radiology - Lead osteopathy

Q7.15: What is the management of lead poisoning?

Answer: Lead encephalopathy:

- **BAL + EDTA**

- Adult: >70 microgram/100ml
- Children: >45 microgram/100ml

- **BAL**
  - Renal failure
  - **EDTA IS NOT GIVEN, AS IT LEADS TO THE EXCRETION OF LEAD VIA URINE.**
- **DMSA (Succimer)**
  - Used in children without encephalopathy.
  - Orally given.
- **Removal of exposure**
  - Calcium disodium EDTA: >45 microgram/100ml.
  - DMSA Succimer: 45 to 69 microgram/100ml.
  - BAL + EDTA: >70 microgram/100ml.

Q7.16: Why is BAL used with EDTA?

Answer: EDTA redistributes Lead to the brain, and BAL prevents this.

BIG QUESTION 8: What are the features, investigations, and treatment of mercury poisoning?

Broad Answer: Mercury poisoning occurs due to exposure to different forms of mercury: elemental, inorganic, and organic. Each form has distinct toxicity and clinical features. It presents with gastrointestinal, renal, and neurological symptoms, varying by the route and chronicity of exposure. Diagnosis involves clinical suspicion, confirmed by lab investigations. Management includes supportive care, chelation therapy, and preventive measures.

DETAILED QUESTIONS

Q8.1: What are the various forms and compounds of mercury, and how do they differ in toxicity?

Answer: Also known as Quicksilver

- Elemental mercury (thermometer)
  - Not poisonous because it is not absorbed from the GI tract.
  - A liquid metal
- Mercuric Compounds are more poisonous than Mercurous compounds.
  - Mercuric salt (poisonous) is known as Mercuric chloride or corrosive sublimate.
  - Mercuric sulfide is used in Sindoor - Vermillion.
- Toxicity: Organic mercury (Methyl, Ethyl) > Mercuric salt > Mercurous salt (Mercurous sulfide- Caromel).

Q8.2: What are the industrial associations of mercury and its compounds in medicine?

Answer:

- Acute exposure to elemental mercury vapor is very common among Glass Industry workers.
- Donovan's Solution used for STD is a combination of mercury and Arsenic.
- Mercuric thiocyanate is used for making crackers known as Pharaoh Serpent

Q8.3: How is mercury poisoning managed?

Answer:

- Gastric lavage with 5% Sodium Formaldehyde Sulfoxylate and Sodium Bicarbonate.
- Sodium Formaldehyde Sulfoxylate is the antidote.
- The Chelating Agent of choice is BAL

Q8.4: What are the features of chronic mercury poisoning?

Answer:

- Chronic poisoning Mercury → Hydra-Gyrism
  - Gingivostomatitis, Erethism, Tremors
- Minamata disease → Seen in Japan (consumption of selfish)
  - Disease - Organic (Methyl) Mercury
- Erethism (Mad Hatter Syndrome) → Shy, depression, Anxiety
  - Loss of confidence, Suicidal
- Danberry Tremor- Coarse tremors of Hand, Lips, Tongue, (Earliest-Worst)
- Hatter's Shake (Not able to dress, walk)
- Glass-Blower Shake
- **Concussion Mercurialis** - Most Severe - Bedridden, No Activity seen
- Mercuria Lentis → Hg = Anterior lens capsule
  - Reflex → Slit examination → Brown malt reflex is seen
  - Visual Acuity → Intact
  - Bilateral
- Acrodynia → also known as pink disease, Swift Disease, Calomel Disease
  - Puffy - Hands & feet
  - Painful
  - Pinkish
  - Pruritus, Perspiration - sweating is seen
  - Peeling of skin, Resemble Kawasaki disease

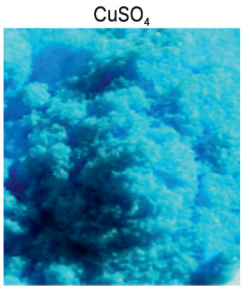
BIG QUESTION 9: What are the features and management of copper poisoning?

Broad Answer: Copper poisoning can occur due to ingestion or exposure to toxic copper compounds such as copper sulfate (blue vitriol), which is the most common. Acute poisoning presents with gastrointestinal symptoms like vomiting (often bluish), abdominal pain, and hemolysis. Chronic copper accumulation is seen in Wilson's disease. Treatment involves supportive care along with chelating agents such as penicillamine.

DETAILED QUESTIONS

Q9.1: What are the various copper compounds responsible for poisoning?

Answer:



- Pure copper is not poisonous.
- CuSO4, aka blue vitriol, is poisonous.
  - Fatal dose- 30 gm
- Copper subacetate / Verdigris
  - Fatal dose- 15gm
- Copper Arsenite → Scheele's Green.
- Copper aceto-arsenite → Paris Green.

Q9.2: What are the clinical features of copper poisoning?

Answer: Most of the time, poisoning is accidental from copper sulphate

- Pain in the Throat, Abdomen

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- **Ptyalism** (increased salivation).
- Vomiting (bluish green).
- Hemolysis in RBC, liver, and kidney.
- **Chalcosis** (Copper depositions in tissue)
  - Chalcosis oculi (Copper deposition in the eye)
  - Defective copper metabolism is Wilson's Disease (an autosomal recessive disease) - sunflower cataract - KF ring is seen in the Descemet layer.
- Clapton Lines (Green color lines in gums because of Copper sulfide)
- Hair becomes green.
- **Vineyard sprayer's lung disease:**
  - It was noticed in Portuguese.
  - Causes interstitial Pulmonary fibrosis.
  - Granuloma is seen in the lungs.
  - Exposure of $CuSO_4$ in vineyards.

Q9.3: How is copper poisoning managed?

Answer:

- Gastric lavage with 1% potassium ferrocyanide
- The chelating agent of choice is D-Penicillamine.
- 1% Potassium Ferrocyanide is also used.

BIG QUESTION 10: What are the features of thallium poisoning?

Broad Answer: Thallium is a highly toxic metal used in rodenticides and historically in depilatories. Poisoning typically presents with painful polyneuropathy, alopecia, and gastrointestinal symptoms. Characteristic features include Mee's lines on nails. Diagnosis is confirmed by detecting thallium in urine or hair. Treatment includes Prussian blue and supportive care.

DETAILED QUESTIONS

Q10.1: What are the features of thallium poisoning?

Answer:

- Alopecia is seen after 1-2 weeks of exposure.
- Painful polyneuropathy resembles GBS.
- Skin rash (Maculopapular rash)- distribution is in a butterfly pattern.
- Sign de sourcil → The Lateral 2/3rd of the eyebrows is lost.
- Mee's line is also seen.

Q10.2: What is the antidote for thallium poisoning?

Answer: Prussian Blue.

BIG QUESTION 11: How does cadmium toxicity occur, and what are its clinical manifestations?

Broad Answer: Cadmium toxicity usually occurs through industrial exposure or ingestion of contaminated food or water. It primarily affects the kidneys and lungs, and chronic exposure leads to Itai-Itai disease due to osteomalacia and renal dysfunction. Management is supportive; chelating agents are generally ineffective.

DETAILED QUESTIONS

Q11.1: What are the sources and occupations leading to cadmium toxicity?

Answer: Very common in the battery, welding industries, water, contaminated food, and smoking.

Q11.2: What is the mechanism by which cadmium causes toxicity?

Answer: Replaces calcium of the body → Hypocalcemia → weak, brittle bones & fractures.

Q11.3: What are the clinical features of cadmium toxicity?

Answer:

- Spine and leg pain
- Gait disturbances
- Disease is known as **Ouch-Ouch Disease or Itai-Itai Disease.**
- Can have PCT necrosis.
- Hair becomes yellowish.
- Teeth become yellow.

Q11.4: How is cadmium toxicity treated?

Answer: The chelating agent of choice is DMSA.

BIG QUESTION 12: What is the mechanism, clinical features of manganese toxicity?

Broad Answer: Manganese poisoning is seen in workers exposed to welding fumes or mining. Chronic exposure affects the basal ganglia, resulting in Parkinson-like features such as tremors, rigidity, and gait disturbances. Treatment is largely supportive, and chelation is not routinely effective.

DETAILED QUESTIONS

Q12.1: How does manganese toxicity occur?

Answer: Inhalation of metal fumes (E.g., Zinc, Nickel, Copper, Antimony, Lead, Iron, Cobalt).

Q12.2: What are the timelines for manganese toxicity?

Answer:

- Symptoms start in 6-8 hrs.
- Symptoms subside in 36 hrs.

Q12.3: What are the clinical features of manganese toxicity?

Answer:

- Known as Metal fume fever or Smelter fever
- Neurological symptoms resemble Parkinson's disease
- The symptoms also resemble Malaria → fatigue, tremors, etc.

BIG QUESTION 13: What are the types, clinical features, treatment, chronic effects, and post-mortem findings of phosphorus poisoning?

Broad Answer: Phosphorus is an inorganic irritant and a non-metallic poison that exists in two forms: white (or yellow) phosphorus and red phosphorus. Among these, white phosphorus is highly toxic and used in rodenticides, fireworks, and fertilizers. Phosphorus poisoning can be acute or chronic, with acute poisoning presenting in three stages (GI symptoms, symptom-free period, and hepatic failure), while chronic poisoning leads to conditions like phossy jaw. Treatment involves gastric lavage with potassium permanganate, avoidance of fats, and supportive care. Post-mortem findings include garlic odor, yellowish-white patches, and fatty degeneration of organs.

DETAILED QUESTIONS

Q13.1: What are the characteristics of phosphorus?

Answer:

- It is a protoplasmic poison.
- Also known as Diwali Poison.
- Red phosphorus (non-toxic)
- Yellow Phosphorus (Poisonous)

Q13.2: What are the differences between White and red phosphorus?

Answer:

Features	White	Red
Toxic	Yes	Non
Odor	Garlicky	No
Luminous	Yes	Non
Morphology	Crystalline	No
Inflammable	Yes	Non
Kept underwater	Yes	No

Q13.3: What are the uses of red phosphorus?

Answer:

- For making matchboxes
  - Glass particle + Red particle.
- Matchstick
  - Sulfur + $KClO_2$ (potassium chlorate)

Q13.4: What are the uses of white phosphorus in various industries?

Answer:

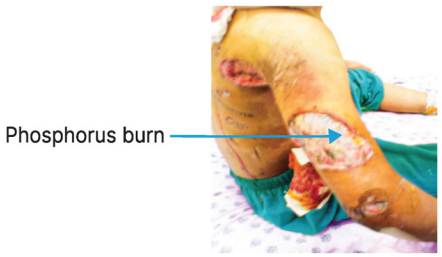
- Used in chemical warfare.
- Used for making crackers (mainly)
- Used for making insecticides.
- Used for making Rodenticide

Q13.5: What are the features of white phosphorus poisoning?

Answer:

- Irritant poison leading to Gastroenteritis.

- Accidental Poisoning is very common in children.
- Asterixis (tremor).
- Smoking stool syndrome



Q13.6: What is the fatal dose and fatal period of phosphorus poisoning?

Answer:

- Fatal dose- 60-120 mg.
- Fatal period- 2-8 days.

Q13.7: How is phosphorus poisoning managed?

Answer:

- Gastric Lavage with $KMnO_4$
- Antidote is $CuSO_4$ (not used orally as it's poisonous).
- Vit K is used for treatment.
- FFP is used for treatment.
- Burn should be washed with 1% $CuSO_4$.

Q13.8: What are the postmortem findings of phosphorus poisoning?

Answer:

- Garlicky Odor
- Jaundice
- PM staining is Dark or chocolate brown
- Yellow liver atrophy
- Multiple Hemorrhages in the mucosa and organs.

Q13.9: What are the features of chronic phosphorus poisoning?

Answer:

- Common in the matchbox industry, while vapor inhalation.
- Phossy jaw or osteonecrosis, Glass jaw or Lucifer's jaw: osteomyelitis of the jawbone.
- Symptoms:
  - Tooth in the hold
  - Pain in the tooth
  - Swelling in the tooth
  - Osteonecrosis of the jaw
  - Multiple discharging sinuses

BIG QUESTION 14: What are the clinical features, medicolegal aspects, and diagnostic tests for ethanol (CNS depressant) poisoning?

Broad Answer: Ethanol is a CNS depressant that causes dose-dependent effects, from euphoria and incoordination to respiratory depression and coma. It is rapidly absorbed, primarily metabolized in the liver, and commonly seen in accidental, suicidal, or homicidal cases. Symptoms include slurred speech, ataxia, vomiting, hypoglycemia, and unconsciousness in severe cases. Medicolegal implications include drunkenness, road traffic accidents, domestic

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violence, and crimes. Tests used are the Breathalyzer (for field testing), the Cavett test, and the Reitox test (for lab confirmation). Blood alcohol concentration (BAC) is definitive and legally important. A BAC of >80 mg% is considered intoxicated in most legal systems. Chronic use can lead to Wernicke's encephalopathy and Korsakoff's psychosis. Postmortem smell of alcohol from stomach contents may indicate ingestion. Medicolegal documentation and chain of custody are crucial in forensic settings.

DETAILED QUESTIONS

Q14.1: What are the physical features of ethanol?

Answer: Colorless, Transparent, Volatile liquid

Q14.2: What is the relative toxicity of different types of alcohols?

Answer: Isopropyl alcohol > methanol > Ethanol

Q14.3: What is the composition of ethanol in different alcohols?

Answer:

- Absolute alcohol - 99.95%
- Rectified spirit - 95% (preserve viscera)
- Denatured/ Methylated spirit - 90% ethanol + 5-10% methanol (wood)
- 100 proof ethanol is 50% ethanol.
- 80 proof ethanol is 40% ethanol.

Q14.4: What are the relative concentrations of alcohol in various body fluids?

Answer:

Sample	Relative Concentration (mg%)
Whole blood	1.00
Plasma or serum	1.12 - 1.2
Urine	1.3
Vitreous	1.2
Alveolar air	0.0021
Brain	0.85
CSF	1.1

Q14.5: Describe the pharmacokinetics of ethanol.

Answer:

- **Absorption**
  - Starts from the mouth.
  - 20% from the stomach.
  - 80% small intestine.
- **Metabolism**
  - Follows zero-order kinetics.
  - Rate of fall 15mg%/1hr.

Q14.6: What is the driving limit of alcohol?

Answer: As per the Motor Vehicle Act: Blood 30 mg%

Q14.7: Why is blood alcohol concentration higher in females compared to males after consuming the same amount of alcohol?

Answer: In females, the blood alcohol will be **25% higher** due to:

- Small aqueous compartment
- More fat
- Lower activity of alcohol dehydrogenase

Q14.8: What are the tests used to diagnose ethanol toxicity?

Answer:

- A blood sample is preferred.
- Preservatives
  - NaF, Potassium oxalate (alive)
  - Vitreous humor (autopsy)
- **Mnemonic:** KBC Hero
- Kozelka test: Qualitative
- Breath Analyzer/Drunkometer
  - Infrared rays-based test.
  - Based on Henry's law
- Cavett test
  - Gas chromatography
  - Best test
  - Quantitative and Qualitative
- Hine test: Qualitative

Q14.9: Which IPC section deals with misconduct after alcohol consumption?

Answer: 510 IPC

Q14.10: What are the different stages of alcohol effects based on blood alcohol concentration levels?

Answer:

- Sober: <10 mg%
- Drinking: 10-70 mg%
- Under influence: 80-100 mg%
- Intoxicated: 150-300 mg%
- Coma: >300 mg%

Q14.11: What are the stages of alcohol intoxication?

Answer:

- **Stage of excitement:**
  - Impairment of cognitive function - 30 mg%.
  - Impaired reaction time - 50mg%.
  - Alcohol/ lateral gaze nystagmus - 80 to 100 mg%.

- **Stage of incoordination:**
  - Flushing with rapid pulse
  - 150 mg%
- **Stage of coma:**
  - Motor, sensory, speech, and coordination are deeply affected.
  - McEwan's sign is +ve
  - Pupil constricted. Pinched, dilated pupil. Again, it becomes constricted.
    → Used to differentiate the type of coma (alcohol or other reasons)

Q14.12: What is the Widmark formula?

Answer:

In blood, a = pcr

Urine = ¾ pcr

- Where,
  - a = wt of alcohol
  - p = body wt
  - c = cons of alcohol in mg%
  - r = constant
    → Male - 0.68
    → Female - 0.55

Q14.13: What are the features of alcoholic withdrawal symptoms?

Answer:

- **Tremors**
  - 6-8 hrs
  - 1st symptom
- **Hallucination**
  - 12 hrs
  - The most common is auditory
- **Seizures**
  - 12-24 hrs
  - Generalized tonic-clonic seizures
- **Delirium tremens**

Q14.14: What are the features of Delirium tremors?

Answer:

- Dangerous
- 2-3 days (48-72 hrs)
- Disorientation
  - Time
  - Place
  - Person
- Automatic activity increased
- Coarse tremor

- Hallucinations (visual)
- If the crime is committed, not punished

Q14.15: What are the neurological syndromes caused by chronic alcoholism?

Answer:

- Early: Wernicke's Encephalopathy - Vit B1 deficiency
- Late: Korsakoff Psychosis - Vit B1 deficiency

Q14.16: What are the features of Wernicke's Encephalopathy?

Answer:

- **G** - Global confusion
- **O** - Ophthalmoplegia
- **A** - Ataxia
- **P** - Polyneuropathy

Q14.17: What are the features of Korsakoff Psychosis?

Answer:

- **C** - Confabulation (filling the memory of the brain with stories)
- **A** - Anterograde amnesia
- **R** - Retrograde amnesia (rare)

BIG QUESTION 15: What is the metabolism, clinical features, and management of methanol?

Broad Answer: Methanol is metabolized to formaldehyde and then to formic acid, which causes metabolic acidosis and optic nerve toxicity. Symptoms include CNS depression, abdominal pain, and visual disturbances like "snowfield vision." Diagnosis involves high anion gap metabolic acidosis and osmolar gap. Treatment includes ethanol or fomepizole, sodium bicarbonate, and hemodialysis.

DETAILED QUESTIONS

Q15.1: What are the features of methanol?

Answer:

- CNS depressant
- Other name: Wood alcohol/ Illicit liquor (illegally made).
- Tragedy: Hooch Tragedy

Q15.2: What is the fatal dose of methanol?

Answer: Fatal dose: 80-120 ml or 80-200 ml

Q15.3: How is methanol metabolized?

Answer:

- Methanol to Formaldehyde (Enzyme: Alcohol dehydrogenase).
- Formaldehyde to Formic acid (Enzyme: Aldehyde dehydrogenase).
- Formic acid causes
  - Metabolic acidosis
  - Retinal damage (snow field vision)

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- **NOTE:**
  - Formaldehyde is 33 times more poisonous than methanol.
  - Formic acid is 6 times more poisonous than methanol.

Q15.4: What are the symptoms of methanol poisoning?

Answer:

- Severe abdominal cramp (earliest).
- Muscular weakness.
- Snowfield vision and complete vision loss (optic neuritis).
- Fixed and dilated pupil
- CNS and cardiac depression.

Q15.5: How is methanol poisoning managed?

Answer:

- Firstly, stabilization.
- **TOC:** Hemodialysis.
- **Antidotes**
  - 1st: Ethanol **(competitive inhibitor for alcohol dehydrogenase).**
  - 2nd - Fomepizole (inhibits alcohol dehydrogenase).
- **Other**
  - Folinic acid **(increases excretion of formic acid).**
  - Sodium bicarbonate is given to treat acidosis.

BIG QUESTION 16: What are corrosive poisons, and what are their clinical features, postmortem findings, and management?

Broad Answer: Corrosives are strong chemical substances that destroy tissues at the site of contact, commonly through ingestion. They are classified as acids and alkalis. In acid poisoning, typical agents include sulphuric acid, nitric acid, carbolic acid, and oxalic acid. These cause intense pain, vomiting, and shock. Management is supportive—emetics and gastric lavage are avoided. Postmortem reveals characteristic corrosive damage to mucosa.

DETAILED QUESTIONS

Q16.1: Which corrosive substances are commonly implicated in poisoning cases?

Answer:

- Sulphuric Acid
- Nitric Acid
- Carbolic Acid
- Oxalic Acid

Q16.2: What type of necrosis is seen in corrosive injury?

Answer: All acids cause coagulative necrosis except hydrofluoric acid, which causes liquefactive necrosis.

Q16.3: What are the features of sulphuric acid poisoning?

Answer:

- H_2SO_4 is also called Oil of Vitriol

- Most potent
- **Signs and Symptoms**
  - Pharyngeal pain
  - Perforation is common
  - Chalky white teeth
  - Blotting paper appearance of the mucosa of the stomach
  - Vitriolage (vitriol throwing)- M/C agent used is sulphuric acid

Q16.4: What important reaction takes place in nitric acid poisoning?

Answer: Xanthoproteic reaction: Tissue becomes a yellow formation of picric acid.

Q16.5: What are the features of carbolic acid poisoning?

Answer: Also termed phenol.

- Pupils are constricted
- Carboluria
  - Urine color changes from green to dark.
- Ochronosis
- PCT (proximal convoluted tubule) necrosis.
- Carbolic acid causes leathery mucosa.
  - Hence, gastric lavage can be performed.

Q16.6: What are the characteristic features of oxalic acid poisoning?

Answer:

- Oxalate: It is seen in spinach, rhubarb, cabbage, etc.
- It is used as a bleaching agent to remove stains/ ink
- It forms calcium oxalate- hypocalcemia- tetany
- Calcium gluconate is the antidote
- Coffee ground vomitus

BIG QUESTION 17: What are spinal poisons, and what are the key clinical and medicolegal features of strychnine poisoning?

Broad Answer: Spinal poisons act mainly on the spinal cord. Strychnine causes powerful generalized reflex spasms with clear sensorium, leading to opisthotonus and death from asphyxia. Even minor stimuli trigger convulsions; jaw and trunk muscles are markedly rigid. Postmortem findings are mostly non-specific except for evidence of violent muscle spasm. Gelsemium produces flaccid paralysis with respiratory failure (contrast to strychnine).

DETAILED QUESTION

Q17.1: What are some important spinal poisons?

Answer:

- Strychnine
- Gelsemium

Q17.2: What are the features of strychnine seeds?

Answer:

- Strychnine poisoning is caused by strychnine, derived from Strychnos nux vomica/ Kuchila/ dog buttons.
- Seeds are concavo-convex in shape
- It is odorless and bitter in taste.
- Fatal dose: One crushed seed

Q17.3: What are the tests to identify strychnine?

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Strychnine Seeds aka Dog Buttons



Answer:

- Wenzel test
- Sonenshein test

Q17.4: What are the active principles of strychnine seeds?

Answer:

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

Q17.5: What is the mechanism of action of strychnine?

Answer:

- Acts on the anterior horn cell of the spinal cord **(Renshaw cells)**
- Complete blockade of the Ventral horn of motor neurons at the postganglionic receptor site.
- The effects of glycine **(an inhibitory neurotransmitter)** are inhibited in the spinal cord and brainstem.
  - Thus, the overall effect is excitatory.
  - Thus, this disease mimics the mechanisms of Tetanus.
- Two phases are present
  - Convulsion
    → The convulsion phase is increased in this poisoning.
  - Relaxation
- Cause of death is respiratory muscle spasm - **Asphyxia.**
- Consciousness will be retained.

Q17.6: How is strychnine differentiated from tetanus?

Answer:

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

Q17.7: What are the clinical features of strychnine poisoning?

Answer:

- **Tonus**
  - Opisthotonus
    → Hyperextension of the back

→ Most characteristic feature
- o Emprosthotonus
  → Hyperflexion of the back
- o Pleurothotonus
  → Lateral bending

- **Spasm**
  - o Risus Sadonicus
    → Spasm of facial muscles

Q17.8: What is the treatment of strychnine poisoning?

Answer:

- 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
  - o Phenobarbitone
  - o Diazepam

Q17.9: What is the mechanism of action of Gelsemium?

Answer: It is inhibitory in action

BIG QUESTION 18: What are insecticidal poisons, and how do they differ in their clinical features and management?

Broad Answer: Insecticidal poisons, commonly used in agriculture, include several chemical classes like organophosphates, carbamates, organochlorines, and pyrethroids. Organophosphates and carbamates cause cholinergic symptoms due to acetylcholinesterase inhibition, managed with atropine (plus pralidoxime for organophosphates). Organochlorines act as CNS stimulants, leading to tremors and seizures, and are treated with symptomatic care. Pyrethroids are less toxic but may cause paresthesia or hypersensitivity, also be managed symptomatically. Prompt decontamination and supportive therapy are essential across all types.

DETAILED QUESTIONS

Q18.1: What are some important agricultural poisons?

Answer:

- Organophosphorus Poisoning- Suicidal
- Carbamate
- OC (Organochlorine)
- Pyrethroids

Q18.2: What are the types of organophosphorus compounds?

Answer: The most common suicidal poison.

- Types:
  - o Alkyl = Po4 (Ex, Malathion, HETP, OMPP, TEPP).
  - o Aryl = Po4 (Ex- Parathion (folidol), Diazinon (Tik-20), Chlortion.

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Q18.3: What is the mechanism of action of OP compounds?

Answer:

- OP compounds cause cholinergic toxicity by irreversibly inhibiting the Acetylcholinesterase enzyme
- Sites:
  - NMJ
  - Ganglia of nervous tissue
  - RBC
- ACE is phosphorylated and irreversibly inhibited, which prolongs cholinergic stimulation.

Q18.4: What are the diagnostic tests used for OP poisoning?

Answer:

- Tests target ACE activity
- RBC/ True Cholinesterase:
  - More specific test.
- Plasma / Pseudocholinesterase:
  - The most common test because it falls rapidly with Organophosphorus poisoning.
  - It is inexpensive.
  - Easy test
  - More sensitive test
- If given 2 mg of Atropine in any case, you are suspected of organophosphate Poisoning if the symptoms are relieved.
- The confirmatory test is the P-nitrophenol test

Q18.5: What are the features of OP poisoning?

Answer: Muscarinic symptoms → ***Mnemonic: DUMB BELS***

- Diarrhea
- Urination
- Miosis and muscle weakness
- Bronchorrhea/ bronchospasm
- Bradycardia
- Emesis
- Lacrimation and lethargy
  - Red tear: Increase in porphyrin → Chromodacryorrhea
- Salivation

Q18.6: How is OP poisoning managed?

Answer:

- Resuscitative Measures (Airway-Breathing-Circulation).
- Gastric Lavage with 1:5000 $KMnO_4$
- Activated Charcoal, which adsorbs the poison.
- Atropine sulfate arrests the muscarinic effect but does not affect the nicotinic action.
- Should be continued till the Atropinization (Till the Tracheo-Bronchial secretion/ clear or dry lung).
- Pupillary status isn't reliable.
- Dose: 2-4 mg IV; Every 10-15 minutes till Atropinization.

- Oximes (PAM) act at Nicotinic sites, along with decreasing muscarinic and CNS symptoms.
- MOA- Oximes remove the phosphate group.
- Pyridoxine decreases the requirement of Atropine and so potentiates the action of atropine.

Q18.7: What are the postmortem findings of OP poisoning?

Answer:

- Signs of Asphyxia
- Congestion of all organs.
- Pulmonary edema
- Blood-stained froth is seen at the mouth and nose (seen in Organophosphorus).
- Kerosene smell due to Aronmax (solvent present in pesticides).
- Organophosphorus can be detected in a putrefied body

Q18.8: What are the characteristic features of carbamates?

Answer:

- **MOA:** Reversibly inhibits carboxyl esterase enzymes (ACHE) by carbamylation.
- **Metabolism:**
  - Spontaneously hydrolysed from an enzymatic site within 48 hrs.
  - Cannot penetrate the CNS.
- **Treatment:**
  - Atropine is a specific antidote.
  - Oximes are contraindicated.
- **Examples:** Aldicarb, D-carb, Propoxur, Baygon, Ficam.

BIG QUESTION 19: What are organochloride insecticides, and what are their clinical features, mechanism of action, and management of poisoning?

Broad Answer: Organochlorides are chlorine-based insecticides like DDT that act by disrupting neuronal ion channels. They cause CNS stimulation leading to tremors, seizures, and coma. They are highly lipophilic, persist in the environment, and bioaccumulate. Treatment is supportive with decontamination.

DETAILED QUESTIONS

Q19.1: What are some examples of organochloride insecticides?

Answer: Aldrin, Endrin, DDT

Q19.2: Where do organochlorides accumulate in the body?

Answer: Deposited in fat.

Q19.3: What is the mechanism of action of organochloride poisons?

Answer: Endrin is also known as Plant Penicillin

- Inhibits GABA-mediated Cl- influx in the CNS.
- Excitatory effect overall
- Endrin is a CNS Stimulant

Q19.4: What are the symptoms of organochloride toxicity?

Answer:

- Symptoms include Tremors, Myoclonus, and seizures.
- Hyperthermia, mydriasis, and respiratory failure are also seen.

Q19.5:What is the management of organochloride toxicity?

Answer:

- Resuscitative measures, along with gastric lavage and activated charcoal.
- No specific Antidote
- Symptomatic treatment

Q19.6: What is a kepone shake?

Answer:

- Tremor of chronic Organochlorine. Ex: Chlordecone, which causes Kepone Shake
- Tremors of the Head, Hand

BIG QUESTION 20: What are metal phosphide poisons and what are their mechanism, clinical features, and treatment?

Broad Answer: Metal phosphides like Aluminium Phosphide and Zinc Phosphide are commonly used rodenticides that release toxic phosphine gas when ingested. Aluminium Phosphide is notorious for severe metabolic acidosis and myocardial depression, leading to high fatality. Zinc Phosphide acts similarly but has a garlic-like odor and a slower onset. Both poisons primarily affect the cardiovascular and respiratory systems. Management is mainly supportive, with no specific antidote available.

DETAILED QUESTIONS

Q20.1: What is aluminium phosphide, and how is it commonly used?

Answer:

- It is a metal phosphide poison, also known as Celphos.
- Used as a grain preservative, having a Garlicky smell / Odor.

Q20.2: What is the mechanism of toxicity of aluminium phosphide?

Answer:

- Each 3gm tablet liberates 1gm of phosphine gas.
- Phosphine inhibits the enzyme Cytochrome oxidase.
- The chemical reaction is accelerated by the presence in the stomach.

Q20.3: What is the fatal dose and the clinical features of aluminium phosphide poisoning?

Answer:

- Fatal dose: 1-3 tablets.
- Liver shows Centrizonal Hemorrhagic Necrosis.
- M/c cause of death is Cardiogenic shock.
- Mortality = 35-100% (high).

Q20.4: How is aluminium phosphide poisoning managed?

Answer:

- No specific Antidote is given.
- Magnesium Sulfate is given to correct Hypomagnesemia and arrhythmia.
- Activated charcoal & Liquid Paraffin are used to decrease absorption and increase excretion, respectively.

Q20.5: What are the features of zinc phosphide?

Answer:

- It can be used as a Rodenticide.
- Causes slow releases of Phosphine.
- Onset is low.
- Garlic / rotten fish smell.

BIG QUESTION 21: What are cardiac poisons, and how does aconite poisoning present in terms of its mechanism, clinical features, and fatal outcomes?

Broad Answer: Cardiac poisons primarily affect the myocardium, altering heart rate and rhythm, and may lead to fatal arrhythmias. Aconite, a well-known cardiac poison derived from the Aconitum plant species, acts by opening sodium channels persistently, causing early depolarization and cardiac excitability. It presents with burning sensations, paresthesia, nausea, hypotension, and life-threatening ventricular arrhythmias. Death is usually due to refractory ventricular fibrillation. Aconite has no specific antidote, and management is largely supportive and symptomatic.

DETAILED QUESTIONS

Q21.1: What are the examples of cardiac poisons?

Answer: ***Mnemonic: Queen D O N A C***

- **Q**uinine
- **D**igitalis
- **O**leander (yellow, white/pink)
- **N**icotina tabacum
- **A**conite
- **C**erebra odellum

Q21.2: What are the identifying features of the aconite plant?

Answer:

- It is also called blue rocket/monk's hood/ meetha zeher
- Roots are conical in shape and tapered at the end with longitudinal ridges.
- All parts are poisonous.
- Roots and seeds are the most poisonous parts.
- Roots of Aconite are generally mistaken for Horseradish root
- They have a sweet taste, no odour.

Aconite (Blue Rocket)





Q21.3: What are the active principles of aconite?

Answer:

- Aconitine
- Pseudaconitine
- Aconin

Q21.4: What is the mechanism of action of aconite?

Answer:

- Mainly acts on sodium channels (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.
  - The respiratory center is slowed.
  - Tachycardia followed by Bradycardia is observed.

Q21.5: What are the signs and symptoms of aconite poisoning?

Answer:

- Tingling and numbness of the mouth and throat (most characteristic symptom)
- Numbness and paraesthesia of the face, perioral area, and progresses to all over the body.
- Weakness of the four limbs
- Twitching of muscles
- Hippus sign: Alternate contraction and dilation of the pupil.
- Xanthopsia: Visual illusion of yellow color around objects.
- Hypotension, Tachycardia, Ventricular ectopy, Cardiac arrhythmia with AV block
- Cause of death: Cardiac arrhythmia (mostly Ventricular arrhythmia)
- Hyperkalemia is also seen.

Q21.6: What is the fatal dose of aconite?

Answer: 1-2 gms of the root is fatal.

Q21.7: What is the treatment of aconite poisoning?

Answer:

- Gastric lavage with warm saline.
- Atropine for AV block.
- Supportive treatment

Q21.8: What is the medicolegal importance of aconite poisoning?

Answer:

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

BIG QUESTION 22: What are the key features, clinical manifestations, and management of Oleander poisoning, and how do other cardiac poisons like Digitalis, Cerebra odollam, and Nicotine compare?

Broad Answer: Oleander poisoning, caused by ingestion of yellow or white oleander, is due to cardiac glycosides (similar to digitalis) that inhibit Na^+/K^+ ATPase, leading to increased intracellular Ca^{2+} and cardiac toxicity. It causes GI symptoms, bradyarrhythmias, and hyperkalemia. Management includes activated charcoal, atropine, and digoxin-specific Fab fragments.

Other cardiac poisons include Digitalis, which has a similar action and ECG changes; Cerebra odollam (suicide tree), which is rich in cerberin (a digitalis-like toxin); and Nicotine, a ganglionic stimulant that can cause bradycardia, tachycardia, and seizures.

DETAILED QUESTIONS

Q22.1: What are the features of yellow oleander?

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Answer:

- Also called **Cerbera Thevetia or peela kaner.**
- All parts of the plant are poisonous.
- **Active Principles**
  - Cerberin
  - Thevetin A and B
  - Neriifolin
- Bell-shaped flowers

Peela kaner



Q22.2: What are the features of pink oleander?

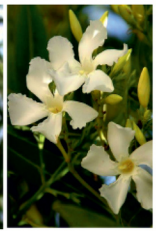
Answer:

- It is termed Nerium odorum or kaner
- **Active Principles**
  - Oleandrin
  - Nerin
  - Folinerin
  - Rosagenin

Nerium odorum



White olender



Q22.3: What is the mechanism of action and clinical features of oleander poisoning?

Answer:

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

Q22.4: What is the treatment of oleander poisoning?

Answer:

- 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

Q22.5: What are the features of digitalis poisoning?

Digitalis Purpurea



Answer:

- Digitalis purpurea is also called purple Foxglove.
- **Mechanism of action**
  - Inhibition of the Sodium-Potassium ATPase channel
- **Treatment**
  - Treatment is the same as for Oleander poisoning

Q22.6: What are the features of cerebra odellum?

Answer: Also called as Suicidal tree.

- **Active Principles**
  - Cerberin
  - Cerebroside
  - Odolin
  - Odolotoxin
- **Treatment:** BHIST regime

Q22.7: What is the most common substance abused in India?

Answer: Nicotine

- Most common illicit substance in India is Cannabis

BIG QUESTION 23: What are asphyxiant poisons, and what are the clinical features, mechanism, and treatment of carbon monoxide poisoning?

Broad Answer: Asphyxiant poisons interfere with oxygen delivery or utilization in the body. Carbon monoxide is the most important and common asphyxiant. It binds to hemoglobin with 250 times greater affinity than oxygen, forming carboxyhemoglobin, which reduces oxygen-carrying capacity. Symptoms include headache, confusion, cherry-red skin, and coma. Treatment involves immediate removal from exposure, administration of 100% oxygen, and, in severe cases, hyperbaric oxygen therapy.

DETAILED QUESTIONS

Q23.1: What are the gases that cause asphyxia?

Answer:

- Carbon monoxide
- Cyanide
- Hydrogen sulphide

Q23.2: What are the features of CO gas?

Answer:

- 40x more affinity for myoglobin than oxygen
- 210x (200-300x) more affinity for hemoglobin than oxygen.

Q23.3: What is the mechanism of action of CO poisoning?

Answer:

- CO shifts the oxygen dissociation curve to the left side.
- This results in anemic anoxia or anemic hypoxia.
- Anaerobic metabolism leads to lactic acid formation and high anion gap metabolic acidosis.

Q23.4: How does CO poisoning occur?

Answer:

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

Q23.5: What are the clinical features observed at different concentrations of CO in blood?

Answer:

CO concentration (%)	Symptom
10-20	• Headache • Muscle weakness
20-30	• Throbbing headache • Dyspnea • Emotional instability
30-40	• Dizziness • Disorientation • Judgmental impairment

Q23.6: What are the symptoms of CO poisoning?

Answer:

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

Q23.7: What is the treatment of CO poisoning?

Answer:

- 100% high-flow oxygen until carboxyhemoglobin falls to 15-20%.
- Hyperbaric oxygen: Barotrauma is a side effect.
- **Rebound toxicity of CO:** Recurrence of symptoms after initial recovery.

Q23.8: What are the tests for CO poisoning?

Answer:

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

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Q23.9: What are the postmortem findings in CO poisoning?

Answer:

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

BIG QUESTION 24: What is cyanide poisoning, and what are its key features, mechanism, and general approach to management?

Broad Answer: Cyanide poisoning is a rapidly fatal condition caused by compounds like hydrogen cyanide and cyanide salts, often seen in industrial exposure, smoke inhalation, or suicidal ingestion. It acts by inhibiting cytochrome oxidase in the mitochondrial electron transport chain, halting cellular respiration. Clinically, it presents with headache, dizziness, dyspnea, hypotension, seizures, and cherry red skin. Death can occur within minutes due to respiratory failure. Management involves immediate supportive care and antidotes like hydroxocobalamin or sodium thiosulfate.

Q24.1: What are the natural and chemical sources of cyanide?

Answer:

- Produced in apples, apricots, peaches, plums, almonds, and linseed.
- Liquid cyanide - Hydrocyanic acid or Prussic acid.
- 4% cyanide in water - Scheele's acid.
- Gas - Cyanogen or Hydrogen cyanide.

Q24.2: What is the characteristic smell seen in cyanide poisoning?

Answer:

- Bitter almond smell.
- Smell perception is a sex-linked recessive trait.

Q24.3: How does cyanide become toxic in the human body?

Answer:

- Ideal for suicidal poisoning.
- Salts such as KCN and NaCN are non-toxic.
- Combine with hydrochloric acid in the stomach to form HCN, which is absorbed.
- No effect in achlorhydric individuals.

Q24.4: What is the mechanism of action of cyanide?

Answer:

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

Q24.5: What is the treatment of cyanide poisoning?

Answer:

- Remove the exposure source and clothes (avoid absorption through the skin).
- **Vitamin B12 → Best antidote.**
  - Hydroxocobalamin combines with cyanide to form CN-cobalamin, which is excreted.
- ELI-LILLY antidote - Triple antidote:
  - Amyl Nitrite inhalation - Methemoglobin formation
  - IV Sodium nitrite - Methemoglobin formation
  - Sodium thiosulfate is 50% - Thiocyanate formation
- Sodium bicarbonate
  - Correction of acidosis.
  - IV Methylene blue is used in severe conditions.
  - Para-aminophenone (PAPP) can also be used.

Q24.6: What is the test for cyanide poisoning?

Answer: Lee-Jones test.

Q24.7: What are the post-mortem findings seen in cyanide poisoning?

Answer:

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

BIG QUESTION 25: What are the clinical features, medicolegal importance, and management of Hydrogen Sulfide poisoning?

Broad Answer: Hydrogen sulfide (H_2S) is a colorless gas with a characteristic rotten egg odor, commonly found in sewers, mines, and petroleum refineries. It is a chemical asphyxiant that inhibits cytochrome oxidase, similar to cyanide. Early symptoms include eye irritation, cough, and dizziness, progressing to loss of consciousness and respiratory failure. The cause of death is usually respiratory paralysis.

DETAILED QUESTIONS

Q25.1: How is H2S formed?

Answer: Formed during the decomposition of organic substances containing sulphur.

Q25.2: What is the site of action of H2S?

Answer: Hydrogen sulphide acts on Cytochrome C oxidase (Complex IV of the electron transfer chain).

Q25.3: What is the characteristic smell associated with H2S?

Answer: Rotten egg smell

Q25.4: What are the other names of hydrogen sulphide?

Answer:

- Knock-down gas - Sudden loss of consciousness.
- Also known as sewer gas. (other sewer gas: methane, carbon dioxide, ammonia, hydrocarbon, hydrogen sulphide)

Q25.5: What is detergent suicide?

Answer:

- The detergent suicide phenomenon is seen in Japan.
- Bath salt containing sulphur combined with toilet bowl cleaner containing hydrochloric acid.

Q25.6: What is the antidote for hydrogen sulphide poisoning?

Answer: Hyperbaric oxygen and nitrites

BIG QUESTION 26: What are deliriant poisons, and how does Datura poisoning present in terms of clinical features, plant characteristics, fatal dose, and management?

Broad Answer: Deliriant poisons are substances that cause delirium, confusion, and hallucinations. Datura, a common deliriant plant, contains anticholinergic alkaloids like atropine, hyoscine, and hyoscyamine. It presents with classical features of anticholinergic toxicity, including dry mouth, dilated pupils, and delirium. All parts of the plant are toxic, especially the seeds. Management includes supportive care and physostigmine as an antidote in severe cases.

DETAILED QUESTIONS

Q26.1: What are the examples of deliriant poisons?

Answer:

- Cannabis
- Cocaine
- Datura/Devil's Trumpet

Q26.2: What are the identifying features of the datura plant?

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Answer:

- White flower plant: Datura Alba

Datura Alba



- Purple dark color flower: Datura Nigeria
- Datura Stramonium, AKA Jimson's weed, is also known as thorn apple.

Datura Stramonium





Seeds

- The **entire plant is poisonous.**
- Seeds resemble chili seeds
- 1 Fruit almost contains 100s of seeds.

Q26.3: What are the active principles and the fatal dose of datura?

Answer:

- Active principle:
  - Hyoscine (Scopolamine), a truth serum drug, which is used in narcoanalysis
  - Hyoscyamine
  - Atropine

- These exert Anticholinergic effects
- Fatal dose:100-125 seeds.
- 1 fruit can kill 4-5 people

Q26.4: What are the common modes of datura poisoning?

Answer: Used as a roadside poison or railway poison.

Q26.5: What are the signs and symptoms of datura poisoning?

Answer:

9 D's

1. Dry skin
2. Dry mouth
3. Dysphagia
4. Dilated pupil: **Corn picker's Pupil** (Unilateral mydriasis).
5. Drunken gait
6. Dysarthria
7. Delirium
8. Drowsiness
9. Death

- **Carpologia:** It feels like it is a kind of hallucination, imaginary threads, and pill-rolling movement.
- Features of datura poisoning are described as:
  - Blind as a bat
  - Hot as a hare
  - Dry as a bone
  - Red as a beet
  - Mad as a hen

Q26.6: What is the medico-legal importance of datura poisoning?

Answer:

- Datura is a stupefying agent
- It can be used as a Love philter.
- Accidental poisoning, as it looks like chilli seeds
- There is no criminal responsibility for a person who has been given Datura because his actions are involuntary intoxication.
- 328 IPC: Hurt with poison with criminal intention.

Q26.7: What are the differences between datura and chilli seeds?

Answer:




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Features	Datura	Chilli
Colour	Dark-brown	Yellow
Shape	Kidney shaped	Round
Consistency	Thick	Thin
Surface	Not smooth	Smooth
Odor	Odorless	Pungent smell
Taste	Bitter	Pungent
Cut-section embryo	Curved outward	Curved inward

Q26.8: What is the treatment of datura poisoning?

Answer:

- Stomach wash and activated charcoal.
- Physostigmine is the antidote of choice for datura → Counteract the anticholinergic effects.
- Short-acting barbiturates to control delirium.

BIG QUESTION 27: What are the forms, effects, and medico-legal implications of Cannabis use and poisoning?

Broad Answer: Cannabis is a deliriant poison derived from the plant Cannabis sativa, used both recreationally and traditionally. It exists in various forms like bhang, ganja, and charas, each differing in potency. Its primary effects include euphoria, altered perception, and impaired judgment. Medico-legally, it has significance in intoxication, dependency, and criminal liability.

DETAILED QUESTIONS

Q27.1: What are the street names of cannabis?

Answer: Marijuana, Weed, Hemp, Grass, Rope, Hash.

Q27.2: What are the various species of cannabis?

Answer:

- Cannabis Indica
- Cannabis Sativa

Q27.3: Under which act is cannabis regulated in India?

Answer:

- NDPS act
- Cannabis is the most common illicit drug.

Q27.4: What is the active principle of cannabis?

Answer: 9 Tetrahydrocannabinol

Q27.5: What are the features of the cannabis plant?

Answer:

- Male and female plants are separate.
- More potent: Leaves and flowers



Q27.6: What are the various preparations of cannabis?

Answer:

Bhang/ Siddhi or Sabji	Ganja	Charas
• It is legal. • Prepared from dried leaves of the cannabis plant. • Active principle is <15% • Sweet product of Bhang is majoon (Bhang + Honey + any edible oil like ghee).	• Flowering top of the female plant • Active principle is about 15-20% • Reefer/ Joint cigarette. • Hukka: A combination of ganja with tobacco.	• Aka Hashish • It is a resin of the plant. • Active principle is about 25-40% • Oil of it is known as Hash oil (the active principle is 70 to 90%) • More potent: Hash oil > Charas.

Q27.7: What is sinsemilla?

Answer:

- Not a preparation of India
- Unpollinated or Seedless dried flower of a female plant

Q27.8: What are the fatal doses of preparations of cannabis?

Answer:

- Charas: 2g
- Ganja: 8g
- Bhang: 10g

Q27.9: What are the acute effects of cannabis?

Answer:

Effects of Cannabis	
Small Doses	**High Doses**
Causes euphoria (excessive happiness)	**Psychiatric problems:** Euphoria, hallucination, increase self-confidence
Disorientation: • **Time:** Temporal • **Space:** Spacial Disorientation	• Increase appetite and thirst. • Increase the time of coitus. • Gynecomastia

Q27.10: What are the chronic effects of cannabis?

Answer:

- Degeneration of the CNS.
- Chronic cannabis poisoning

- Hashish insanity: Hallucinations
  - → Auditory
  - → Visual
- **Run amok:** A person goes into depression, and then there is a homicidal tendency, and then a suicidal tendency.
- **84 IPC:** Unsound mind, where you are not liable for the crime.
- **Amotivational syndrome:** Frustrated, lack of confidence
- **Flashback phenomena:** Most commonly seen in LSD. (Re-experience of experience)
- Intermittent vomiting: Hyperemesis Syndrome
- **KORO**
  - Males: Penis shrinks in size.
  - Females: Breasts shrink in size.

Q27.11: What is the characteristic smell associated with cannabis use?

Answer: Burnt rope smell

Q27.12: What is the treatment of cannabis?

Answer: Diazepam is used to treat cannabis

BIG QUESTION 28: What are the key features of cocaine, including its source, effects, and clinical relevance?

Broad Answer: Cocaine is a powerful CNS stimulant derived from the leaves of Erythroxylum coca. It blocks the reuptake of dopamine, norepinephrine, and serotonin, leading to intense euphoria and sympathomimetic symptoms. It causes mydriasis, hyperthermia, tachycardia, and can lead to sudden cardiac death. Medico-legally, it is an abused drug under the NDPS Act.

DETAILED QUESTIONS

Q28.1: What are the common names of cocaine?

Answer:

- Coke
- Crack
- Snow
- She
- White lady

Q28.2: What are the properties of cocaine?

Answer:

- It is a CNS stimulant
- It causes vasoconstriction.

Q28.3: What is the source of cocaine?

Answer:

- Prepared from coca leaves.
- The plant is known as Erythroxylum coca.

Q28.4: What are the common routes of cocaine administration?

Answer:

- Common routes:
  - o Snorting
  - o Smoking
  - o IV
  - o Oral route
- Crack is smoked (cocaine + baking soda).
- Salt of cocaine is in powder form, which is known as cocaine hydrochloride, and is taken as an injection.

Note:

- Crack house: Place where crack is sold.
- Shooting the gallery: Place where heroine is sold.
- Speed ball: Cocaine + Heroine

Q28.5: What is the mechanism of action of cocaine?

Answer:

- Inhibits the synaptic reuptake of Epinephrine, Norepinephrine, Dopamine, and Serotonin.
- All these substances will increase the synaptic cleft.
- This will cause Sympathomimetic Toxidrome.

Q28.6: What are the clinical features of cocaine toxicity?

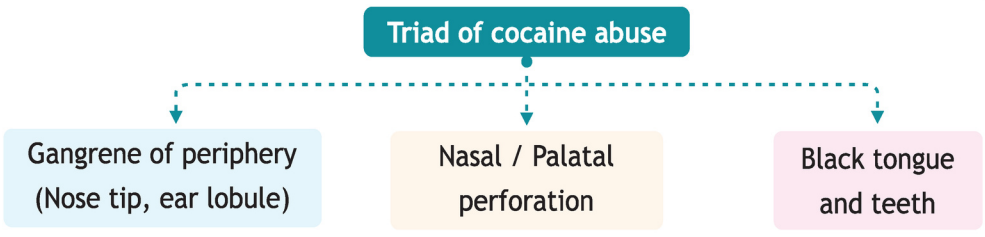
Answer:

Sympathomimetic Toxidrome Complications		
Features	**Small Dose**	**High Dose**
Heart rate	Increase	Cardiac arrhythmia
Blood vessels	Constrictive	Myocardial function
Blood pressure	Increase	Intracerebral brain stroke
Respiratory rate	Increase	Increase
Temperature	Increase	Crack fever
Sweating	Increase	Increase
Pupil	Dilated	Fixed
CNS Effects	Excitement Euphoria	Delirium Excitement

Q28.7: What are the features of chromic coccaine abuse?

Answer:

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- AKA Cocainism, Cocainomania, or Cocainophagia
- Tolerance for high doses
- Rush (when excited) and crash (when depressed)
- Cocaine bugs: Magnan symptom or formication.
  - This is tactile hallucination → Seems like insects, mice, or rats are crawling on the skin.

Q28.8: What is the treatment of cocaine toxicity?

Answer:

- Antidote: Amyl nitrite to control heart rate and BP
- Supportive and Symptomatic treatment
- Fatal dose: Around 1g.

BIG QUESTION 29: What are somniferous poisons, and how does opium exert its toxicological effects?

Broad Answer: Somniferous poisons are substances that induce sleep or unconsciousness, and opium is the classical example. Derived from the poppy plant, opium contains active alkaloids like morphine and codeine, which act on the central nervous system, causing sedation and respiratory depression. Toxicity may lead to pinpoint pupils, coma, and death from respiratory failure. Opium also has significant medico-legal importance due to its potential for abuse and role in narcotic regulations.

DETAILED QUESTIONS

Q29.1: What are the other names of opium?

Answer: Afim, Kasoomba, Madak

Q29.2: What is the source of opium?

Answer:

- From the fruit known as Papaver Somniferum.
- Extracted from unripe fruit after giving a vertical incision.
- Milky juice (Latex) is extracted.
- When latex becomes dry, it becomes a brown or dark color.
- It is known as crude opium.
- Poppy seeds are known as Khas Khas.
- It is used in cooking sweets, etc.
- Poppy seeds are nontoxic.

Poppy Fruit



Poppy Seed



Q29.3: What are the derivatives of opium?

Answer:

- Natural (MTC): Morphine, Thebaine, and Codeine
- Semi-synthetic: Heroine
- Synthetic (m): Methadone

Q29.4: What is the mechanism of action of opium?

Answer:

- Acts with the release of endorphin.
- Opium depresses all centers except vomiting, sweating.

Q29.5: What are the fatal doses of opium and its derivatives?

Answer:

- Opium: 2g
- Morphine: 0.2 g
- Methadone: 100 mg
- Codeine: ½ g

Q29.6: What are the clinical features of opium poisoning?

Answer: **Classical Triad (CRP):**

- Coma
- Respiratory depression
- Pinpoint pupil

Stages:

- Excitement: Euphoria
- Stupor: Drowsiness, constriction of the pupil, and cyanosis.
- Coma
  - Hypothermia
  - Respiratory depression
  - Typical pinpoint pupil
  - All secretions are suspended except for sweating.

Q29.7: What are the tests for opium toxicity?

Answer:

- M: Marquis test
- D: Deninges test
- H: Husemann test

BIG QUESTION 30: What are the characteristic symptoms and treatment modalities of Morphine poisoning?

Broad Answer: Morphine poisoning presents with classical features of opioid toxicity, including pinpoint pupils, respiratory depression, and unconsciousness. It is managed primarily with the opioid antagonist Naloxone, along with supportive care to maintain airway, breathing, and circulation. In severe cases, mechanical ventilation may be required.

DETAILED QUESTIONS

Q30.1: What are the features of morphine overdose?

Answer:

- **M:** Miosis
- **O:** Orthostatic Hypotension
- **R:** Respiratory Depression
- **P:** Pain Relief
- **H:** Histamine Release (Bronchospasm), Hypothermia
- **I:** Increased ICT, Infrequency in the GI tract. (Constipation)

- **N:** Nausea, Naloxone (Antidote)
- **E:** Euphoria
- **S:** Sedation

Q30.2: What is the daily tolerated dose of opium in chronic addicts?

Answer: In chronic poisoning (Morphinism, Morphinomania), opium addicts can tolerate 3 to 6 gm per day.

Q30.3: What is the treatment of morphine overdose?

Answer:

- Gastric lavage with $KMnO_4$
- Done even if taken by the parenteral route/IV route.
- Antidote: Naloxone, Naltrexone (Oral)

Q30.4: What are the postmortem findings in morphine poisoning?

Answer:

- Signs of asphyxia
  - Froth: Mouth and nostrils
- PM staining: Blackened
- Organs: Congested

Q30.5: What are the features of morphine withdrawal?

Answer:

- Yawning
- Insomnia
- Dysphoric mood
- Dehydration
- Increased BP
- Heart rate
- Respiration
- Increased secretions - rhinorrhea
- Piloerection
- Mydriasis

BIG QUESTION 31: What are the features of heroin (diacetylmorphine) poisoning?

Broad Answer: Heroin is a semi-synthetic opioid derived from morphine and is highly addictive. It is commonly abused for its euphoric effects and is associated with rapid tolerance and dependence. Poisoning can cause respiratory depression, pinpoint pupils, and coma. Medico-legally, heroin is classified as an NDPS substance and is often linked with illicit drug use, trafficking, and addiction-related offenses.

DETAILED QUESTIONS

Q31.1: What are the common names of heroin?

Answer: Junk/Dope/Smack Sugar

Q31.2: What is heroin chemically, and what is its fatal dose?

Answer:

- Heroin is diacetyl morphine
- Fatal dose: 50 mg

Q31.3: What is cutting of heroin, and what are the common adulterants used?

Answer: **Cutting:** Adulteration of heroin.

- Common cutting agents:
  - Quinine
  - Fructose
  - Chalk powder
  - Mannitol

Q31.4: What are the different routes and methods of heroin administration?

Answer:





- **Speedball: Heroin + Cocaine**
  - If smoked, this condition is known as Moon Rock.
  - **HS:** Hotshot is strychnine
- **Most common method: Chasing the dragon** (Smoking)
  - Take aluminum foil, add brown sugar, and heat it below and smoke/sniff.
- IV and skin-popping are done for Heroin hydrochloride.

Q31.5: What is the difference between brown sugar and heroin?

Answer:

Brown Sugar	Heroin
• Less refined and not pure. • Black tar present (Not pure) • Can be smoked or sniffed. • Not given by IV route because it causes Thrombosis sclerosis.	• Pure and refined • Comes with salt heroin hydrochloride. • Taken in injection form.

Brown sugar



Heroin



Q31.6: What is the treatment of heroin poisoning?

Answer:

- Antidote: Naloxone
- Shooting the gallery: A Place where heroin is sold

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BIG QUESTION 32: What are organic irritant poisons, and which common plants are classified under this category?

Broad Answer: Organic irritant poisons are naturally occurring plant-based substances that produce local irritation when ingested, applied to the skin, or introduced into the body. These poisons cause inflammation, blistering, or systemic toxic effects depending on the route and dose. Some common examples of organic irritant plants include: Ricinus communis (Castor), Croton Tiglium, Abrus Precatorius, Semecarpus Anacardium (Marking Nut), Calotropis, Capsicum annuum (Chili) - Contains capsaicin; causes burning sensation and is used in self-defense sprays. These plants are commonly implicated in accidental, occupational, or criminal poisonings and are important in medico-legal contexts due to their recognizable effects and toxic profiles.

DETAILED QUESTIONS

Q32.1: What are the features of Ricinus communis?

Answer:

- Castor plant or Arandi
- **Fatal dose:** 10 seeds
- The entire plant is poisonous.
- **Main toxalbumin:** Ricin
- **Mechanism of action of toxalbumin: Inhibits RNA polymerase**
- Toxalbumin: Causes RBC agglutination
- **Potency: 6000 times > Cyanide poison.**
- **Signs and symptoms**
  - Burning pain
  - Abdominal pain
  - Bloody diarrhea
- **Biological warfare:** Category B
- Small shiny seeds with yellow or white markings

Ricinus Communis

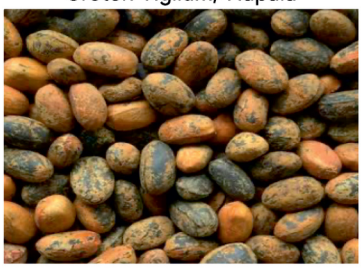


Q32.2: What are the features of Croton tiglium?

Answer:

- AKA Jamalgota or Napala
- **Fatal dose:** 5 seeds
- **Active principle:** Crotin
- The entire plant is poisonous.
- **Signs and symptoms**
  - Strong purgative

Croton Tiglium/ Napala



Q32.3: What are the features of Abrus precatorius?

Answer:

- **Fatal** dose: Around 1-2 seeds
- It is an animal poison.
- Arrow poison
- AKA Ratti, Gunja, Gunchi, Rosary Bead, Jequirity, Indian Licorice
- Most important **active principle:** Abrin, Abralin, Abralic acid

- Abrin is like viper venom.
- **Signs and symptoms**
  - Local necrosis of Abrin
  - Systemic manifestation
- Needle or Sui is prepared from crushed seeds, which are used to throw at cattle. It is considered an ideal cattle poison.
- The size of the needle or Sui is around 15mm.
- **Treatment:** Gastric Lavage
- **Injection: Anti-Abrin**
- Dissection of either the sui or the needle

Ratti Seeds



Red seed with black tip

Fatal dose:

- Abrus - 1 seed
- Crouton - 5 seeds
- Ricinus - 10 seeds
- Datura - 100 seeds

Q32.4: What are the features of Semecarpus anacardium?

Answer:

- AKA Marking Nut, Bhilwa plant.
- Heart-shaped seed
- **Active principles:** Semicarpol and Bhilawanol
- Pericarp irritant juice
- **Used for**
  - Making an Artificial bruise.
  - Causes the formation of painful blisters on the skin.
  - Marking on clothes
- **Fatal dose**: 5-10g
- **Orally:** GI symptoms

Semecarpus Anacardium



Q32.5: What are the features of Calotropis?

Answer:

- AKA Akdo or Madar
- **Active principle:** Calotropin, Calotoxin, Calactin, Gigantean, Uscharin
- **2 species of Calotropis**
  - **Calotropis Gigantea:** Purple color flower
  - **Calotropis Procera:** White color flowers
- Calotropis is AKA **rubber bush.**
- Artificial poison
- Artificial bruise
- Cattle poison
- It can cause conjunctivitis, which can be used as a **malingering.**
- Dilated pupil
- Convulsion

Calotropis



Q32.6: What are the features of Capsicum annuum?

Answer:

- AKA **Chilli/ mirchi**
- Active principle: Capsaicin, Capsaicin
- **Odor and taste:** Pungent
- Seeds resemble Datura
- Cross-section of the seed gives a figure of 6 appearance
- Painful contact dermatitis (known as Hunan Hand)
- Used for torture and robbery
- Can cause conjunctivitis

Chilli Seeds



BIG QUESTION 33: What are animal irritant poisons, which organisms cause them, and their clinical features and management?

Broad Answer: Animal irritant poisons are toxic substances from animals that cause local or systemic irritation. Important examples include blister beetle, scorpion, venomous spiders, and snakes. Blister beetle secretes cantharidin, a vesicant causing skin blistering and urinary irritation. Scorpion venom contains neurotoxins causing pain, sweating, and sometimes cardiac effects. Venomous spiders like the Black Widow (neurotoxic) cause severe local or systemic symptoms.

DETAILED QUESTIONS

Q33.1: What are the examples of animal poisons?

Answer: Blister beetle, scorpion, venomous spiders, and snakes.

Q33.2: Which venomous arachnid species is responsible for severe envenomation?

Answer: Scorpion Buthidae (Venomous Arachnids)

Q33.3: What is the mechanism of action of a scorpion bite?

Answer:

- C from scorpion
- Uncontrolled release of Catecholamine.
- It affects the sodium-potassium channel.

Q33.4: What are the toxins released from scorpion venom?

Answer:

- Neurotoxin
- Hemotoxic
- Resembles spider and cobra.
- The amount is less, so not fatal.

Q33.5: What are the clinical features of scorpion envenomation?

Answer:

- Causes an autonomic storm.
- **Local symptoms**

  - Intense pain
  - Swelling
  - Blisters
- **Other symptoms**
  - Sweating palpitation
  - Chest pain
  - Mydriasis
  - Priapism

Q33.6: What is the treatment of spider envenomation?

Answer:

- Immobilization
- Pain (NSAID)
- ASV (Anti Scorpion Venom)
- Alpha blocker (Prazosin)

Q33.7: What are the features of the blister beetle?

Answer:



- If consumed, it causes Cantharide poisoning.
- AKA Spanish fly
- Active principle: Cantharidin
- 1 beetle contains 0.2-0.7 mg of cantharidin
- Indian flies contain 3% of cantharidin

Q33.8: What is the fatal dose of cantharidin?

Answer: 15-30mg of cantharidin

Q33.9: What are the features of cantharidin poisoning?

Answer:

- Locally produces painful blisters
- Oral intake: Increases **libido**
  - Aphrodisiac
- Causes priapism: Painful erection of the penis
- Cantharidin is nephrotoxic
  - Can cause chronic renal failure
  - Have symptoms of **uremia**

Q33.10: What are the features of spider envenomation?

Answer:

- Spider (Venomous Arachnids)
- **Toxin:** Neurotoxin
  - Locally Necrotic
  - Excitatory Neurotoxin- priapism
- **Most poisonous spider:** Black widow

- **Treatment**
  - Antihistamines
  - If infection, Antibiotics
  - Dapsone

BIG QUESTION 34: What are the different types of snakes, and what are their clinical manifestations and management?

Broad Answer: Snakes are classified as venomous and non-venomous, with common venomous families being Elapidae (cobra, krait), Viperidae (Russell's viper, pit viper), and Hydrophiidae (sea snakes). Venomous snakebites may show features like fang marks, swelling, neurotoxicity, coagulopathy, or myotoxicity depending on the species. Identification relies on signs such as local reaction, bleeding, paralysis, or dark-colored urine. Management involves immobilization, supportive care, and timely administration of polyvalent anti-snake venom (ASV), with attention to anaphylaxis and monitoring.

DETAILED QUESTIONS

Q34.1: What is the study of snake poison?

Answer: Study of the snake poison: Ophiology

Q34.2: What are the types of snakes?

Answer:

- Viperidae: (True viper) Russel's viper, saw-scaled viper.
  - Vasculotoxic
- Elapidae: Cobra and Krait (Common)
  - Neurotoxic
- Hydrophiidae: Sea snakes
  - Act on skeletal muscles.
  - Myotoxic

Q34.3: What are the dangerous snakes seen in India, and their fatal doses?

Answer: Five Dangerous and Poisonous Snakes in India:

- **Cobra**
  - Fatal dose: 12 mg
  - 200-250mg venom
  - More dangerous
- **Common Krait**
  - Fatal dose: 6 mg
- **Russell Viper**
  - Fatal dose: 15mg
- **Saw Scaled Viper**
  - Fatal dose: 8 mg
    - → Echis: E for 8 mg
- **King Cobra**
  - Fatal dose: 12 mg

- Most dangerous snake: King cobra.
  - One bite amount: 200-250 mg venom (Cobra).
  - It is more in King cobra.
- Most poisonous snake: Krait

Q34.4: What are the differences between poisonous and non-poisonous snakes?

Answer:

Feature	Poisonous	Non-Poisonous
Head scale	Small	Large
Belly scale	Large Covers the entire breadth of the belly	Small
Tail	Compressed	Not compressed
Fangs (teeth)	Like a hypodermic needle	Multiple teeth
Bite mark	2 bite mark	Multiple bite mark
Habit	Nocturnal	Diurnal



Q34.5: What are the exceptions to the head scale in poisonous snakes?

Answer:

- 2 poisonous snakes with large head scales
  - Cobra: 3rd Supra-Labial is large and touches the eye shield.
  - Common Krait: 4th Infra-labial is Large and touches the eye shield.

Q34.6: What are the differences between cobra and king cobra?

Answer:

Features	King Cobra	Cobra
Name	Ophiophagus - Hannah	Naja Naja
Length	15-20 ft (longest)	5 ft
Hood	Present	Present but large
Spectacle/Binocellate mark	Absent	Present
Inject venom	More	Less

King Cobra and Cobra



Note:

- Spit cobra: Spits venom
- If spits in the eye causes ophthalmia

Q34.7: What are the features of krait?

Answer:

- Bungarus caeruleus
- Hexagonal Scale with white band.
- Toxin: Bungarotoxin

Common Krait



Q34.8: What are the anatomical features of Russell's viper?

Answer:

- Daboia Russeli
- Venom: Vasculotoxic
- Brown spots are diamond-shaped.
- One row on top and 2 rows on the lateral part.

Russel Viper



Q34.9: What are the features and fatal dose of the saw-scaled viper?

Answer:

- Echis carinatus
- Venom Vasculotoxic
- Angular scale
- 8mg fatal dose
- Coiled around, giving a rustling sound.

Saw Scaled Viper-angulated scale, coiled around



Q34.10: What are the morphological features of the hump-nosed viper?

Answer:

- Hypnale Hypnale
- H = Hump
- Snout form hump

Hump Nosed Viper-Hypnale Hypnale



Q34.11: What are the features of sea snakes?

Answer:

- Flat tail (Paddling)
- Skeletal muscle

Sea Snake-Flat Tail



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Q34.12: What are the features of Python?

Answer:

- Nonpoisonous
- Cause traumatic Asphyxia by encircling

Q34.13: What are the features of the glands and fangs of snakes?

Answer:

- Gland for poison.
- Fang: Maxillary teeth.
- Glands: Modified salivary glands.
- The salivary gland duct opens in the teeth.
- Whenever it bites, it goes through the body through skin puncture.
- Ingestion of venom- no effect.
- Ulcer in the GI tract: There is an effect.

Q34.14: What is Ophitoxaemia?

Answer: The study of envenomation-causing symptoms is known as Ophitoxaemia.

Q34.15: What are the general symptoms seen in snake envenomation?

Answer:

- Most common symptom: Fright (the most common cause of death).
- 70-80% are non-venomous snakes.
- 20% of venomous snakes cause dry bites.
- Snake bite venom injection: Clinical spectrum.

Q34.16: What are the local symptoms of a snake bite?

Answer:

- Pain
- Swelling
- Blisters
- Bleeding (Characteristic)
- Necrosis
- Regional Lymphadenopathy (Characteristic)

Q34.17: What are the differences in local symptoms in different snakes?

Answer:

- Local symptoms are maximum with a viper.
- Local symptoms are less with krait.
  - No bite marks.
  - No symptoms

Q34.18: When should ASV be started?

Answer: ASV (Anti Snake Venom) should be started if the patient develops painful progressive swelling.

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Q34.19: What are the signs and symptoms depending on the types of snakes?

Answer:

Signs and Symptoms of Neurotoxic snakes (Elapidae)	Sign and Symptoms of Vasculotoxic (Viper)
• Ptosis: Dropping of Eyelid b/l (Most Important and Common Symptom) • Diplopia: Paralysis of extra ocular muscles. • Dysphagia: Paralysis of pharyngeal muscles. • Dysphonia: Paralysis of vocal codes. • Dysarthria: Paralysis of tongue muscles. • Dyspnea: Paralysis of respiratory muscles. • Stridor: Respiratory difficulty. • Descending Paralysis • Death due to respiratory muscles paralysis leading to respiratory failure. • **Treatment:** Mechanical ventilation, ASV, Neostigmine (with a combo of Atropine) • **Neuroparalytic Symptom without Local Finding:** Mechanical Ventilation, ASV.	• DIC: Disseminated Intravascular Coagulopathy • Local and systemic bleeding • Epistaxis, hematemesis, melena, gum bleeding (common bleeding), Pain swelling • Renal Failure: Due To DIC • If Abdominal Pain-Retro: Peritoneal Bleeding, Suggests Viper Bite • **Treatment** o Start With ASV o FFP (Fresh Frozen Plasma) o Surgical Debridement.

Q34.20: What is the single breath count test?

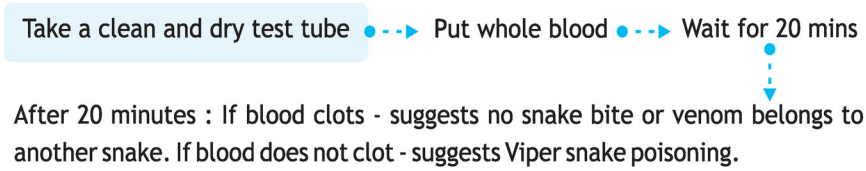
Answer:

- For the Elapid test
- Count the numbers in a single breath.
- Every 15 minutes
- If it decreases, suggest that respiratory failure is taking place.

Q34.21: What is a vasculotoxic test?

Answer:

- 20-minute whole blood clotting test
- Steps
- Repeated every 6 hours



Q34.22: What are the signs and symptoms of myotoxic snake bite?

Answer:

- Local pain and Swelling
- First Finding: Muscle Necrosis
- Rhabdomyolysis
- Myoglobinemia
- Myoglobinuria
- Renal Failure - cause of death

Q34.23: What is the initial management of a snake bite?

Answer:

- Follow the **RIGHT** strategy
  - **R**: Reassure
  - **I**: Immobilization
  - **G H**: Go to the Hospital
  - **T**: Tell all the history and Symptoms to the doctor.
- **NO**: Mistakes to avoid
  - No Cautery
  - No Suction
  - No Ligature
  - No Tourniquet
- Immobilize the limb by
  - Crepe bandage or Sutherland Wrap
    - → The motive is to occlude the lymphatic.
    - → Venom passes through the lymphatic system.
    - → **Upper Limb pressure:** 40-70 mmHg
    - → **Lower Limb pressure:** 55-70 mmHg
    - → Done in a cobra bite.
    - → Not done in viper bite, because it can cause compartment syndrome

Q34.24: What is Anti-snake venom (ASV), and how is it used in the management of snakebite cases?

Answer:

- **Source:** Horse Hyperimmunized serum.
- Discovered by Calmette
- Institute in India: Hawkins Institute
- **ASV Route**: IV
- **Rate:** 1-2 mL/kg
- **Doses**: 8-10 vials
- Frozen or dried powder: Use some diluent.
- Should be within 4-5 hours of the bite.

Q34.25: Which snake species are covered by ASV in India?

Answer:

- Cobra
- Krait
- Russell Viper
- Saw a scaled viper.

Q34.26: What is the common complication of ASV, and how is it managed?

Answer:

- Can lead to: Allergies/Anaphylaxis
- Get ready with Adrenaline to counteract any allergies.

Q34.27: When is ASV given, and what guides the duration of its administration?

Answer:

- **ASV is given when:**
  - Severe local: Pain, progressive swelling with bleeding.
  - Severe systemic: Bleeding in the System, Neurotoxic, Abnormal whole blood clotting.
- **Duration:**
  - Neuroparalytic symptom: Till clinical improvement
  - Vasculotoxic symptom: Till clotting time becomes normal.

Q34.28: What are the other treatment options available for snakebite?

Answer:

- **Neostigmine:** 1.5mg
  - Anticholinesterase (increases the acute cholinergic effect).
  - Reduce Respiratory failure.
  - **Action:** Post-synaptic toxin action as in cobra.
- **Atropine:** 0.6mg
  - To control the muscarinic effect of anti-cholinesterase.
- **Antibiotics and thickness toxoid:** For infection
- **ASV+ Neostigmine, Atropine, Mechanical ventilation:** For cobra bite.
- **ASV, FFP, and surgical debridement:** Done in viper bite.
- **ASV+ Mechanical ventilation:** Krait

Q34.29: What is the site of action of krait venom?

Answer: Krait venom has presynaptic action.

BIG QUESTION 35: What are hallucinogenic drugs, and what are their key types, effects on the body, and clinical relevance?

Broad Answer: Hallucinogens are drugs that distort perception, thought, and mood. They include substances like LSD, MDMA, etc, which primarily act via serotonin receptors. These can cause visual hallucinations, euphoria, or agitation. Other agents like chloral hydrate, cyclodiene compounds, and certain poisons may also lead to hallucinations. Management is usually supportive with sedation if required.

DETAILED QUESTIONS

Q35.1: What are hallucinogens?

Answer: The agents that cause hallucinations.

Q35.2: What are the features and clinical manifestations seen with LSD?

Answer:

- **LSD - Lysergic acid Diethylamide:** Acid blotter or paper stamp.
- Increases serotonin level in the brain (only psychological dependence).
- Taken as fumes
- Obtained from rye fungus (ergot)
- Associated with the trip (most common)

- **Good trip**
  - → Visual hallucinations
  - → Illusions
- **Bad trip**
  - → Anxiety
  - → Panic attacks

- Flashback phenomenon is seen (re-experiencing the past experience)

Q35.3: What are the features of MDMA?

Answer:

- MDMA: Methylene-dioxy-methamphetamine
- Other names: Ecstasy/ Molly/ Rave drug/ Club drug/ Party drug/ Hug drug
- Causes euphoria.

Q35.4: What is Love Boat?

Answer: Cigarette or Tobacco or Marijuana + PCP (Phencyclidine) or Formaldehyde

Q35.5: What is the common name of Phencyclidine?

Answer: Angel dust.

Q35.6: Which stimulant causes hallucinations?

Answer: Cocaine (Not actually hallucinogenic)

Q35.7: Which drug is not a true hallucinogen but may cause hallucinations due to its stimulant properties or in overdose?

Answer: Amphetamine (Urine can be used as a liquid gold → Slang).

BIG QUESTION 36: What are the features of toxicological agents, such as chloral hydrate poisoning, Conium maculatum toxicity? Describe body packer and body stuffer syndromes, and specific types of suicide.

Broad Answer: In forensic toxicology, several rare but high-yield topics are clinically significant, such as certain sedative poisons like chloral hydrate and classic toxic plants like Conium maculatum. Additionally, medico-legal cases may involve body packers and body stuffers, where individuals conceal drugs internally or externally for smuggling or escape. Understanding the differences in types of suicide is also critical in psychological autopsies and legal reporting.

DETAILED QUESTIONS

Q36.1: What are the features of Chloral hydrate?

Answer:

- Other names: Dry wine/ Micky- Finn/ Knockout drops
- Colorless crystalline drug
- Given along with alcohol.
- Acrid smell

Q36.2: What is the historical significance of Conium maculatum?

Answer:

- Other name: Hemlock
- Used to kill Socrates

NOTE: Envenomation: *It is believed that Arsenic was used to kill Napoleon → But later realized that it was Mercury.*

Q36.3: What are the features of Conium maculatum?

Answer:

- **Active principle:**
  - Conine
  - Methyl conine
- All parts of the plant are poisonous.
- Unripe fruits and seeds are more poisonous.
- Nerve poison
- Involves motor nerves.





Q36.4: What is the characteristic smell seen in Conium poisoning?

Answer: Mousy smell

Q36.5: What are the clinical features of Conium poisoning?

Answer:

- 1st involves lower limb muscles - progressive motor paralysis
- Death is from respiratory paralysis.

Q36.6: What is the management of Conium poisoning?

Answer: No specific antidote, only symptomatic treatment.

Q36.7: What are the features of Body packers syndrome and body stuffer syndrome?

Answer:

Contents	Body Packers Syndrome/ Surgical Mules Syndrome	Body Stuffer Syndrome (Hurried)
Introduction of drugs	• Planned way • Polythene or condom • Swallow/ vagina/ rectum	• Unplanned way • Vagina or anal canal • Hurriedly swallowed
Type of conduct	Scheduled	Spontaneous
Packet number	Many	Few
Risk	Medium or high	High
Other	Used in drug smuggling (good pack)	Damaged or unpacked

Q36.8: What are the types of suicide?

Answer:

- The most common cause of suicide in India is **hanging.**
- 3 types
  - Complex: Attempt more than one method of suicide.
  - Complicated: Attempt one method, died due to unintentional trauma.
  - Para-suicide: Attempt at suicide, but not to die. The most common type is poison or drug ingestion.

BIG QUESTION 37: What are the forensic aspects and identifying features of death due to starvation?

Broad Answer: Starvation is a form of neglect or intentional harm that leads to progressive wasting and eventual death, and it holds important medico-legal significance in forensic practice. Forensic examination looks for key signs like extreme emaciation, absence of subcutaneous fat, atrophied organs, and an empty gastrointestinal tract. Starvation may occur in situations of abuse, imprisonment, or abandonment, and establishing it requires careful differentiation from cachexia or chronic disease.

DETAILED QUESTIONS

Q37.1: What is starvation?

Answer: Withholding of food and or administration of unsuitable food leads to starvation.



Q37.2: What is a baby farmer?

Answer: A term used to describe any child who is starved by their parents

Q37.3: What is the fetal period for starvation?

Answer:

- If completely withdrawn from both food and water, Death occurs 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.

Q37.4: What are the postmortem findings of starvation?

Answer:

- Extreme emaciation and the general reduction in size and weight of all organs, except the brain.
- The 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.
- The wall of the intestine appears like tissue paper with atrophy of the mucosa, and all layers are also bile-stained.

14. THANATOLOGY AND DECOMPOSITION

BIG QUESTION 1: What is Thanatology and how is death classified and understood?

Broad Answer: Thanatology is the scientific study of death and the post-mortem processes. It includes legal and medical definitions of death, classifications based on physiological dysfunctions, and transitional states like suspended animation. These distinctions are crucial for clinical diagnosis and medicolegal documentation.

DETAILED QUESTIONS

Q1.1: What are the core definitions and distinctions in Thanatology?

Answer:

- Thanatology: Study of death
- IPC 46: Defines death legally
- Taphonomy: Study of post-mortem changes
- Bishop's Tripod of Life: Heart (circulation), Lung (respiration), Brain (function)

Q1.2: What differentiates Somatic (Clinical) Death from Molecular (Cellular) Death?

Answer:

Aspect	Somatic Death	Molecular Death
Definition	Complete and irreversible stoppage of any component of Bishop's tripod	Occurs 1-2 hours after somatic death
Time	Immediate	Delayed (1-2 hours later)
Determination	Declared by doctor	Biochemical process

Q1.3: What is Bichat's mode of death and what does Atria Mortis refer to?

Answer:

- Bichat's Mode of Death: Death classified by primary system failure:
  - Respiratory → Asphyxia
  - Circulatory → Syncope
  - Brain function → Coma
- Atria Mortis/Gateway of death: Stoppage of only one component of Bichat's tripod of life (respiration, circulation or brain function) results in death. E.g. of somatic death.

Q1.4: What is Suspended Animation (Apparent Death) and its causes?

Answer:

- Apparent death with minimal signs of life; resuscitation is possible.
- Causes include:
  - Trance, Typhoid, Hypo-/Hyperthermia
  - Electrocution, Drowning, Morphine overdose
  - Shock, Sunstroke, Prolonged anesthesia

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- Newborns (most common), Barbiturate poisoning
- Cholera, Cachexia, Concussion

Q1.5: What is the Supra-vital interval?

Answer:

- It is the time period between somatic death and molecular (cellular) death.

Q1.6: What are the signs of death and how are they staged?

Answer:

Sign Type	Features
Immediate	1st sign is insensibility (loss of sensation), loss of voluntary power, cessation of respiration and circulation
Early	Eye changes (e.g., Kevorkian sign), Algor mortis, Livor mortis, Rigor mortis
Late	Decomposition changes including Putrefaction, Autolysis, and Mummification

BIG QUESTION 2: What are the postmortem ocular, thermal, and hypostatic changes, and how do they help determine time since death (TSD)?

Broad Answer: Postmortem changes begin with observable physical signs, particularly in the eyes, skin, and body temperature. These signs occur in a predictable timeline and are critical in estimating the time since death (TSD). Key markers include eye signs such as the Kevorkian sign, cooling (algor mortis), and blood pooling (livor mortis).

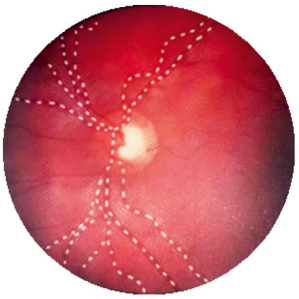
DETAILED QUESTIONS

Q2.1: What are the key postmortem eye changes and their relevance to TSD?

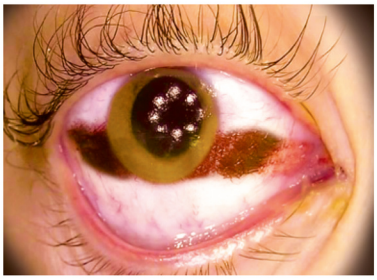
PYQ: NEET PG 2019

Answer:

- **Kevorkian sign**: Earliest postmortem eye sign where the retinal blood vessels appear segmented or fragmented. It is seen within a few minutes to one hour after death using an ophthalmoscope. It is used to determine time since death (TSD).
- **Loss of corneal reflex & dilated pupil**: Precedes Kevorkian sign.
- **Flaccidity of the eyeball:** Drops from normal 20 mmHg to 0 mmHg within 2 hours postmortem. Used to determine time since death
- **Tache noire**: Triangular black area on sclera (cell debris + mucus); develops 3–6 hours postmortem.
- **Corneal changes**:
  - Hazy cornea: after 1 hour
  - Corneal opacity: after 6 hours
- **Vitreous humor changes**:
  - No putrefaction effect
  - Increase: Potassium (K^+), Hypoxanthine
  - Decrease: Glucose
  - Used for TSD estimation
  - Formulas: Sturner's & Madea's (for K^+ levels)



Kevorkian sign



Tache- Noir

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Q2.2: What is Algor Mortis and how is it used to estimate TSD?

Answer:

- Cooling of the body postmortem begins within 15 minutes. Core body temperature decreases.
- **Thanatometer:** A chemical thermometer (25-30 cm long) used rectally to measure core body temperature.
- **Rate of temperature fall:**
  - Summer: ~0.4°C/hour
  - Winter: ~0.6°C/hour
  - Average: 0.5°C/hour
- **TSD formula:** (NBT - RT)/ROF
  - NBT = Normal Body Temp
  - RT = Rectal Temp
  - ROF = Rate of Fall

Q2.3: What is postmortem caloricity and what causes it?

Answer:

- Rise in body temperature 1-2 hours after death.
- Causes:
  - Septicemia (e.g., cholera, typhoid) → increased bacterial activity
  - Sunstroke (pontine hemorrhage)
  - Strychnine poisoning → excessive muscle activity

Q2.4: What is Livor Mortis and how does it develop?

PYQ: FMGE 2020

Answer:

- Also known as postmortem staining, lividity, hypostasis, vibices, or suggillation.
- Blood pools in dependent (gravity-facing) areas → bluish-purple skin coloration due to deoxyhemoglobin.
- Absent in pressure areas.
- Timeline:
  - Begins: 30 minutes after death
  - Visible: for 2 hours
  - Fixation: after 7-8 hours
  - Max: Peaks at 6-12 hours
  - Remains until decomposition
- Repositioning before 7-8 hours leads to secondary staining.
- **Color change with decomposition:** skin turns green

PM staining



Q2.5: How does body position affect postmortem staining?

Answer:

- **Supine** → back of head, neck, chest, legs
- **Prone** → front of the body
- **Hanging** → hands and feet (glove and stocking pattern)
- **Running water** → no staining due to constant washing away of blood

Q2.6: What is the medico-legal significance of postmortem staining?

Answer:

- Estimating time since death (TSD)

- Inferring body position at time of death
- Aiding in cause of death assessment

BIG QUESTION 3: What is rigor mortis and what are the other types of postmortem muscle stiffening?

Broad Answer: Rigor mortis is the postmortem stiffening of muscles due to ATP depletion, following an initial phase of flaccidity. It progresses in a specific sequence and timeline, and its presence helps in estimating time since death (TSD). Other postmortem muscle changes include heat stiffening, cold stiffening, gas stiffening, and cadaveric spasm.



DETAILED QUESTIONS

PYQ: NEET PG 2021

Q3.1: What are the three stages that the muscle undergoes after death?

Answer:

- Primary flaccidity phase or primary relaxation phase
- Rigor mortis
- Secondary flaccidity phase or secondary relaxation phase

Q3.2: What changes are noted in the Primary flaccidity phase or the primary relaxation phase?

Answer:

- Primary flaccidity occurs during somatic death
- Actin-myosin separation takes place in primary flaccidity

Q3.3: What is rigor mortis, when does it occur, and what is its underlying mechanism?

Answer:

- Rigor mortis refers to muscle stiffening, some shortening, and opacification of the fibers
- Rigor mortis occurs during cellular death
- The mechanism of rigor mortis is ATP depletion
- Lack of actin-myosin separation causes rigor mortis
- When rigor mortis starts, ATP decreases to 85% of the normal content
- At maximum rigor mortis, ATP decreases to 15-30% of the normal content

Q3.4: What is the secondary flaccidity phase in postmortem changes, and what causes it?

Answer:

- Secondary flaccidity occurs when decomposition starts
- Actin and myosin filaments are broken down, leading to the separation

Q3.5: When does rigor mortis begin, and in what sequence does it affect the muscles?

Answer:

- The occurrence of rigor mortis in muscles begins 1-2 hours after death
- Seen in all muscles, whether voluntary or involuntary
- 1st muscle affected is the myocardium
- 1st external muscle affected is the upper eyelid muscle i.e., orbicularis oculi
- The sequence in which external muscles are affected: Eyelid muscles → Neck → Lower jaw → Muscles of face → Muscles of chest → Upper limbs → Abdomen → Lower limbs → Fingers and toes

Q3.6: What do Nysten's Law and Shapiro's Law state about the progression of rigor mortis, and which is correct?

Answer:

- **Nysten's Law:** Rigor mortis progresses from the upper parts of the body to the lower parts
- **Shapiro's Law:** Rigor mortis develops in all muscles at the same time. (Disproven)

Q3.7: In what order does rigor mortis disappear from the body?

Answer: Rigor mortis disappears in the same order as its onset, starting with the upper eyelid and concluding with the fingers and toes

Q3.8: What factors modify rigor mortis?

Answer:

- **Fetuses <7 months:** Absent due to underdeveloped muscle fibers.
- **Hot climate:** Early onset, short duration (18-36 hrs)
- **Cold climate:** Delayed onset, prolonged duration (24-48 hrs)
- **Wasting diseases:** Early onset, short duration due to thin muscle mass with decreased ATP storage. E.g. Cholera, TB, cancer, cachexia and typhoid.
- **Violent deaths:** Early onset, short duration. E.g. Cut throat or fire arm injury
- **Thick muscles:** Delayed onset, longer duration

Q3.9: What are the exceptions to the usual onset and duration of rigor mortis?

Answer:

- **Strychnine poisoning:** Early onset of rigor mortis with long duration
- **Arsenic poisoning:** Late onset of rigor mortis with long duration

Q3.10: What is the Rule of 12 in rigor mortis?

Answer:

- Rigor sets in all muscles within the first 12 hours
- Persists for the next 12 hours
- Disappears completely within 36-48 hours
- Disappears completely within 36-48 hours

Q3.11: What are other types of muscle stiffening postmortem?

Answer:

- **Heat stiffening:** Also known as boxing attitude or pugilistic attitude or fencing attitude. Surrounding external temperature is ≥ 65°C. Mechanism involves the coagulation of muscle protein. Normal rigor mortis is not seen & persists till decomposition occurs.
- **Cold stiffening:** Surrounding external temperature is ≤ -5°C. Mechanism involves freezing of the body fluid and hardening of the subcutaneous tissue. In warm temperature, cold stiffening disappears. Normal rigor is present.
- **Gas stiffening:** Due to gas buildup during decomposition

Q3.12: What is cadaveric spasm, and what are its key features?

PYQ: INICET 2022

Answer:

- Also known as cataleptic rigidity or instantaneous rigor
- The mechanism involves ATP depletion

- Muscle contracted during life remains rigid and stiff after death
- Occurs immediately after death
- Primary relaxation is absent, and Secondary relaxation is present
- An exclusively ante-mortem event



Cadaveric Spasm

Q3.13: List the causes of cadaveric spasm.

Answer:

- Asphyxial death
- Brain injury
- Cerebral injury
- Drowning
- Dinitrocresol poisoning
- Excitement
- Fear
- Firearm e.g., in suicide

Q3.14: Tabulate the differences between cadaveric spasm & Rigor mortis.

Answer:

	Cadaveric spasm	Rigor mortis
Time	Immediately after death	1-2 hours after death
Muscles	• Mainly involves voluntary muscles. • Generally, involves a short group of muscles e.g. hand muscles.	Involves both voluntary and involuntary muscles.
Primary relaxation	Absent	Present
Molecular death	Absent	Present
Electronic stimuli	Response present	Response absent
Importance	Describes the manner of death.	Determines TSD

BIG QUESTION 4: What are the mechanisms and sequential signs of decomposition?

Broad Answer: Decomposition is the breakdown of body tissues postmortem, caused by autolysis and putrefaction. It follows a characteristic pattern and sequence involving color change, gas formation, marbling, skin slippage, and eventual skeletonization. These features help estimate time since death and provide clues to body disposal and postmortem interval.

DETAILED QUESTIONS

Q4.1: What are the two major mechanisms of decomposition?

Answer:

- **Autolysis:**
  - Breakdown of cells by body's own enzymes
  - Examples:
    - → Clouding of cornea (first external change)
    - → Brain/glandular softening (first internal change)
  - Aseptic autolysis in utero → mummification of fetus

YOURWISH

- **Putrefaction:**
  - Caused by bacterial activity
  - Most common organism: Clostridium welchii / Clostridium perfringens
  - Most common enzyme: lytic lecithinase
  - Three stages of change: Colour change, Gas formation, and Liquefaction of tissue

Q4.2: What are the first internal and external changes observed in putrefaction?

Answer:

- **First internal/overall change:** Reddish-brown discoloration of the aortic intima
- **First external change:** Green discoloration of the right iliac fossa



Decomposition - Greenish discolouration of the body

Q4.3: What is the mechanism behind the first external change of putrefaction — green discoloration of the right iliac fossa?

Answer:

- Bacteria form hydrogen sulfide
- The cecum, located beneath the right iliac fossa, has maximum bacterial activity
- The skin lies superficial to the cecum
- Sulfur combines with hemoglobin to form a green-colored compound

Q4.4: How does the time of onset for green discoloration in putrefaction differ between summer and winter?

Answer:

- **Summer:** 12–18 hours after death
- **Winter:** 1–2 days after death

Q4.5: What is marbling and how does it occur?

Answer:

- Discoloration of prominent superficial veins to green-brown color.
- Corresponds to the vascular channel.
- Mechanism: Clostridium welchii bacteria form hydrogen sulfide gas in the superficial veins with the formation of green, brown sulpha hemoglobin.
- Helps in determining TSD.
- Appears after 24 hours, prominent at 36-48 hours
- Seen in chest, shoulder, abdomen, thigh



Marbling

Q4.6: What is a filigree burn, and what are its characteristics?

Answer:

- Caused by lightning injury
- Produces pink discoloration
- Does not correspond to vascular channels

Q4.7: What is the role of maggots in decomposition and TSD estimation?

Answer:

- Maggots are the larvae of flies such as *Musca domestica* and *Musca vicinia*
- Forensic entomology studies their stages to estimate time since death (TSD)
- Development stages:
  - **Maggots (larvae):** appears on the body after 1-2 days
  - **Pupae:** appear 3-6 days
  - **Adult flies:** complete cycle in 5-10 days (longer in winter: 8-20 days)
- First seen in natural orifices
- Poisons ingested by the deceased can be detected in maggots (entemotoxicology)
- Maggot staging method by Megnin



Maggots

Q4.8: What is post-mortem purge, and when does it occur?

Answer:

- Due to gas formation during decomposition
- Causes expulsion of blood-stained froth and gastric contents from nose and mouth
- Seen after 2-3 days

Q4.9: What is post-mortem luminescence, and what are its causes?

Answer:

- The body emits light after death
- Causes:
  - Bacterial - e.g., Photobacteria
  - Fungal - e.g., Armillaria, Ram's bottom

Q4.10: What is the time sequence of significant postmortem changes?

Answer:

- Gas stiffening and post-mortem purge: 2-3 days
- Uterine and anal prolapse: 2-3 days
- Loose hair and nails: 3-5 days
- Skin peeled off: 3-5 days
- Pattern: skin peeling starts in the hands and legs i.e., glove and stocking pattern
- Colliquative putrefaction i.e., liquefaction of tissue: 5-10 days

Q4.11: What organs decompose in what sequence?

Answer:

- **First:** Larynx and trachea
- **Then:** Stomach, spleen, small intestine
- **Followed by:** Liver, lung → Brain, heart, kidney, uterus
- **Then:** Skin, muscle, tendon
- **Last:** Bone and tooth
- **Gender-specific:**
  - Female: Non-gravid uterus decomposes last
  - Male: Prostate decomposes last

Q4.12: What is the significance of liver changes and temperature in decomposition?

Answer:

- **Foamy/honeycomb liver:** due to gas formation (24-36 hrs)
- **Optimum temperature:** 21-38°C
- **Decomposition starts:** >10°C

Q4.13: What substances delay decomposition?

Answer:

- Strychnine
- Arsenic, antimony, thallium (metallic poisons)
- Carbon monoxide
- Cyanide
- Carbolic acid

Q4.14: What amino acids disappear from bone during decomposition?

Answer:

- **First:** Proline
- **Second:** Hydroxyproline
- **Last:** Glycine
- 100-year-old bones have <7 amino acids remaining

Q4.15: What is Casper's dictum?

Answer:

- Formula proposed by Taylor.
- Shows the relationship between the rate of decomposition in air, water, and soil (earth).
- Air > Water > Earth.
- Air has the fastest rate of decomposition.

BIG QUESTION 5: What is postmortem preservation and what factors modify decomposition outcomes?

Broad Answer: Postmortem preservation includes naturally occurring and artificially induced processes that delay decomposition. Modifications such as adipocere formation, mummification, and embalming help in maintaining body integrity and assist in medico-legal identification and investigation. Factors like climate, chemical exposure, and burial conditions influence decomposition and preservation.

DETAILED QUESTIONS

Q5.1: What is adipocere and how is it formed?

Answer:

- Also known as saponification or grave wax
- Occurs in **moist, warm, anaerobic environments**
- Sites: face, breast, buttocks, abdomen (fatty areas)
- Bacteria: *Clostridium welchii*
- Enzyme: intrinsic lipase
- Mechanism:
  - o Fat → fatty acids → hydrolysis + hydrogenation → soap formation with Ca^{2+} or Nh_4^+



Adipocere

- Smell: ammoniacal, sweetish (pseudo-smell sticks to examiner's clothes)
- Types:
  - Fresh: soft, moist, white, greasy
  - Old: dry, hard, brittle, yellow
- Timeframe: 3 days to 3 months
- Absent in fetuses <7 months

Q5.2: What is mummification and under what conditions does it occur?

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Answer:



Mummification

- Occurs in **dry, hot, windy environments**
- Body undergoes dehydration
- Preserves body features (e.g., skin, nails, hair)
- Leads to 60-70% weight loss
- Timeline: 3 to 12 months
- Aided by arsenic and antimony (especially in intrauterine death)

Q5.3: What is the medico-legal significance of adipocere and mummification?

Answer:

- Indicates environmental conditions at death
- Helps in estimating time since death (TSD)
- Facilitates body identification

Q5.4: What is embalming and when is it done?

Answer:

- Artificial preservation of the body
- Should be performed within 6 hours of death
- Done after postmortem or once a death certificate is issued

Q5.5: What is the composition of embalming fluid?

Answer:

- **Preservatives**: Formalin, formaldehyde, methanol
- **Antiseptic/germicide**: Phenol
- **Wetting agent**: Glycerine/glycerol
- **Anticoagulant**: Sodium citrate
- **Buffer**: Sodium bicarbonate, sodium carbonate, sodium chloride
- **Vehicle**: Water
- **Note**: Ethanol is *not* a component of embalming fluid

Q5.6: What are the different methods of embalming?

Answer:

- **Arterial embalming**
- **Cavity embalming**
- **Surface embalming** (rare)
- Best technique: **discontinuous injection and drainage**
- Preferred vessel: **femoral artery**
- May use high-pressure/low-volume technique

Q5.7: When is embalming of a body performed concerning post-mortem examination or issuance of a death certificate?

Answer: Embalming is always done **after** a post-mortem examination **or** after receiving the death certificate.

Q5.8: For how long is an unknown dead body preserved?

Answer: Body preservation for an unknown dead body is done for at least 72 hours

Q5.9: What does the legal principle of "presumption of survivorship" under Section 107 of the Indian Evidence Act entail?

Answer:

- Presumption of survivorship: 107 IEA.
  - Nothing is suggestive of death; the person is presumed alive for the next 30 years

Q5.10: What is the legal presumption of death according to Section 108 of the Indian Evidence Act (IEA)?

Answer:

- Presumption of death: 108 IEA
  - Nothing has been heard about a person from family or relatives for 7 years

Q5.11: What is the significance of stomach content in estimating time since death?

Answer:

- Light meal: 1-2 hours
- Medium meal: 3-4 hours
- Heavy meal: 5-8 hours
- Useful only if food was ingested within 2 hours before death
- Influenced by food type, health, alcohol, stress

Q5.12: How do antemortem and postmortem findings differ microscopically and chemically?

Answer:

Feature	Antemortem	Postmortem
Content	Inflammation, chloride, protein	Gas
Color/Base	Erythematous	Pale
Redness	Present	Absent
Vital/Enzymatic reaction	Present	Absent