Yourwish

1. POSTMORTEM TECHNIQUES

AUTOPSY

00.00.17

- A/K/A - Necropsy, Postmortem examination, Thanatopsy
- Necro - Dead body
- First medicolegal autopsy in India:
  - Conducted by Dr.Edward Buckley
  - Done on Mr.Wheeler in Chennai
  - Case of Arsenic Poisoning

Types Of Autopsy

00.00.47

Medicolegal	• M/c type of autopsy in India
	• On inquest of the Police and Magistrate (Investigating officer)
	• Consent of the relative is not required
	• The dead body is returned to the investigating officer
	• Done in Unnatural death
	• Done for the whole body
	• Done for law purposes: To know-
	  o Cause of death
	  o Time since death
	  o Manner of death
	• Done by a forensic expert, RMP

Pathological	• A/K/A Clinical autopsy • Consent of the relative is required • The dead body is handed to the relative • Done in natural death • Done for a specific organ/body cavity • Done for academic purposes • E.g changes in MI
Psycological	• Not a postmortem examination • Interview with family members of the dead person • Performed to know the mental status of the person before suicide.

Virtopsy / virtual autopsy	• Body imaging (non-invasive method): CT and MRI
	• Done to know the cause of death
	• Detects structural abnormalities
	  o Fracture
	  o Internal injuries

Obscure	• Means not sure
	• Gross finding
	  o Inconclusive finding
	  o Minimal finding
	• Lab investigation, histopathological, and Toxicological studies done for concluding cause of death

Negative	• No cause of death after performing post-mortem examination, lab investigation, HPE, and toxicological analysis
	• The total number of negative autopsies in India is 2-5%
	• Example: Death due to
	  o Vagal inhibition
	  o Laryngospasm
	  o Epilepsy

POST MORTEM TECHNIQUES

00.04.32

Virchow method	Ghon's method	Lettule's method	Rokitansky method

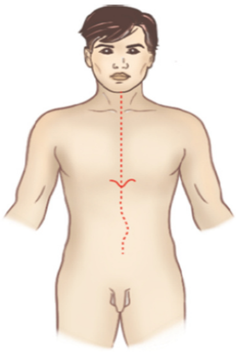
• M/c method
• Organs are removed one after the other
• Interorgan relations are not studied
	• En Block method (targeted block)
	  o Cervical block
	  o Thoracic block
	  o Abdominal block
	  o Pelvic block
	• Interorgan relations are studied
		• En-masses/evisceration
		• Organs(cervical, thoracic ,abdominal , pelvic) are removed as single mass - Large mass
		• Intact vessels
		• Interorgan relations are best studied
			• In situ method (inside dissection)
			• Done in case of infectious diseases like
			  o HIV
			  o HBV
			  o COVID-19
			  o Infants

Types Of Incision

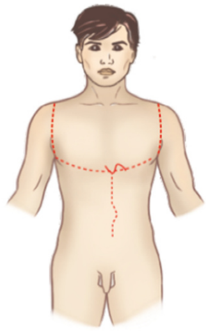
00.06.14

- I incision
  - Incision from the chin to the pubic symphysis
- Y incision
  - Incision started from the acromion process to the xiphisternum below the mammary line till the pubic symphysis
  - Done in females for cosmetic purposes

- Modified Y incision

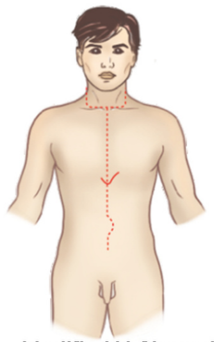


I-shaped



Y-shaped

- Incision started from the mastoid process to the suprasternal notch, ending till pubic symphysis
- Done in Asphyxial death



Modified Y-Shaped

- X incision
  - Two incisions made from the two shoulders opposite the iliac crest
  - Done in the back
  - Done for deep injuries or custodial death

Body Cavity To Be Opened First

- Newborn
  - Brain > Abdomen > Thorax
  - Abdomen is opened before the thorax to see the position of the diaphragm (estimating the respiration)
- Poisoning
  - Cranium → opened first
    → Best smell of poison comes from the cranium
- Asphyxial death
  - Cranium > Thorax > Abdomen > Neck
  - Neck
    → It is the last to be opened to provide a bloodless field
    → Blood is drained from all cavities
- Traumatic head injury
  - Cranium → opened first
- Pneumothorax: Air in the pleural cavity

Thorax (chest cavity) is opened first
↓
Skin flap taken out
↓
Filled with water
↓
Pleura is punctured
↓
Bubble comes out
↓
Water test (pleura has air)

- Air embolism: Thorax opened first

Technique 1

Pericardium opened
↓
Filled with water
↓
Ventricle is punctured
↓
Bubble comes out
↓
Water test

Technique 2
(Pyrogallol test)

Blood is aspirated from syringe with Pyrogallol
↓
Color of pyrogallol solution turns brown
↓
Air is present in the ventricle

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ORGAN TO BE DISSECTED

00.10.17

- Brain:
    - With fixation: Done with 10% formalin (a bucket with string for 1 week)
    - Without fixation
    - 1cm incision is made in the coronal section of the brain
- Heart
    - Inflow - Outflow technique

Right atrium
↓
Right ventricle
↓
Pulmonary artery
↓
Dissect Lung
↓
Left atrium
↓
Left ventricle
↓
Aorta

- Spinal cord
    - Opening on the posterior side is considered better than the anterior side
    - Done in spinal cord injuries and strychnine poisoning
- Stomach
    - Double ligature method
    - Incision made on the greater curvature

      → Corrosive poison acids cause more damage to the lesser curvature → Magenstrasse method.
- Small intestine
    - Dissected from the mesenteric border
- Large intestine
    - Dissected from the anterior taenia
- Liver
    - Dissected by the parallel dissection technique

EXHUMATION

00.11.58

- Digging out the dead body (lawful)
- Done in the presence of the magistrate, police, doctor
- A second autopsy is done if needed

Steps

- Identify the site
- Done early in the morning
- There is no time limit for exhumation

- Soil sample - 500grams from where the body has been dug out, and a control sample is also taken to make a comparison
- Bone and Tissue taken for
  - Chemical analysis
  - Toxicological analysis
- Arsenic present in the soil can go into the dead body → postmortem imbibition

THROMBUS

Thrombus

- **Antemortem thrombus**
  - Firm
  - Dark red
  - Striae of Zahn
    - Fine white line of fibrin
  - Coralline platelet thrombus
    - Alternate layers of platelet and fibrin
- **Postmortem thrombus**
  - **Red current jelly**
    - Blood clot rapidly
  - **Chicken fat clot**
    - Clotting process is slow

SUDDEN DEATH

00:13:57

- A person, not known to be suffering from any dangerous disease, injury, or poisoning, is found dead or dies 24 hours after the onset of terminal illness
- Cause: Block of the Left anterior descending artery within 2cm of its origin → Widow artery

Under-taker Fracture

- Postmortem fracture → Cervical C6-C7 fracture
- During the transport of the dead body

PYQ

00.15.48

Q. In a fetal autopsy, why is it important to open the abdomen and note the position of the diaphragm by passing a finger before opening the thorax?

a. To accurately measure abdominal organ size
b. To confirm the diaphragmatic position to avoid postmortem air artefact in the lungs
c. To check intra-abdominal hemorrhage before thoracic examination
d. To evaluate gastrointestinal malformation early in the autopsy

Ans. b. To confirm the diaphragmatic position to avoid postmortem air artefact in the lungs

2. COURT OF LAW

TYPE OF WITNESS

00.00.21

FMGE 2023, AIIMS 2018

TYPE OF WITNESS	DESCRIPTION
Common witness	• MC ,Eye witness • Seen the crime / fact • First hand knowledge rule
Expert witness (May be common) 39BSA	• Opinion • Qualified person o Doctor , fingerprint expert , chemical examiner , serologist , firearm • Volunteering of statement

Important Facts of the Iea

FMGE 2023
INICET 2022

- Direct evidence→ A killed B → C, seen
- Indirect evidence
  - Collateral form, in which an inference may be drawn
  - Corroborative evidence→ A with knife → E, seen
  - Circumstantial→ A - fingerprint - crime scene
  - Hearsay evidence → C told D (not valid)

Important Definitions

- Plaintiff (victim)
  - The person who files a case
  - Lawyer - Prosecution lawyer
- Defendant (Accused)
  - The person who defends the case
  - Lawyer - Defense lawyer
- Civil case
  - Between the two parties
  - Divorce, property, A vs B
- Criminal case
  - Case against Government
  - State vs accused

COGNIZABLE OFFENCES	NON - COGNIZABLE OFFENCES

• Arrest without warrant
  o RAPE (sexual offence)
	• Arrest with warrant
	  o Hurt

o Murder o Attempt o Grievous hurt o Negligence - death o Dowry death	o Forgery

BAILABLE OFFENCES	NON - BAILABLE OFFENCES
Bail +	No Bail

COMPOUNDABLE OFFENCES	NON-COMPOUNDABLE OFFENCES
• Settled / agreement between parties o Defamation o Hurt	• No agreement o Rape o Murder

COURTS

00.04.17

- Court which can give death sentence / unlimited fine
  - Supreme court
  - High court / state
  - Session court / district
  - Additional session court

Other Courts

Other courts	Maximum punishment	Penalty
Assistant session court	10years	Unlimited fine
Chief judicial magistrate (CJM) / Metropolitan magistrate (MM)	7years	Unlimited fine
1st class Judicial magistrate (JM) / MM	3years	50k
2nd class JM / MM	1years	10k

- Juvenile court
  - 1st class JM
- Fast-track court
  - Session court

Commutation of Death Sentence

- If session order death sentence
  - High court: Confirms
  - Supreme Court: Appellate
  - President: Amnesty (forgive)

Magistrate

00.06.41

JUDICIAL MAGISTRATE	EXECUTIVE MAGISTRATE

• Trial in court
• Superior
• Investigates
  ○ Police custody death
	• District magistrate , additional district magistrate , deputy collector , Tahsildar , deputy tahsildar
	• Administrative power
	• Investigates
	  ○ Dowry death
	  ○ exhumation

Inquest

00.07.38

- Investigations done to identify the cause of death
- 2types
  - Police Inquest
    - 194BNSS
    - Investigating officer - Police
  - Magistrate Inquest
    - 196BNSS
    - Investigating officer - Magistrate
- If a crime has happened→ crime scene → 2 local witnesses - dead body
- Crime scene, examination weapon or evidence/photo inquest repor,(PANCHNAMA)→
  D.B. → MEDICAL LEGAL- AUTOPSY→ I.O.

FMGE 2023, 2024

INQUEST	POLICE (M.C)	MAGISTRATE(J.M-POLICE)
Rank	Minimum - senior head constable	Ex.M.-Remaining
Deaths	Unnatural death	Asylum - mental Beating - police Custodial - death/rape Dowry death(<7yr)) Exhumation Firing - police

- Inquest not followed in india
  - Coroner inquest
  - Medical examiner system
    - Best
    - Done in USA

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Court Procedure (Evidence)

00.10.49

Summon

- It is a Document
- Also called Subpoena - UNDER PENALTY
- 63-71 BNSS
- Sent to witness mentions the date , time and address to attend the court
- If witness fails to appear in the court after issuing summon then punishable
    - Punishment - 208BNS : 6month of imprisonment / 10k fine
- Summon - same date/time
    - For both civil and criminal case: criminal case
    - If both criminal case: Higher court
    - If both same level court : first received

Oath

- Age limit - 12 year
- Refusal to take oath
    - Punishment - 213BNS : 6month of imprisonment / 5k fine
- I do swear in the name of God
- " I do solemnly affirm that " - ATHEIST
- Truth , complete truth ,nothing but the truth

BNS For Evidence (Punishment)

- 227 BNS
    - Definition of perjury
    - Giving false evidence
- 229 BNS
    - Punishment for perjury
    - False evidence - imprisonment upto 7 years

Examination of the Witness

00.14.34

NEET PG 2021, 2022
FMGE 2022

- Chief examination
    - Same party lawyer
- Cross examination
    - Opposite party lawyer
    - No time limit
- Re-examination
    - Same party lawyer
- Judge/magistrate
    - Can examine any time

Prosecution Witness vs Defense Witness

00:15:37

Examination of the witness	Prosecution witness	Defense witness
Chief examination	Public prosecutor	Defense lawyer

Cross examination	D.L	P.P
Re -examination	P.P	D.L

Leading Questions and Hostile Witness

FMGE 2022, 2025

- Leading questions
  - yes/no type answer for the question
  - Asked only in cross examination
- Hostile witness
  - Not desirous of telling the truth
  - Leading question can be asked in chief examination

Conduct Money

- A/k/a Diet money
- In a civil case : paid by the party
- In a criminal case
  - Common witnesses are not paid
  - Expert witnesses are paid by the court

Exceptions for Oral Testimony

- Dying declaration
- Expert opinion expressed in a treatise/textbooks
- Evidence of a doctor recorded in a lower court
- Reports of certain government scientific experts
  - Chemical examiner
  - Chief inspector of explosive serologists
- Evidence given by a witness in a previous judicial proceeding
- Public records
- Hospital records

DYING DECLARATION	DYING DEPOSITION
• India • 26(1)BSA • Oral /written statement	• Developed country
• Recorded by o Victim o Magistrate o Doctor ▪ Have to say whether the person is in state of Compos mentis SOUND-MIND o Police o Public recording - 2 witnesses	• Recorded by o Only judge / magistrate o Accused / Defense lawyer
• Oath - no • Cross examination - no	• Oath - yes • Cross examination - yes(protect accused) - best

• Leading examination - no • Incomplete - valid • If person survives then it is not valid • Person not in compos mentis then not valid	• Leading examination - yes • Superior

MCQs

Q.While recording evidence in the court of law, the opposing lawyer asked the witness, "Did A kill B in your presence ?" The witness said "Yes". Which procedural route would this type of question be permitted in the court of law? NEET PG 2025 NEETPG 2021

a.Examination in chief

b.Direct examination

C. Cross examination

d. Re-direct examination

Ans. c

Q.The court summons a member of the public who witnessed the incident to provide testimony and document their account. What kind of evidence does the witness offer to the court? FMGE Jan 2023

a.Oral evidence

b. Hearsay evidence

c.Subpoena

d.Circumstantial evidence

Ans. a

Q.Who is responsible for handling the investigation in the case of a custodial death?

a.Police inspector

b.Jail superintendent

c.Superintendent of police

d.Judicial magistrate

Ans. d

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3. FORSENIC PSYCHIATRY

CRIMINAL RESPONSIBILITY

00.00.13

- Law used for criminal responsibility of the insane: McNaughten rule
- McNaughten rule - 1843 - the right or wrong test; the legal test
- "An accused person is not legally responsible, if it is clearly proven, that at the time of committing the crime, he was suffering from such a defect of reason from abnormality of mind, that he did not know the nature or quality of the act he was doing, or that what he was doing was wrong.

"22 BNS (MC NAUGHTEN RULE)

FMGE 2019

Nothing is an offense, which is done by a person who, at the time of doing it by reason of unsoundness of mind, is incapable of knowing the nature of the act or that he's doing what is either wrong or contrary to law

Insanity Laws Or Rules

00.01.50

- A : American law institute test :Implemented in 1972
- B : Brawner's rule
- C : Curren's rule : Implemented in 1961
- D : Durham's rule :Implemented in 1954
- E : Irresistible impulse test / New Hampshire Doctrine

American Law Institute Test (MNEMONIC - AAA)

- A person is not responsible for criminal conduct if at the time of such conduct as a result of mental diseases or detect, he lacks Adequate capacity, either to Appreciate the criminality of his conduct, or to Adjust his conduct to the requirements of the law

Brawners Rule

FMGE 2023

- Substantial capacity to appreciate the criminality of the conduct

Curren's Rule (MNEMONIC - CC)

- An accused person is not criminal responsible if at the time of committing the act, he did not have the Capacity to regulate his Conduct to the requirements of the law as a result of mental disease or defect An accused person is not criminal responsible if at the time of committing the act, he did not have the capacity to regulate his conduct to the requirements of the law as a result of mental disease or defect

Durham Rule

NEET PG 2018

- An accused person is not criminally responsible if his unlawful act is the product of mental disease or mental defect

Irresistible Impulse Test

It states that an accused person is not criminally responsible, even if he knows that 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 bill has been destroyed by mental disease

Civil Responsibility

FMGE 2019

- Testamentary(Testament = will) capacity
- Mental capacity to make a valid will
- Requirement - Sound mind : Compos mentis
- It should be certified by a doctor
- Age should be ≥18years
- Unsound people cannot write the will
- Holograph will : A will written entirely in the Handwriting of the testator
- Insane person is not competent to testify in court if he is unable to understand the question.
- If a person becomes insane after marriage , then marriage is valid
- If a person becomes insane after marriage for 3 years , then the party can file a case for divorce

Lucid Interval

INICET 2021

- INSANE - - - - - - - SANE - - - - - - - INSANE
- Period is called lucid interval
- During this period , accused is responsible for the crime
- Can also act as witness by providing evidence to the court

INICET 2021

PERCEPTION DISORDER

00.06.08

Hallucination

- False perception without external stimulus
- Types
  - Visual - sight
  - Auditory - sound
  - Olfactory - smell or odour
  - Gustatory - taste
  - Tactile - touch
    → E.g : Magnan syndrome / Cocaine bugs

Illusion

- Misinterpretation , external stimulus present
- E.g misinterpretation of rope as a snake

THOUGHT DISORDER

00.07.15

Delusion (MNEMONIC - FFF)

- False , Firm and Fixed belief
- Which is not a fact and that persist even after its falsity has been clearly demonstrated

TYPES OF DELUSIONS	DESCRIPTION
Persecution	• MC • Delusion of harm or killing
Grandeur / Exaltation	• Superiority image for yourself • MC in mania
Nihilistic	• Patient imagines that he does not exist or there is no world • MC in depression
Infidelity / othello syndrome / morbid jealousy	• Patient might think that his or her partner is not loyal or unfaithful to him • Mnemonic: OATH LO
Erotomania / De clerambault's syndrome	• Delusion of love (BAULT LOVES ME)
Cotard syndrome(Tired)	• A delusional belief that person is dead ,lost his or her blood or internal organs and is putrefying
Delusion of double	
Capgras syndrome (APNA PARAYA)	• Familiar person is considered as Stranger (CAFGRAS)
Fregoli syndrome	• Strangers are considered as a familiar person • For example, a beggar is standing in front of you, but you are thinking him as your boss

PHOBIA

00.10.02

PHOBIA	DESCRIPTION
Agoraphobia	Fear of public / crowded space
Claustrophobia	Fear of closed space
Acrophobia (Acromegaly)	Fear of height
Nyctophobia(Night)	Fear of darkness
Mysophobia (Mud)	Fear of dirt/germs
Ailurophobia	Fear of cats
Cynophobia	Fear of dogs

Hydrophobia	Fear of water
Glossophobia (Glossy)	Fear of public speaking
Trypanophobia (Prick)	Fear of injection / needles
Arachnophobia	Fear of spiders
Nomophobia(No mobile)	Fear of not having mobile phone connectivity
Thanatophobia	Fear of death
Phonophobia	Fear of loud noise

MENTAL HEALTH CARE ACT 2017

00.11.13

- Psychiatric hospital is renamed as mental health establishment centers
- Decriminalizing suicide attempt
- Prohibiting ECT
  - For adult without use of anesthesia and muscle relaxants
  - For minor
- Protection of rights of person with mental illness
- Right of confidentiality
- Right to access medical records
- Prohibition on sterilization of men or women as a mode of treatment for mental illness
- Prohibition on any form of chaining of persons
- Establishment of central and state mental health authority

Advance Directive (direction in Advance for Mental Illness)

- Any major can write
  - To specify an individual's health care decisions
  - Ways to be treated
  - Ways not to be treated
- Identify persons who will make those decisions for the said individual in the event that he is unable to communicate his wishes to the doctor in the future (nominated representative)

TRAIT	INSANITY	FEIGNED INSANITY
Onset and motive	Gradual with no motive	Sudden with some motive
Signs and symptoms	Uniform and present whether observed or not	Present only when conscious being observed
Frequent examination	Does not mind	Resents for fear of examination
Facial examination	Peculiar vacant look	No peculiarity
Mood, sleep pattern, habit	Abnormal	Normal
Predisposing factor	Present	Absent
Loss of appetite	Many days	Absent

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NEET PG 2023

Criminal Responsibility

- Delirium tremens (Mnemonic: DT → Do Teen)
  - Alcohol withdrawal symptom
  - Seen in 2 D to 3T days of withdrawal
  - If a crime is committed - not responsible
- Run Amok
  - Homicide → Suicide
  - Chronic cannabis abuse symptoms
  - Can develop homicidal tendencies
  - If a crime is committed - not responsible
- Somnambulism
  - Sleepwalking
  - If a crime is committed - not responsible
- Sleep drunkenness
  - Also called somnolentia
  - Awake and drowsy or confused for long time
  - If a crime is committed - not responsible
- Kleptomania
  - Steal article of low value
  - Insight present
  - Liable if crime is committed

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4. TRACES OF EVIDENCE

BLOOD STAINS

00:00:22

- It is used in cases like Rape and Murder

Screening Test

Peroxidase

↓

Nascent oxygen is formed

↓

Oxygen combines with Hemoglobin

↓

Different colors for different reagents

Screening test	Color
Benzidine test	Blue
Phenolphthalein test (Kastle-Meyer)	Pink
Ortho - toluidine test	Blue green
Leucomalachite test	Peacock blue

Luminescence Test

- Lumino spray and UV rays
- Used for the detection of invisible or old / washed stains

Benzidine Test

NEET PG 2018

- Most sensitive test
- It can detect very old stains
- Disadvantage: Carcinogen

Confirmatory Test / Specific Test

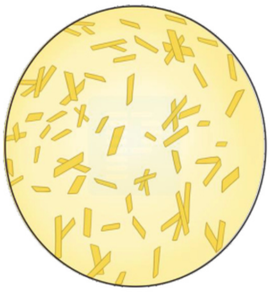
00:02:28

- Microchemical test
- Spectroscopy test (most specific)
- Microscopy

Microchemical Test

FMGE 2018

	Teichmann test	Takayama test
Appearance	Brown - Rhombic	Pink - Feathery

Chemicals used	• Sodium chloride • Glacial acetic acid	• Glucose • Pyridine • Sodium hydroxide
Type of crystal	Hemin/Hematin	Hemochromogen
		

Important Information

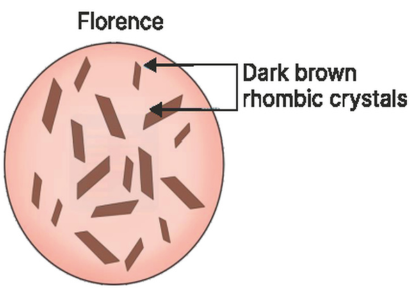
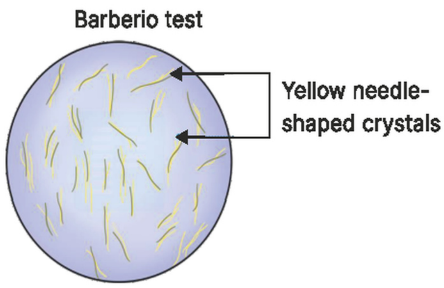
- Precipitin test → Detects species of hair, bone, and blood

SEMEN ANALYSIS

00:04:20

NEET PG 2019, 2023
INICET 2024
FMGE 2020, 2021, 2023, 2024

- Sperm - 10%
- Seminal fluid - 90%
- It is used in cases like Rape and sexual assault

	Florence test	Barberio's test
Detects	Choline - Iodide crystal	Spermine - picrate crystal
Reagent	Potassium iodide and water	Picric acid
Type of crystals	Dark brown	Yellow needle
		

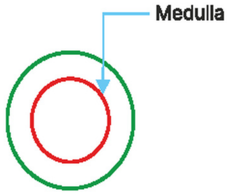
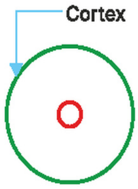
- LDH Isoenzyme
  - Detection of sperm
  - Most specific method → Absolute proof of semen
  - LDH positive + one broken sperm → semen
- Phadebas test
  - Saliva can be detected by L-amylase
- Semen stain fluorescence

- Bluish white color when examined under filtered ultraviolet light
    - Detects choline crystal
- Acid phosphatase test
    - Aspermia
- Creatine phosphokinase test
    - Detects old semen
- Lugol's iodine
    - Detects vaginal cells in the penis
    - Positive result upto 4 days

INICET 2021

HAIR ANALYSIS

00:07:01

	Animal hair	Human hair
Medulla	Wide	Narrow
Cortex	Narrow	Wide
Cuticle	Coarse, thick	Fine, thin
Pigment	Centre (medulla)	Periphery
Scale	Coronal	Imbricate
Medullary index **Width of medulla/width of shaft**	>0.5	<0.3
		

PATERNITY AND MATERNITY DISPUTE

00:08:46

- DNA fingerprint
    - Best test
    - Also used to identify a decomposed body
    - Father of DNA fingerprinting: Alec-Jeffreys
- HLA typing
- Blood grouping: Best test
    - Method used - Elution

EDMOND LOCARD CONTRIBUTIONS

00:09:27

- Poroscopy
    - Skin → pores
    - Used as an identification method

- Exchange principle
  - Material exchange in the crime scene

MCQ

00:11:12

Q. Which test is employed to distinguish human blood from the blood of other species among the options provided?
a. Teichmann test
b. Precipitin test
c. Barberio test
d. Takayama test

Ans: b

Q. Which confirmatory test is utilized by a forensic expert to establish the presence of a bloodstain at a crime scene?
a. Spectroscopic test
b. Kastle Meyer test
c. Benzidine test
d. Orthotoluidine test

Ans: a

Q. A 30-year-old man has been accused of rape by his 26-year-old female friend. The woman was allegedly lured by the man on a pretext of helping with an assignment, but had later spiked her drink and raped her while she was unconscious. The team has taken swabs of his urethral lining to test for the presence of vaginal cells. What test would be done for the same?
a. Lugol's iodine test
b. Takyama test
c. Florence test
d. Precipitin test

Ans: a

Q. The medullary index of human hair is
a. 0.2
b. 0.4
c. 0.5
d. 0.6

Ans: a.

Q. The best method to prove paternity is:
a. Blood grouping
b. Finger printing
c. Phenotypic resemblance
d. DNA fingerprinting

Ans: d

Q. Pinky feathery crystals are seen in?
a. Takyama test
b. Teichmann test
c. Barberio test
d. Xanthoprotein

Ans: a

PYQ

00:12:03

Q. Which of the following tests is not used for the detection of seminal stains?
a. Acid phosphatase test
b. Florence test
c. Barberio's test
d. Reinsch test

Ans: d

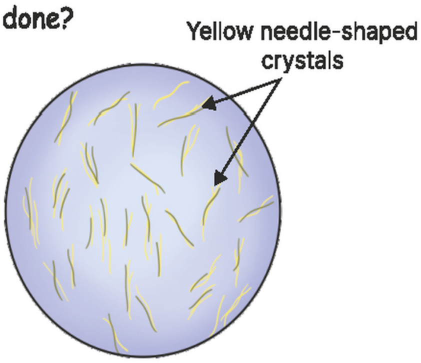
Q. During the forensic examination of semen from a rape victim, the identification of distinctive yellow-needle like crystal raises attention. What is the specific method employed to ascertain the presence of sperm?
a. Barberio test
b. Acid phosphatase test
c. Papanicolaou smear
d. Florence test

Ans: a

Q. Which test is employed to distinguish human blood from the blood of other species among the options provided?
a. Teichmann test
b. Precipitin test
c. Barberio's test
d. Takyama test

Ans: b

Q. Examination of a suspicious stain shows the following finding. What is the test done?
a. Barberio's test
b. Florence test
c. Teichmann test
d. Takyama test



Ans: a

Q. A 10-year-old male child came to the casualty with difficulty in walking and pain in the perianal region. On subjecting the specimen from the perianal region to a test, it produces a yellow needle-shaped rhombic crystal with picric acid. What is the test done?

a. Barberio's test

b. Florence test

c. Teichmann test

d. Acid phosphatase test

Ans: a

5. TORTURE

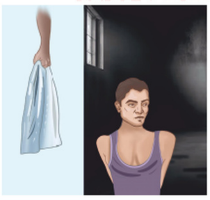
DEFINITION

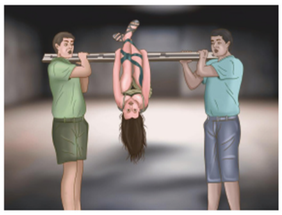
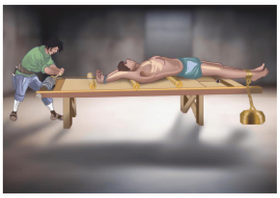
00.00.07

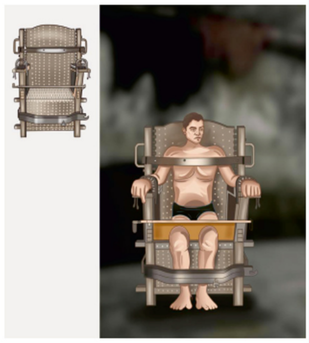
- 120BNS
- Declaration of Tokyo → International guidelines for Physicians (medical professional) concerning torture
- Istanbul (Turkey) protocol: For examination for torture patient
  - Examination of torture victim
  - Reporting injuries
  - Documentation
  - Information

TYPES OF TORTURE

00.00.59

Type of Torture	Features
Dry submarine	• Bag/cloth suffocation INICET 2021 
EL Planton	• Prolonged force standing 
Picana	• Electrical stimulation 
Cattle prod	• Electrical stimulation on genitalia 
Falanga / Bestinado	• Beating on the soles INICET 2024 

Telefona	• Beating on the ear 
Black slave	• Hot metal rod in the anus 
Bellary	• A stick smeared with Red or Green chilly paste in the anus
Quirafino	• Hitting the abdominal 
Parrot perch/Jack	Suspending from a pole placed under the knees with the wrist bound to the ankles 
Crucifixion	• The neck and trachea are compressed • Cause of death - Positional asphyxia 
Jackknife position	• The chest and thigh come towards each other • Cause of death - Positional asphyxia INICET 2024 
Belana	• Crushing of soft tissue and damage to the muscles of the leg and body FMGE 2024 

Caning	• Pointed object on the anus	
Passing on the board	• Hitting on the back	
Iron / Confession chair	• Electric chair	
Sawhorse	• Sitting on the pointed object	
Chepuwa	• Forced torture • Legs and thighs are tied very tightly with the bamboo stick to induce severe pain	
Wet submarine	• Face in water (suffocation)	

Other Common Types Of Torture 00:05:11

- Carotid strain / Sleeper holds
  - Compression on the lateral side of the neck → compression of the carotid artery
  - Causes temporary hypoxia of the brain
- Chokehold
  - Pressure on the trachea in front
- Ghotna
  - Wooden pole is rolled up and down the front of the thigh with one or more individual standing on it
- La Bandera / Strappado
  - Reverse hanging / Palestinian hanging

Suspension by the wrist
↓
Brachial plexus injury and Shoulder dislocation

- Mercielago
  - Suspended by the ankles
- Dunking
  - Victim face is immersed in water and taken out for some time
- Hog tie
  - Wrist and ankle bound behind the back

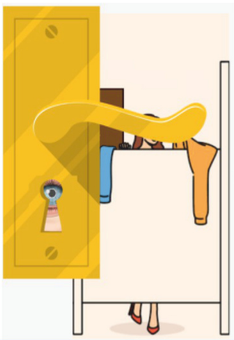
6. SEXUAL OFFENCES

SEXUAL PERVERSIONS/PARAPHILIA

00:00:14

- An abnormal act to get sexual gratification without sexual intercourse

FMGE 2022,NEET PG 2019

TYPES	DEFINITION
Sadism/Algolagnia	Getting satisfaction by inflicting pain on a partner
Masochism/passive algolagnia	Getting satisfaction by receiving pain from a partner
Bondage	SADISM + MASOCHISM
Lust murder	Murder serves as a stimulus for sexual acts
Urolagnia/Undinism/ Urophilia	Urine sight, smell, or touch
Uranism	Sexual gratification by fingering, fondling, licking, and sucking the genitalia of the opposite sex. AKA FOREPLAY
Coprophilia	Fecal smell or touch
Feliatio	Oral stimulation of the male genitalia NEET PG 2021
Cunnilingus	Oral stimulation of the female genitalia - LINGUS (tongue)
Exhibitionism	• Showing private parts • Punishable for 3 months/Rs. 1000 under 296 BNS • Steaking: Running naked in a public place • Mooning: Showing the bare buttocks • Flashing: Momentarily exposing body parts by quickly moving the clothing
Necrophagia and Necrophilia (Dead Bodies)	-philia: sex with a dead body -phagia: eating dead body parts
Transvestism/Eonism	Wearing dresses of the opposite sex, MC in male
Fetishism	Satisfied with inanimate objects of the opposite sex, MC is male.
Voyeurism (Scoptophilia/ Peeping Tom) 	• Watching the removal of clothes by a girl • Watching a girl taking a bath • Mixoscopia is a form of voyeurism in which sexual gratification is obtained by the sight of others engaged in sexual intercourse

Frotteurism	• Rubbing private parts against a female's buttocks or thighs • Punishable under IPC 292 BNS for 3 months
Masturbation (Onanism, Ipsation)	• Self-stimulation of the genitalia • Punishable if done in public
Coprolalia	Obscene language
Scatalogia	Obscene telephone calls/pictures
Partialism	Sexual interest in a specific body part other than the genitalia
Klismaphilia	Sexual gratification by enema
Ecouterism	Listening to sounds associated with sexual intercourse
Nymphomania	Excessive sexual desire in females
Satyriasis	Excessive sexual desires in males
Dippoldism	A teacher beating a student for sexual gratification. (DANDA)
Gerontophilia	Sex with old people
Pedophilia	Sex with children
Narratophilia	Sexual stimulation by reading erotic material
Somnophilia	Sexual arousal by a stranger who is asleep
Pyromania	Sexual arousal by setting fire
Playing the bagpipes	Having intercourse under the armpits
Troilism	Intercourse between 3 people

NATURAL SEXUAL OFFENCES:

00:06:36

- Those offences where the route is PENO-VAGINAL

1. Rape
2. Incest
    - Sexual relationship between blood relatives
    - Not a crime in India
    - No BNS
    - 3 complexes:
        - Electra complex: Daughter and Father (D-E-F)
        - Oedipus complex: mOther and sOn (O-O-O)
        - Pharaon complex: Brother and sister.
3. Adultery
    - Extramarital affair

- Decriminalized in India
- Civil case
- Strong ground for divorce

UNNATURAL SEXUAL OFFENCES:

00:08:07

Anal/Greek Love/Sodomy/Buggery

- Sex through the anal canal
- Can be between male-male and male-female
- When it's between an adult and a child:
  - Adult (active)- Pedderast
  - Child (passive)- Catamite

Oral Sex/Coitus Per Os/sin of Gomorrah

- Mainly done with the child

Animal Sex/Bestiality

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

Lesbianism/Sapphism/Tribadism

- Between females
- Active agent: Butch/Dyke
- Passive agent: Femme
- Mnemonic: ABDF

MEDICAL EXAMINATION OF SODOMY

00:09:42

- Examination done in the knee-elbow position

Habitual Passive Agent

- No pain and tenderness
- Perianal hair is shaved
- Funnel-shaped depression of the anus
- Dilatation of the anus with loss of mucosal rugosity and prolapse of the rectal mucosa
- Lateral buttock traction test: Paradoxical dilatation of the anus during bimanual traction of the buttocks

Non-habitual Passive Agent

- Pain/tenderness is present
- Fresh or dried semen in the anus or perianal area
- Perianal injuries, along with tenderness
- Fresh bleeding or dried blood stains may be present in the anal or perianal area
- The Tyre sign seen in forceful sodomy is the loss of the skin fold in the perianal region due to a hematoma

RAPE

00:11:43

- Definition by 63 BNS: A man is said to commit rape if he penetrates his penis or penis-like object/body part into the vagina, oral cavity, anal canal, or urethra

Conditions

- Against the will
- Without the consent (consent is a part of the will)
- With her consent: if the consent is obtained by putting her in fear of death or hurt
- Impersonation (as husband)/fraud- Portraying yourself as unmarried while you are married for consent
- Intoxication/insanity- Influence of drug or alcohol.
- With or without her consent when she is under 18 years of age. If it is with consent, it is called statutory rape
- Unable to communicate the consent- Coma/unconsciousness

The Quick Pills

- The slightest penetration of the penis within the vulva (labia majora) or other, with or without emission of semen or rupture of the hymen, constitutes rape
- In India, there is no age limit under which a boy is considered physically incapable of committing rape
- The minimum age for a girl to give consent for sex is 18 years
- Impotence is not a defense for rape
- Medical proof of intercourse is not legal proof of rape
- Medical interventions are not rape (if proper consent is obtained)
- POCSO Act: Protection of children against sexual offenses (applicable if a child <18 years is involved), either male or female

64 BNS - 6+4= 10 Y

- Subsection (1): Punished with rigorous imprisonment for a term that shall not be less than 10 years or imprisonment for life, and shall also be liable to a fine
- Subsection (2): This subsection is for serious forms of rape as described below
  - Punished with rigorous imprisonment for a term that shall not be less than 10 years but may extend to imprisonment for life (which shall mean imprisonment for the remainder of that person's natural life), and shall also be liable to a fine
  - This punishment is for a rape by a,
    - Police officer in the police officers' custody, member of the armed forces, or by the management or staff of the jail, hospital
    - By relative, guardian, or teacher
    - During communal violence
    - A pregnant woman
    - Suffering from mental or physical disabilities, incapable of giving consent, under 18 years, or commits rape repeatedly, causing grievous bodily harm, or endangering life

65 BNS:

- Punishment for rape in certain cases
- <16 years of a girl- 20 years to life imprisonment, which shall mean imprisonment for the remainder of that person's natural life
- <12 years for a girl- 20 years to death sentence

66 BNS

- Causing death/vegetative state of the victim while committing rape- 20 years to death sentence

67 BNS:
- Sex with husband during separation, punishment is 2-7 years

68 BNS
- Sex by person in authority (5-10 years)

69 BNS
- Sex by using deceitful means, e.g., false promises (6-9 years) of marriage (up to 10 years)

70 BNS: Gang rape (G-7)
- >18 years (20 years to life), which shall mean imprisonment for the remainder of that person's natural life
- <18 years (life imprisonment to death sentence)

71 BNS
- Repeat offender (life imprisonment - death)

72 BNS
- Disclosure of the identity of a rape victim (up to 2 years)

120 BSA (Bharatiya Sakshya Adhiniyam)
- Presumption of absence of consent (burden of proof-accused)
- If the victim says that she did not consent, it is presumed

CAMERA TRIAL - 366 BNSS (Bharatiya Nagarik Suraksha Sanhit)
- Closed courtroom proceedings

184 BNSS - EXAMINATION OF THE VICTIM OF RAPE/ATTEMPT

00:19:46

- Any police officer should examine the information within 24 hours of receiving it
- Female S.I. must be present
- Consent of the woman for examination is a must, and she should be examined under the supervision of an RMP (female RMP)
- Ask her to remove her clothes
- Examine the clothes and collect the evidence (blood, clothes, hair, nails, scrapings)
- Collect the foreign hairs, seminal stains, and other stains if present
- Report within 7 days
- If the female refuses examination, document the informed refusal
- Search for physical injuries
- Toluidine blue contrast is applied to detect fresh microinjuries over the anogenital area
- 4 vaginal swabs (ASAP- 3 days)- smear, sperm (motility-saline), DNA profiling, and chemical test
- Examine in the lithotomy position in good light
- Glaister-Keen rod or hymenoscope is used for examination of the hymen. Tearing usually occurs posteriorly at the sides, between 5 and 7 o'clock positions
- A speculum is used for the examination of the vagina, and a colposcope for the cervix
- Treat STDs, injury, or pregnancy, and provide psychological support

Yourwish

EXAMINATION OF ACCUSED - 52 BNSS WITH REASONABLE FORCE - PRISONER 00:23:10

- Requests for examination should be made by a sub-inspector or above.
- General examination- behaviour, clothes, hair, blood
- Genital examination
- Smegma (whitish discharge in the glans) at the corona glandis and under the foreskin of the glans appears in 24 hours if there has been no sex in the last 24 hours
- Examine the penis and glans for vaginal cells
- Papanicolaou's stain and Lugol's iodine
  - Penile Swab → Dried → Exposed to vapors of Lugol's iodine → Brown if vaginal cells are present (presence of glycogen)
- Lugol's iodine can be done up to 4 days after rape

SAFE KIT (SEXUAL ASSAULT FORENSIC EVIDENCE) 00:25:38

- Bags and sheets for evidence collection
- Swabs for collecting fluids from the lips, cheeks, thighs, vagina, anus, and buttocks
- Clear glass slides
- Self-sealing envelopes for preserving the victim's clothes, head hair, pubic hair, and blood samples
- Nail pick for scraping debris from beneath the nails
- White sheets to catch physical evidence stripped from the body
- Documentation forms
- Labels
- Sterile water and saline

Yourwish

7. IMPOTENCE AND STERILITY

Impotency (erectile Dysfunction)

00:00:15

- Definition: Inability to initiate or maintain penile erection

Causes

- **Most common → Psychogenic**
- Others:
    - Vasculogenic
    - Neurogenic
    - Congenital
    - Acquired
- **Honeymoon impotency**
    - Temporary anxiety on the honeymoon
- Impotent to a particular woman- Quoad hanc

Special Type

- **Honeymoon impotency**
    - Temporary anxiety on the honeymoon
    - → Transient impotence

Special Term

- Impotent to a particular woman
    - → Quoad hanc

Female Sexual Disorders

Frigidity

- Female unable to initiate or maintain sexual arousal

Vaginismus

- Involuntary contraction of the pelvic floor & Vaginal muscles
- Due to fear of penetration

Quoad Hunc

- Female impotent to a particular man

Sterility

- Male → cannot father a child
- Female → cannot conceive

Important Information

- Sterility is not a ground for divorce

Marriage Terminology (hindu Marriage Act)

00:02:00

- Valid marriage- Act 5
- Annulment of marriage- Cancel the process
  - Void marriage
  - Voidable marriage

Void Marriage

- Invalid from the beginning
- **Examples**
  - Bigamy (already married)
  - Prohibited relationships

Voidable Marriage

- Valid initially → Declared void by the court
- **Examples**
  - Impotency
  - Impersonation
  - Pregnancy by another person
  - Consent by fraud
  - Intoxication

Grounds Of Divorce

- Frigidity
- Impotency after marriage → Ground of divorce
- Only impotency → Not a ground as it is a Voidable marriage
- Sterility → NOT a ground

Mnemonic - Divorce

- D - Desertion ≥ 2 years
- I - Insanity
- V - Venereal disease
- O - Offense (criminal)
- R - Renunciation
  - Becoming saint
- C - Cruelty
- E - Extramarital affair

Fecundation Extra

- Rare condition
- Conception without penetration
- **Mechanism** - Semen is deposited on the thigh/vulva, and the sperm reaches the uterus

Legitimate Child

- Definition: A child born during a valid marriage or within 280 days of dissolution, and the other remains unmarried
- Law: Section 116 BSA

Posthumous Child

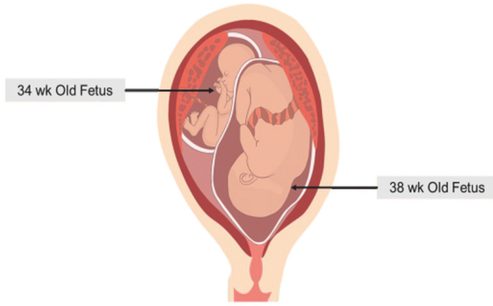
- Child born after the father's death

Affiliation Case
- Disputed paternity/maternity

Supposititious Child
- Also called a fictitious/substituted child
- Purpose: Blackmail/property claim/money
- **Methods**
    - False claim of a child
    - Adoption/kidnapping

Superfecundation Vs Superfetation

NEET PG 2021, 2024

Feature	Superfecundation	Superfetation
Timing	Same menstrual cycle	Different menstrual cycles
Process	Two ova fertilized	Two conceptions
Fathers	Same or different men	Typically, the same (rare cases are different)
Fetuses	Same age, equal development	Different age (~1 month difference)
		

Pseudocyesis (false Pregnancy)
- Subjective symptoms present
- No actual pregnancy
- **Features**
    - Abdominal distension
    - Morning sickness
    - Breast enlargement
- ***Investigation*** - USG → Empty uterus
- ***Cause*** - Psychological/hormonal

Assisted Reproductive Techniques (art)

00:09:32

TYPES
- Artificial insemination
- Surrogacy
- IVF (Test tube baby)
- GIFT
- ZIFT
- ICSI
    - Used in oligospermia

Yourwish

Artificial Insemination

Indications (husband)

- Impotency
- Sterility
- Hereditary disease
- RH incompatibility wife
- Hypospadias/epispadias
- Oligospermia/azoospermia

Indications (wife)

- Cervical stenosis
- Cervicitis
- Vaginismus
- Antisperm antibodies

Artificial Insemination - Types & Consent

AIH (Husband)

- Semen from husband
- Consent → Husband + Wife

AID (Donor)

- Semen from a donor
- Consent- Both couples

AIHD

- Pooled semen (H + D)

Precautions

- Consent of the donor and his wife is essential
- DONOR - No risk of genetic disease, <40 years
- Donor must be mentally and physically healthy
- Donor must not be a relative of either spouse
- Donor's race and characteristics should resemble those of the husband and have the same blood group as that of the husband
- A physician who administered artificial insemination should avoid delivering the child
- Usually, a single donor's semen is not used to produce >10 children

Legal Status Of Child

AIH

- Legal child

AID

- Requires adoption
- Then ba ecomes legal child

Special Point

- Single woman → AI is legal
- No adultery (if proper consent taken)

Important Law
- AI without husband's consent - Ground of divorce
- AI due to sterility - Not a ground of divorce

Surrogacy Act 2021

00:13:30

Surrogate Mother
- Woman who carries a child

Type In India
- Only altruistic surrogacy is allowed

Altruistic Surrogacy
- Only:
  - Medical expenses
  - Insurance (3 years)
- No monetary benefit

Surrogacy Regulation Act
Surrogate Mother Criteria
- Once, 3 attempts
- Age → 25-35 years
- Married
- At least one child
- Close relative
- Mentally & physically fit

Intending Couple Criteria
- Female → 23-50 years
- Male → 25-55 years
- ≥5 years of marriage
- Must have infertility

Other Rules
- No sex selection
- Child is legitimate

Punishment
- **LAW VIOLATION** - 5 years imprisonment + ₹1 lakh fine
- **COMMERCIAL SURROGACY** - 10 years imprisonment + ₹10 lakh fine
- **DOCTOR PENALTY** - Registration cancelled for 5 years

Error Files
- **Superfecundation**
  - Same menstrual cycle

- **Superfetation**
  - Different menstrual cycles
- **Impotency (before marriage)**
  - Voidable marriage
- **Impotency after marriage**
  - Ground of divorce
- **Sterility**
  - Not a ground of divorce
- **Frigidity**
  - Ground of divorce

PYQs

00:16:05

Q. What is the term for a child born when a woman pretends to be pregnant and later uses the child to extort a man?

a. Supposititious child

b. Superfecundation

c. Posthumous child

d. Superfetation

Ans: a. Supposititious child

Q. All of the following are true about Superfoetation except:

a. Two different acts of coitus

b. Same menstrual cycle

c. Twin pregnancy

d. Fertilization of two ova by two sperms

Ans: b Same menstrual cycle

Q. A woman presents with a twin pregnancy. On USG, the estimated age of one fetus is 1 month more than that of the other fetus. What is the diagnosis?

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a. Superfetation

b. Superfecundation

c. Supposititious child

d. Posthumous child

Ans: a. Superfetation

8. VIRGINITY, ABORTION, AND MTP

VIRGINITY

00:00:06
INICET 2021

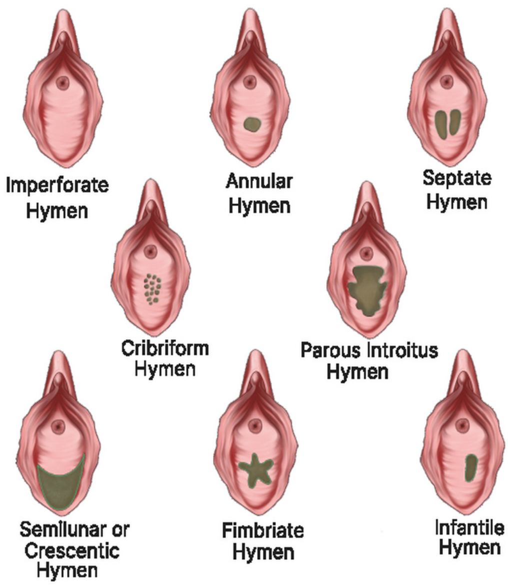
- Virginity loss: Defloration
- Hymen: It is a fold of the mucous membrane surrounding the vaginal orifice or vaginal outlet
- A true virgin has never had sex; the hymen is intact/ruptured
- False virgin: Sex + hymen is intact (thick, elastic, fleshy)

Sign of virginity	Defloration
• Hymen intact • L. majora is closely apposed • The labia minora are pink • Posterior commissure & Fourchette- Intact • Intact fossa navicularis • Narrow vaginal canal with rugosity • Breast: Smaller, firm, pink, small areola, nipple	• Hymen torn (postero-lateral) • Not so- L. majora is exposed • The labia minora are pigmented • Fourchette and Posterior commissure- Torn • Fossa navicularis- Disappears • Vaginal canal- Dilated/rugosity (-) • Breast- Large, flabby, raised

HYMEN

NEET PG 2022

- It is a fold of the mucous membrane
- Types: Hymen IS A VICS
  - Imperforated
  - Semilunar/crescentic: MC
  - Annular
  - Vertical
  - Infantile
  - Cribriform
  - Septate
  - Fimbriate

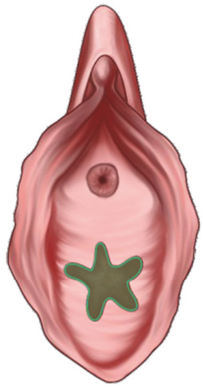


CAUSES OF HYMEN RUPTURE

- Sexual intercourse
- Masturbation
- Accidental
- Surgery
- Infection
- Foreign body like SOLA-PITH
- Rupture during,
  - Sex: Postero-lateral, 5-7 o'clock
  - Masturbation: Antero-lateral, 11-1 o'clock

- Aptae viris: Rendering very young girls fit for sexual intercourse
  - Sola pith - vagina - absorb moisture - vagina dilated
- Sexual assault of a female child: The hymen is not ruptured because it is situated deep

	Hymenal tear	Fimbriated hymen
Situation of notches	Posterior	Anterior
Extension	Extends to the vaginal wall	Don't extend to the vaginal wall
Shape and size	U/L, asymmetric	B/L, symmetrical
Mucous membrane	Lost over notches	Intact
Causes	Sex, masturbation, trauma	Natural



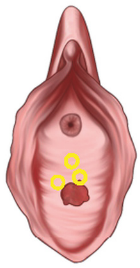
Fimbriate Hymen

Glaister Keen Rod-Examine Margin

- An instrument used to examine the vagina
- Globe: illuminated bulb
- Inserted in the vagina and pulled out
- The margin of the hymen is on the globe

Carunculae Hymenales Or Myrtiformes:

- These are small, round, fleshy projections found in the already destroyed hymen in women
  - Those who are used to having coitus
  - After childbirth

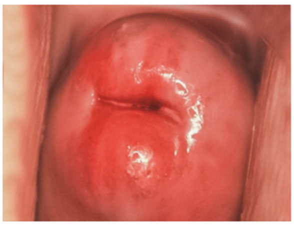


Carunculae Hymenales

PREGNANCY SIGN - PRESUMPTIVE SIGNS

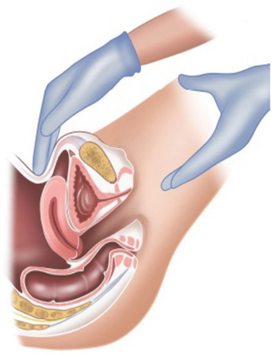
00:08:04

- Amenorrhea is the earliest sign of pregnancy
- Quickening: Fluttering movements in her abdomen, seen at about the 16^{th} to 20^{th} week
- Chadwick's or Jacquemier's sign: Seen at about the 4^{th} week, the mucosa of the vagina changes from pink to blue due to venous obstruction
- Morning sickness, Montgomery's tubercles in the breast, urinary disturbances, etc.



Probable Signs

- Hegar sign: The ishtmus, between the hard cervix and elastic uterus, is compressible and soft
  - Seen at about the 6^{th} week
  - This is the most valuable physical sign of early pregnancy
- Goodell's sign: Softening of the cervix. Well marked at about the 4^{th} month
- Braxton-hicks sign (KICK): Intermittent painless uterine contractions. Easily felt after 4 months
- Ballottement (4^{th} and 5^{th} month) and enlargement of the abdomen



Positive Signs

- Fetal movement after the 16th week, and fetal parts can be distinctly felt after 24 weeks of gestation
- Fetal heart sounds are heard between 18 and 20 weeks
- Fetal parts can be detected in an X-ray at about the 15th to 16th week
- USG: Gestational sac (6th week), distinct ECHO from embryo (7th week), heartbeat (10th week). Along with the placental and umbilical soufflés, these are important signs

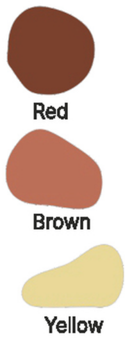
LOCHIA

00:11:13

- Discharge from the vagina after delivery

Mnemonic: RU SSI A

- Rubra: 1 to 3-4 days
  - Red
- Serosa: 4-10 days
  - Pink-brown
- Alba: 10-28 days
  - white/yellow



ABORTION - PREMATURE EXPULSION OF FETUS

00:11:48

FMGE 2021

- Viability of the fetus is 28 weeks
- Full term: 280 days
- Medical abortion: Expulsion before 28 weeks
- Legal definition of abortion: Expulsion at any time before full term

Natural	Induced	
Spontaneous: 1st trimester due to chromosomal abnormality	MTP (legal)	Criminal (illegal)
Accidental	Indication- Present Done by the doctor	Indication- Absent Punishable

MTP ACT

00:13:08

- MTP Act 1971, implemented in 1972
- New changes in 2021

Indications

Mnemonic: SETH

- Contraceptive failure: Social
- Congenital malformation: Eugenic
- Mother's life in danger: Therapeutic/teratogenic radiation/TORCH infections
- Rape: Humanitarian
- Consent: Mother can give, if >18 years of age
- Confidentiality: 1 year imprisonment/fine/both

- Mostly MTP is done up to 24 weeks
  - Up to 20 weeks: 1 doctor
  - 20-24 weeks: 2 doctors
- In contraceptive failure: MTP done up to 20 weeks
- In pregnancy/rape/incest/vulnerable female/minor: MTP done up to 24 weeks
- >24 weeks: Only if there is a substantial fetal abnormality, the medical board should be consulted
  - OBG
  - Pediatrician
  - Radiologist/sonologist
  - Any other member/gazetted officer
- MTP can be done at any time to save the life of the pregnant female and can be done by 1 doctor
- MTP is done in government institutions and by
  - RMP: 25 assisted MTP
  - 6 months of a house job in the OBG department
  - OBG: MD/MS/diploma/DNB
  - 1 year of experience in the OBG department

LEGAL ASPECTS: CRIMINAL ABORTION

00:15:54

- 88-92 BNS
- 88 BNS: Criminal abortion with mother's consent
- 89 BNS: Abortion without mothers' consent
- 90 BNS: Death of the mother due to abortion

Criminal Abortion Methods

- Up to the end of the first month: Violent exercise
- Up to the end of the second month: Abortifacient drugs
- 3rd or 4th month: Mechanical interference

Abortificant Drugs

- Ecbolics- drugs (cause uterine contraction)- EQSO
  - Ergot
  - Quinine
  - Strychnine
  - Oestrogen
- Emmenagogues (increased menstrual flow) causing expulsion- BOSSS
  - Borax
  - Oestrogen
  - Sanguinarine
  - Savin
  - Senecio
- Irritation of GUT/GIT:
  - Cantharides, oil of turpentine, castor oil, magnesium sulfate, and croton as purgatives

Violence Methods

- Local

  - Syringing
  - Rupturing of the membrane
  - Abortion sticks
  - Dilation of the cervix
  - Dilation and curettage
  - Air insufflation
- Higginson's syringe: Air/soap causing water in the uterus
- Slippery elm bark and drugs: Dilatation of the cervix

Abortion Stick

- It is 12 to 18 cm in length, soaked with the juice of cotton or cloth- PECOLA
  - Plumbago
  - Ergot
  - Calotropis
  - Oleander: yellow/white
  - Lead, (diachylon) mercury, copper
  - Arsenic, abrus, aconite
  - UTUS paste: KI + iodine

General Violence

- Trauma and violent exercise
- Cupping
  - A lighted wick covered with a cup or a mug over the hypogastrium
  - A vacuum is created, and the cup is removed violently
  - Placental separation: Expulsion

Causes Of Death

- Hemorrhages: MC
- Vagal inhibition: VVS
- Air embolism: Early death
- Fat embolism
- Amniotic fluid embolism
- Sepsis (delayed death): 2-3 days

ERROR FILES

88-92 BNS: criminal abortion

- 88 BNS: criminal abortion with mother's consent
- 89 BNS: abortion without mothers' consent
- 90 BNS: death of mother due to abortion

MTP

- In contraceptive failure: MTP done up to 20 weeks
- In pregnancy/rape/incest/vulnerable female/minor: MTP done up to 24 weeks
- > 24 weeks: only if there is a substantial fetal abnormality, the medical board should be consulted
- MTP can be done at any time to save the life of the pregnant female and can be done by 1 doctor.

Yourwish

MCQs

00:21:36

Q. Typically, what is the condition of the hymen in cases of sexual assault involving a young child?

A. Ruptured since it is located superficially

B. Ruptured since it's very thin

C. Unruptured since it's deeply situated

D. Unruptured since it's highly elastic

Answer: **C**

Q. According to the MTP Act of 1971, what is the maximum gestational age at which medical termination of pregnancy is permitted?

A. 28 weeks

B. 22 weeks

C. 24 weeks

D. 16 weeks

Answer: **C**

Q. Legally, abortion means expulsion of the product of conception:

A. Within 12 weeks of gestation

B. Within 20 weeks of gestation

C. Within 28 weeks of gestation

D. At any point of gestation

Answer: **D**

Q. The most common site of rupture of the hymen by the sexual act is:

A. 3 to 5 o'clock position

B. 5 to 7 o'clock position

C. 11 to 1 o'clock position

D. 7 to 9 o'clock position

Answer: **B**

Q. During the outpatient department visit, an 18-year-old female patient was examined. The genital examination disclosed the following observations. These observations suggest,

INI CET Nov 2021

Labia majora: separated

Labia minora: flabby

Fourchette tear present

A roomy vagina is seen with an intact hymen

A. True virgin

B. False virgin

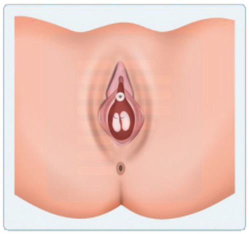
C. Premenstrual stage

D. Molestation

Answer: **B**

Q. Identify the type of hymen shown in the image below:

NEET PG 2022



A. Imperforate hymen
B. Semilunar hymen
C. Septate hymen
D. Annular hymen

Answer: **C**

Q. A 16-year-old girl was rescued from a village in Bihar, where she had been sold off by her father for Rs. 25000 to a 45-year-old man. On examination, she was found to be 12 weeks pregnant. She was granted permission to abort the pregnancy, taking into consideration the age of the girl and the circumstances of her pregnancy. A doctor who will be eligible to perform the abortions for this girl should have performed at least how many MTPs before this?
A. 10
B. 15
C. 25
D. 35

Answer: **C**

9. INFANTICIDE

INFANTICIDE

Term	Definition	Legal Reference / Note
Infanticide	Killing a child under the age of 1 year	Section 103, BNS - Like murder
Neonaticide	Killing of a child within 24 hours of birth	Neonatal period: first 28 days
Feticide	Killing of the fetus	—
Filicide	Killing of a child by parents	—

Viability of Fetus

- Capable of surviving outside after 28weeks - 7Month
- Length - 35cm
- Weight - 900 -1200gm
- Fingernails - Thick
- Meconium - in large intestine
- Eyelids are open , pupillary membranes disappears
- Testes are found at External inguinal ring

After 28 Weeks

Situation	Term
Death in uterus	IUD (Intrauterine death) / Dead born
Death in birth canal or during labor	Stillbirth
Death of baby after respiration	Live birth

DEAD BORN

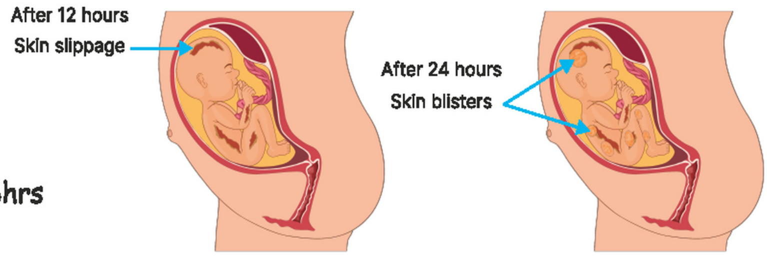
00.02.36

Signs

- Spalding sign
- Hyperflexion of spine , Halo sign
- Over crowding of ribs
- Rigor mortis , Robert sign
- Mummification
- Aseptic autolysis a/k/a Maceration

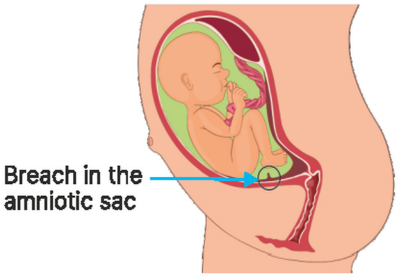
Maceration

- Intact amniotic sac
- Amniotic fluid good or adequate
- Skin slippage / reddening /peeling - 12hrs
- Skin blisters - 24hrs
- Softening of joint or Hypermobile joints - 48hrs
- Sweetish → Disagreeable smell
- Subcutaneous edema - 5days
- Abdominal distention



MUMMIFICATION - shrink

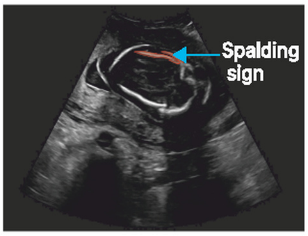
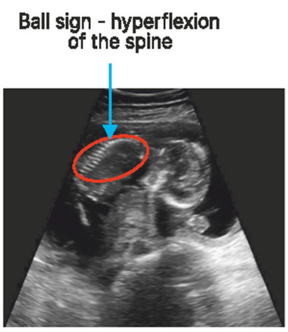
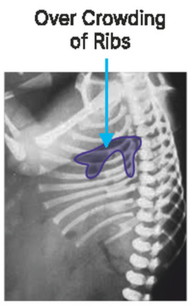
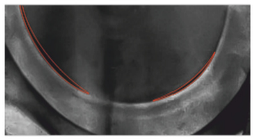
- Intact amniotic sac
- Deficient amniotic fluid , air ,blood
- Odorless



Putrefaction

- Ruptured amniotic sac → breach in amniotic sac
- Presence of bacteria

Radiological Signs

RADIOLOGICAL SIGNS				
Robert sign	Spalding sign	Ball sign	Overcrowding of ribs	Deuel halo sign
• Gas/air shadow in heart / great vessels • Earliest sign • Seen within 12 hrs	• Overlapping of skull bones • Caused by brain collapse (LIQUEFACTION) • Seen in 4-7days due to maceration 	• Hyper flexion of spine - vertebral column • Hypermobile joint. 		• Separation of subcutaneous fat of scalp from cranial bones  

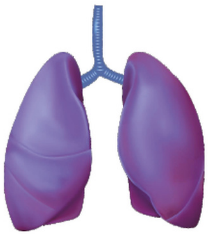
LIVE BIRTH

00.07.18

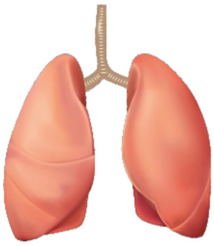
- According to RBD act 1969
  - Any sign of life after complete birth (expulsion of product of conception) of the child
    - Respiration +
    - Cry of baby +
    - Movements of baby +

Registration of Birth and Death Act 1969

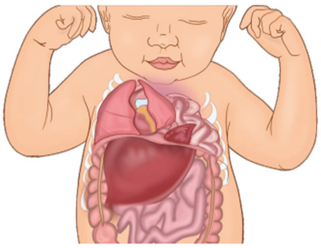
	NO RESPIRATION	RESPIRATION
Levels of diaphragm	4-5 ribs	6-7ribs
Chest	Flat	Expanded
Lung volume	Less	More
Size	Small	more
Margin	Sharp	Round
Consistency	Solid , firm	Spongy , crepitant
Weight	30gm	60gm
Colour	Blue violet	Light red (mottled)
Epithelium	Cuboidal	Squamous
Specific gravity	1.04	0.94



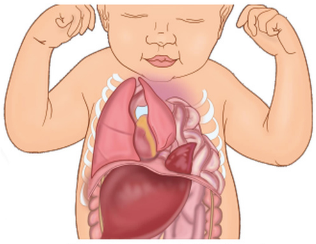
No Respiration



Respiration



Diaphragm at the level of 4^{th}-5^{th}rib



Diaphragm at the level of 6^{th}-7^{th}rib

Live Birth Tests

Wreden's Test

- Air in Middle ear

Fodere's Test / Static Test

- Weight of non respired lung - 30gm
- Weight of respired lung + 60gm (2fold)

Ploucquet Test

- Proportion of lung weight to body weight
- Non respired lung - 1/70
- Respired lung - 1/35

Breslau's 1st Life Test

FMGE 2020
NEET PG 2019

- Also called lung float test / Raygat test / Hydrostatic test
- Specific gravity of water - 1
  - Specific gravity of respired lung - 0.94 → FLOAT
  - Specific gravity of non-respired lung - 1.04 → SINK
- If residual air present then it is respired lung

Control Test

- Liver - float - then it is putrefied

Lung Test

- Lung - float
- Lung cut in 12-20 pieces and lung pieces are squeezed to remove TIDAL VOLUME
  - Float then it is a respired lung
  - If some pieces float then it is feeble respiration

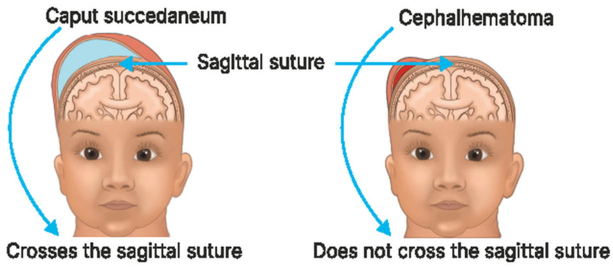
False Positive	False Negative
• Putrefaction • Artificial respiration	• Pneumonia • Oedema • Alveolar duct membrane • Atelectasis • Complete absorption of air – lungs

- A hydrostatic test is not necessary for
  - Non viable
  - Dead born - maceration, mummification, monster
  - Live born - milk in the stomach
  - Umbilical scar : 10 -12 days

Breslau's 2nd Life Test

- Air in stomach / intestine
- Both ends of stomach is ligated
- Placed in water
- Incision made in stomach - presence of air bubble suggest positive test

FEW MORE SIGNS OF LIVE BIRTH



Feature	Caput Succedaneum	Cephalhematoma
Nature	Scalp edema	Subperiosteal hematoma
Suture line	Crosses suture line	Does not cross suture line
Pitting on pressure	Pit +	Pit –

Umbilical	Days	Remnants
Umbilical artery	3 days	Medial umbilical fold
Umbilical vein	4 days	Ligamentum teres
Umbilical cord	5-6 days	Fall

- UNBORN
  - Vagitus uterinus
    - Intrauterine cry
  - Vagitus vaginalis
    - Vaginal cry

SUDDEN INFANT DEATH SYNDROME (SIDS)

00.18.16

- a/k/a Cot or Crib death
- Unexplained death of healthy baby
- Negative autopsy : Cause of death is not identified
  - Common in male
  - Around 6 month (2week-2year)
  - Incidence : 0.2%
  - Common cause - prematurity
  - Time - early morning
  - Most seen in children who parents especially mother is intoxicated with alcohol or drug
- Face
  - Cyanosed
- Mouth , nostrils
  - Blood ,milk,froth is seen
- Cause of death
  - Deficiency of Ca,Mg,Se
  - Sleep apnea - most common cause of death
  - Respiratory depression - viral
  - Cow milk allergy
- Petechial hemorrhage seen in organs

MUNCHAUSEN SYNDROME OF PROXY

00.19.52

- Child abuse by parents by laxative , emetics
  - Repeated frivolous complaints by the parents for unnecessary investigations and treatment
  - Illness produced or alleged or both by a parent
  - Repeated request for medical care of a child leading to multiple medical procedures
  - Parental denial of knowledge of cause of symptoms
  - Regression of symptoms when the child is separated from their parents Rosenberg criteria

BATTERED BABY SYNDROME

00.21.48

FMGE 2020
NEET PG 2019

- kempe / Mal treatment
- Discrepancy between history and findings
- Delay in medical attention
- Different stages of injury
- MCC of death
  - Head injury
  - Blunt trauma (abdomen)
- A single X ray of the whole body
  - Baby grain

Predisposing Factors

- Age <3years
- Sex- male
- Eldest , youngest , illegitimate
- Unwanted
- Common in lower socio-economic state
- Unmarried
- Unemployed parents
- Alcohol / drug /smokers

Injuries

- MCC : Direct manual violence
- Most characteristic lesion
  - Tear inside lips/Frenulum
- Retinal detachment leads to vitreous hemorrhage
- Pinch marks produces bruises called butterfly bruise
- Burn , hot water ,cigarette mark
- Glove and stocking pattern
- Scald

Infantile Whiplash Syndrome

- Also called shaking baby syndrome
- Subdural haematoma
- Periocular bleeding
  - Dot - Blot hemorrhage
  - Retinal detachment

Yourwish

- Encephalopathy
- Skull fracture
  - Linear #
  - Egg shell #

Multiple Rib Fracture

- Anteroposterior compression
  - Mid axillary line #
- Lateral compression
  - Posterior , para - vertebral gutter
  - Nobbing #
- Callus
  - Formed at 1-2 weeks
  - X ray - string of bead appearance

CORNER OR BUCKET HANDLE FRACTURE

- Metaphyseal fracture of Tibia , Femur

TRAUMATIC ALOPECIA

- Sub galeal hematoma

Q.Identify the condition in a neonate with the swelling of the head shown in the image below at a few weeks of life ? FMGE June 2024

FMGE June 2024

a.Caput succedaneum
b.Cephalhematoma
c.Subgaleal bleed
d.Encephalocele

Ans. b

Yourwish

10.NEW INDIAN LAWS

- IPC changed to BNS (Bhartiya Nyaya Sanhita)
    - A total of 358 sections
    - Definition and punishment
- CrPc changed to BNSS (Bhartiya Nagarik Suraksha Sanhita)
    - A total of 531 sections
    - Procedure
- IEA changed to BSA (Bhartiya Sakshya Act)
    - Witness and evidence

BNS

00.01.07

- 2 BNS
    - Subsection 6 : Death
    - Subsection 14 : Injury
    - Subsection 17 : Life

Criminal Responsibility

FMGE 2021, 2023, 2024, Neet PG 2025

- 20 BNS
    - Children <7year not responsible for crime
- 22 BNS
    - McNaughten rule
    - Criminal responsibility of mentally ill
- 23 BNS
    - Person under involuntary intoxication
    - Not responsible for the crime
- 24 BNS
    - Person under voluntary intoxication
    - Responsible for the crime

Consent

- 25 BNS
    - Act not intended and not known to be likely to cause death or grievous hurt
    - Done by consent , age >18years
    - Done during surgical procedure
- 26 BNS
    - Act not intended to cause death
    - Done in good faith for person's benefit by consent
- 27 BNS
    - Act in good faith for person <12 years of age , mentally ill
    - Consent by guardian

- 28 BNS
  - Consent got under fear , misconception ,<12 years , mentally unsound , intoxication is not valid
- 29 BNS
  - Consent for acts which are offence is not valid
  - E.g - criminal abortion
- 30 BNS
  - Act done in good faith for the benefit of person
  - Without consent in emergency

Sexual offence

- 63-79 BNS
- 71 BNS
  - Repeat offender of sexual offence
  - Punishment -Life imprisonment to death
- 72 BNS
  - Disclosure of identity of rape victim
  - Punishment upto 2years
- 73 BNS
  - Publishing any matter related to court proceedings
  - Punishment upto 2years
- 74 BNS
  - Sexual assault by criminal force
  - Punishment upto 1-5years
- 75 BNS
  - Sexual harassment
  - Physical contact / request for sexual favours / showing pornography
- Punishment upto 3 years
  - Sexually coloured remarks
    → Punishment upto 1 year
- 76 BNS
  - Disrobing
  - Removal of clothes of woman
  - Punishment upto 3-7years
- 77 BNS
- Voyeurism
  - 1st offence - Punishment upto 1-3years
  - 2nd offence - Punishment upto 3-7years
    → Non- bailable
- 78 BNS
  - Stalking
  - 1st offence - Punishment upto 3 years
  - 2nd offence - Punishment upto 5 years
    → Non- bailable
- 79 BNS
  - Word, gesture or act intended to insult the modesty of a woman
  - Punishment upto 3 years

Offences related to marriage

FMGE 2021, NEET Pg 2023

- 80-87 BNS
- 80 BNS
    - Dowry Death
    - It is death of women within 7 years of marriage
    - Punishment upto 7 years of life
- 85(PUNCH) BNS
    - Women subjected to cruelty by husband or in laws
    - Punishment upto 3 years of life

Criminal abortion

- 88-92 BNS
- 88 BNS
    - Criminal abortion with consent of mother
- 89 BNS
    - Abortion without mother's consent
- 90 BNS
    - Death of mother due to abortion
- 91 BNS
    - Act done with intent to prevent child being born alive or to cause to die after birth(Poison to pregnant mother)
- 92 BNS
    - Causing death of quick unborn child
    - By act amounting to culpable homicide
    - E.g Hitting abdomen of pregnant lady

Offences against children

- 93-99 BNS
- 93 BNS
    - Child <12 years abandoned by parents
- 94 BNS
    - Newborn death concealment

Offences affecting life

- 100 - 113 BNS
- 100 BNS
    - Definition of culpable homicide
- 101 BNS
    - Definition of murder
- 103 BNS
    - Punishment of murder
- 105 BNS
    - Punishment of culpable homicide not amounting to murder

Provocation

- 106 BNS

Yourwish

- Death due to negligence
- Punishment upto 5 years
- But for medical negligence upto 2 years

Hurt

INICET 2023

- 114 BNS
  - Definition of hurt
  - Whoever causes bodily pain , disease or infirmity (DISABILITY) to any person is said to cause hurt
- 115 BNS
  - Punishment for voluntarily causing hurt
  - Punishment - 1 year / 10k fine
- 116 BNS
  - Definition of grievous hurt
  - Emasculation - loss of erection of the penis
    - → Cutting the penis
    - → Castration or any
    - → Spinal injury
  - Permanent privation of sight of either eye
  - Permanent privation of hearing of either ear
  - Privation of any member or joint
    - → Member - any part of the body which has independent function
    - → Joint
    - → Nail - removed - hurt
  - Destruction or permanent impairing of power of any member or joint
  - Permanent disfiguration of the head or face
    - → Acid attack
  - Fracture or dislocation of a bone or tooth
    - → Hairline# is a grievous hurt
  - Any hurt which endangers life (Dangerous injury) or which causes the victim to be in severe bodily pain >15days or unable to follow ordinary pursuits for a period of 15days
- 117 BNS
  - Punishment for voluntarily causing grievous hurt
  - Punishment for 7 years
- 118 BNS
  - Hurt or grievous hurt by dangerous weapon
  - Punishment for 3-10 years
- 122 BNS
  - Hurt or grievous hurt on Provocation
- 123 BNS
  - Hurt by poison
- 124 BNS
  - Grievous hurt by acid → throwing or administering
    - → Acid attack
    - → Punishment for 10 years to life imprisonment
  - Acid attempt → Vitriolage
    - → Punishment for 5 - 7 years

False evidence

- 227 - 246 BNS
- 227 BNS
  - Definition of perjury
  - Giving false evidence
- 229 BNS
  - Punishment for perjury
  - Punishment upto 7 years
- 228 BNS
  - Fabricating false evidence
- 234 BNS
  - Issuing false certificates
- 238 BNS
  - Disappearance of evidence of offence
- 296 BNS
  - Obscene acts (Exhibitionism)

FMGE 2025

IMPORTANT BNSS: PROCEDURE

00.17.14

- 2 BNSS
  - Various definitions like
    - → Types of Offences
    - → Bailable
    - → Cognizable
    - → Warrant case
    - → Summon case
- 33 BNSS
  - Crime information to police
- 51 BNSS
  - Medical examination of arrested person for any offence
  - Forceful examination allowed
- 52 BNSS
  - Medical examination of arrested person accused of rape
  - Forceful examination allowed
- 63-71 BNSS
  - Summons
- 184 BNSS
  - Medical examination of a victim of rape
- 194 BNSS
  - Police inquest
- 196 BNSS
  - Magistrate inquest

IMPORTANT BSA (EVIDENCE / WITNESS)

00.18.50

- 26 BSA
  - Dying declaration

- 39 BSA
  - Expert witness
- 110 BSA
  - Presumption of survivorship
- 111 BSA
  - Presumption of death
  - If person not seen for 7 years then is considered as Dead

MCQ

Q.According to the Bharatiya Nyay Sanhita (BNS) , which of the following is not classified as grievous hurt? INICET MAY 2025

a.Pain lasting for 5days
b.Elbow dislocation
c.Emasculation
d.Fracture of a tooth

Ans. a

11. POSCO ACT AND OTHER ACT, MISCELLANEOUS TOPICS

JUVENILE JUSTICE ACT - CARE AND PROTECTION

FMGE 2022
NEET PG 2019, 2021

- Age criteria: <18 years
- Age determination methods
  - Birth certificate
  - Physical appearance
  - Medical examination
- **Functions**
  - Punishment for cruelty against Juvenile
  - Handle a juvenile who has committed a crime
- **Juvenile Justice Board (JJB): 3 Members**
  - 1 first class judicial magistrate (J.M.)
  - 2 social workers (ONE must be female)
- **Punishment categories**

INICET 2022

Offense type	Punishment duration	Place of detention
Normal Offence	<3 years	Juvenile Home
Serious Offense	3-7 years	
Heinous Crime	>7 years	

- Special category: "In conflict with the law"
- Child between 16-18 years who has committed a heinous crime (Rape/Murder):
  - Will be sent for psychiatric assessment
  - Tried as an adult
- Other orders available
  - Counselling
  - Fine
  - Special homes
  - Community services

CONSUMER PROTECTION ACT 2019

02:00:00

- **Old Act**: 1986
- **New Act**: 2020
- **Redressal Commission Structure**

NEET PG 2018

Commission Level	Jurisdiction	Appeal Path
District	Up to ₹1 Crore	→ District

State	₹1 Crore - ₹10 Crore	→ State
National	>₹10 Crore	→ National → Supreme court

- Time Limitations
  - Case filing & appeals:
  - Case filing: Within 2 years
  - Appeal after the district: Within 45 days
  - Next appeal after the state: Within 30 days
- Case completion time:
  - Normal case: 3 months
  - If any lab test required: 5 months
  - Appeal completion: 90 days
- Important features (New Additions)
  - E-Filing of complaints
  - E-commerce Included
  - Misleading advertisement covered
  - Forum: Commission
  - Central Consumer Protection Authority- Established
- Rights to Consumer (6 Rights)
  - Information
  - Protection
  - Assurance
  - Heard
  - Awareness
  - Redressal

PROTECTION OF CHILDREN FROM SEXUAL OFFENCES (POCSO) ACT - 2012

00:03:56

FMGE 2018, 2021, 2022, 2023

- Enacted: 2012
- Last Amendment: 2019 BILL
- Age Coverage: <18 years
- Reporting mechanism: Child Abuse/Assault → Inform police
- Timeline requirements:
  - Evidence recording: Within 30 days
  - Trial completion: Within 1 year (as soon as possible)

Sexual Harassment

FMGE 2020, 2021

- **Definition:** Bullying or coercion of a sexual nature and the unwelcome or inappropriate promise of rewards in exchange for sexual favors
- **Includes:**
  - Sound and gesture, and exhibit object
  - Child pornography/show (now watching/storing → offense)
  - Make the child exhibit a body part or show his body part

Sexual Assault

- **Definition:** An act in which a person intentionally:
  - Sexually touches another person without that person's consent OR
  - Coerces or physically forces a person to engage in a sexual act against their will
  - **No penetration should be there**

Penetrative Sexual Assault

FMGE 2021
NEET PG 2024

- **Definition:** Penetrating the penis into any orifices of a child, or any object into the:
  - Vagina
  - Urethra
  - Anus
- OR
  - Applies mouth (body part) to the:
    - → Penis
    - → Vagina
    - → Urethra
    - → Anus of a child

Aggravated Penetrative Sexual Assault-(Traitor)

INICET 2024

- Two or more than two persons
- Relative
- Age <12 years, Armed forces
- Insane/institute
- Trust of Authority
- Officer
- Repeat offence
- Sexual assault by:
  - Police Officer
  - Public Servant
  - Armed/Security Forces
  - Management of Jail, Remand Home, Protection Home
  - Hospital Staff
  - Staff of an Educational or Religious Institute
- Using a deadly weapon
- Causing grievous hurt
- Make a child mentally ill
- Act on a Disabled child, a pregnant child
- Make a child pregnant
- Transmit HIV

Pocso - Offenses And Punishment

Offense	POCSO 2012	POCSO Bill 2019
Penetrative Sexual Assault	7 years to life imprisonment + fine	If child below 16 years → 20 years to life term + fine

Aggravated Penetrative Sexual Assault	10 years to life imprisonment + fine	20 years to the death penalty + fine It adds two more grounds to the list of aggravated sexual assault: Assault resulting in the death of a child During a natural calamity
Sexual Assault (without penetration)	3-5 years imprisonment + fine	3-5 years imprisonment + fine
Aggravated Sexual Assault (without penetration)	5-7 years imprisonment + fine	5-7 years imprisonment + fine Add two more offences: • During natural calamities • Administering any chemical or hormones for cervical maturity
Sexual Harassment	0-3 years imprisonment + fine	0-3 years imprisonment + fine
Use of a Child for Pornographic Purposes	0-5 years (7 years for subsequent offense) + fine	Minimum 5 years imprisonment
Storage of Child Pornography	0-3 years + fine	0-3 years + fine Add two more offences: • Failure to destroy or delete such • Made for transmitting

TISSUE AND HUMAN ORGAN TRANSPLANTATION ACT (HOTA) - 2014

FMGE 2024
NEET PG 2025

- Background
  - Original Act: HOTA 1994
  - Current Act: 2014
- Purpose
  - Removal, storage, and transplant of organs
  - Prevents commercial dealing of organs
- Definition: Human Organ
  - Any part of the human body (a structured arrangement of tissue), if removed, cannot be replicated in the body

Brain Stem Death Declaration

AIIMS 2020
NEET PG 2024

- Can be declared by:
  - Treating doctor
  - Hospital in-charge doctor
  - Neurologist/Neurosurgeon
  - Intensivist, Anesthetist, or Physician
  - Independent specialist authorized by the Government

FMGE 2024
NEET PG 2025

Types Of Donations

Living Donation

- **Near Relatives Include:**
  - Parents
  - Son
  - Daughter
  - Brother
  - Sister
  - Grandparents
  - Grandchildren
- **Non-Relative Donation:**
  - Requires prior approval from the Authorized Committee
- **Swap Transplantation:**
  - Between an unmatched pair
  - One wants the liver, another wants the kidney

Cadaveric Donation → Supra-Vital-Interval

FMGE 2018, 2021

- **Authorization requirements:**
  - Donor authorization (before death):
    → Age >18 years
    → Sound mind
    → Will in writing
  - Witnesses required
  - After Death - Consent needed from a person who has legal possession of the body
  - Unknown dead body (>48 hours): Authorized by a doctor or hospital in-charge
  - In MLC cases: Approval needed from an autopsy surgeon

Organs Donated

NEET PG 2019

- **Most Common: Kidney > Liver > Heart**
- **List of Organs:**
  - Heart
  - Liver
  - Thymus
  - Intestine
  - Lungs
  - Kidney
  - Pancreas

Tissues Donated

NEET PG 2019

- **Most Common: Cornea > Bone Marrow > Tendon**
- **List of Tissues:**
  - Bones
  - Cartilage
  - Cornea
  - Middle Ear

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- Veins
- Valves
- Skin
- Tendon
- Ligament

Punishment Under Hota

AIIMS 2018

- **For Human Organ/Tissue Transplantation Without Authorization**
    - Imprisonment: 10 years
    - Fine: ₹20 lakhs
    - Applicable for: Doctor, medical staff
    - Additionally, for doctors:
      → 1st offense: Removal of registration → 3 yrs
      → Subsequent offense: Penal erasure
- For commercial dealing
    - Imprisonment: 2 to 7 years
    - Fine: As per the court

MEDICAL CERTIFICATION OF CAUSE OF DEATH (MCCD)

00:16:52

- **Issuing Authorities**

Document	Issued By
MCCD (Medical Certificate)	Doctor
Death Certificate	Registrar/Sub-registrar

- **Doctor's Duties**
    - Diagnose that the person is dead
    - Declare death
    - Conclude cause of death (COD)
    - Certify cause of death (COD)

Cause Of Death - Classification

FMGE 2022
NEET PG 2019

Category	Definition	Used For
Underlying/Primary	Disease or injury that initiated events → Death, circumstances/violence - injury	Mortality statistics - Eg, DM
Antecedent/Intermediate	Sometime between primary and immediate	Example: Gangrene
Immediate	Final complication (disease or injury), Most recent event occurred before death	Example: Septicemia

Form 4a → Mccd

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.

- Part I - Direct Chain of Events:
  - (a) Immediate cause
  - (b) Antecedent cause
  - (c) Underlying cause
- Part II - Contributory Conditions:
  - Not related to disease
  - But contributed to death (Unfavorable)
    → Smoking or Alcohol

Example Of Mccd Filling

- **Part I:**
  - Immediate: Rupture of the myocardium
  - Antecedent: Myocardial infarction (6 days)
  - Underlying: Coronary artery thrombosis (7 years)
  - Primary: Atherosclerosis (10 years)
- **Part II (Contributory Conditions):**
  - Smoking
  - COPD
  - Diabetes Mellitus

Registration Of Birth And Death Act - 10(3) & 194 Bnss

- Under RBD Act 10(3):
  - Obligatory for: RMP (attended the last illness)
  - Police inquest is needed if the cause of death is not known
  - No Fee
  - Time: Instantly
  - Who can certify COD: RMP
- Form Submission Flow: MCCD (Form 4A) + Death Report (Form 2) → Sent to Registrar → State → Death Certificate in 21 Days
- If brought dead - Only form 2 (Death Report) and the doctor informs the police → 194 BNSS (POLICE INQUEST) → PM → COD

POSTMORTEM FINDINGS - STARVATION DEATHS

00:23:00

- Extreme emaciation and general reduction in size and weight of all organs except the brain
- Gallbladder: Distended with bile
- Brown atrophy of the heart
- Rigor mortis: Sets in and disappears early
- Specific body part findings
  - Face & skin:
  - Face is pale
  - Skin is inelastic and pigmented
  - Ankle edema present
- Subcutaneous tissue:
  - Fat is completely absent in subcutaneous tissue
  - Sparing: Female breast and orbit
- Skeletal System:
  - Stress fracture due to:
    → Demineralization
    → Osteomalacia
- Gastrointestinal System:
  - Wall of intestine appears tissue paper-thin
  - Atrophy of mucosa and all layers also bile-stained

Error Files

- Juvenile Justice Board
  3 MEMBERS - 1st Class J.M. + 2 Social Worker (ONE-FM)
- CAUSE OF DEATH
- Underlying/Primary Disease or Injury that initiated Events → Death, Circumstances/Violences - Injury Mortality Statistics - DM
- Antecedent/Intermediate / Sometime B/W These Two - Gangrene
- Immediate - Final Complication (Disease or Injury), Most Recent Event Occurred Before Death - Septicemia

MCQs

00:24:53

Q. Death registration in India done within?

a. 21 days
b. 28 days
c. 30 days
d. 40 days

Ans: a

Q. An 11-year-old girl was found to be quiet and shy in her classroom with intermittent crying for the past few days. It was discovered that her uncle was touching her genitals inappropriately. The duty of the principal is to report this to?

a. Magistrate
b. Police
c. Child welfare committee
d. Parents

Ans: b

Q. What is the appropriate course of action following the observation of cigarette burn marks on the forearm of a 14-year-old girl who presents to the doctor with a fractured forearm, claiming to have fallen and hit her hand?

a. To inform higher authorities
b. To do a complete physical examination
c. To tell or discuss with colleagues that she is a case of abuse
d. To call a local social worker for help

Ans: a

Q. A 45-year-old chronic alcoholic who was under regular treatment for Diabetes died from an acute exacerbation of chronic pancreatitis. As per the Medical certification of cause of death, column part I(a) of the death certificate is filled with which of the following?

a. Acute exacerbation of Chronic pancreatitis
b. Chronic pancreatitis
c. Chronic alcoholism
d. Diabetes Mellitus

Ans: a

- Part I(a) contains the **IMMEDIATE** cause of death

Q. The Protection of Children from Sexual Offences (POCSO) Act covers which of the following groups?

NEET PG 2025

a. Girls below 18 years
b. All children below 18 years
c. Girls below 16 years
d. All children below 16 years

Ans: b

- POCSO Act covers **Age <18 years** - ALL children regardless of gender

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12. MECHANICAL INJURIES

DEFINITION OF INJURY [BNS 2(14)]

- **Injury**: Any illegal harm to Body, Mind, Reputation, or Property

CLASSIFICATION OF MECHANICAL INJURIES

Due to Blunt Force	Due to Sharp Force
• Caused by: Stone, hammer, or heavy objects • Types: 1. Abrasion 2. Contusion 3. Laceration 4. Fractures or dislocations	• Caused by: Knife, blade, sword, axe • Types: 1. Incision 2. Stab (pointed objects) 3. Chop (axe) - may also fall under laceration

Abrasion

INI CET Nov 2021

- Loss of Epidermis (scraping of epithelium)
- MC mechanical injury
- High Medico-Legal importance (most significant wound)
- Corneal abrasion → Falls under BNS-116 (Grievous hurt)

Types of Abrasion

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

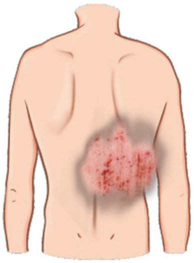
Scratch abrasion (linear abrasion)

- Occurs by tangential force
- Examples:
  - Fingernail abrasion
  - Thorn abrasion
  - Pin abrasion

Scratch Abrasion

Grazed abrasion

- Cause: Sliding on rough surfaces (roads)
- MC in Road Traffic Accidents (RTA)
- Also known as:
    - Grinding abrasion
    - Gravel rash
    - Brush-burn
    - Sliding abrasion


Pressure abrasion (crushing abrasion)

- Mechanism: Crushing of epidermis by continuous pressure
- Force direction: Perpendicular (90°) to the epidermis
- May have a chance of contusion
- Examples:
    - Ligature mark (hanging)
    - Bite mark

Pressure or Crushing Abrasion

INI CET Nov 2022

Imprint Abrasion

- Also known as:
    - Impact abrasion
    - Contact abrasion
    - Patterned abrasion
- Characteristic: Forms a pattern of objects orweaponsn
- Force: Perpendicular force by a rough object with an irregular surface
- Examples:
    - Tyre marks
    - Patterned ligature mark


Aging of Abrasions

- <12 hours → No scab(Scab = dried lymph
- Scab color changes (Mnemonic: ABR):
    - BR- Bright Red Scab: 12-24 hours
    - RB - Reddish Brown Scab: 2-3 days
    - B - Brown Scab: 4-5 days
    - Black Scab: 6-7 days

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Antemortem vs Postmortem Abrasion

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

Contusion/bruise

INI CET Nov 2022

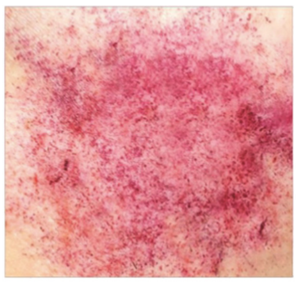
- Injury to the dermis (accumulation of blood) by blood vessel rupture
- Caused by blunt objects/force
- Features:
  - Swelling/discoloration
  - Margins are irregular

Factors Affecting Contusion Size

- Site-
  - Vascular areas (Face, vulva, eyelid, scrotum):
    - → Impact/Force/Trauma: Smaller
    - → Size of contusion: Bigger (severe)
  - Thick skin (palm & sole):
    - → Impact: Bigger
    - → Size of contusion: Smaller (less)

Age of Bruises (mnemonic: R-vibg-yo)

- Color changes start from the periphery → center

Timeline	Color	Pigment/Compound
1-2 hours	**R** - Red	Fresh contusion 
A few hours to 3 days	**V** - Violet, **I** - Indigo (Blue)	Deoxyhemoglobin 

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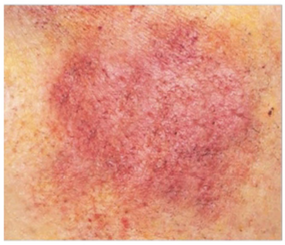
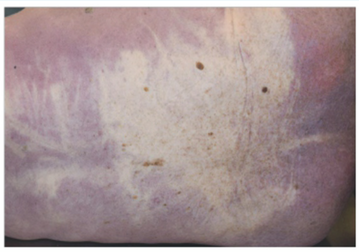
4th-5th day	**B** - Brown	Hemosiderin 
5th-6th days	**G** - Green	Biliverdin 
7-13 days	**Y** - Yellow	Bilirubin 
After 14 days	**O** - Original color	- 

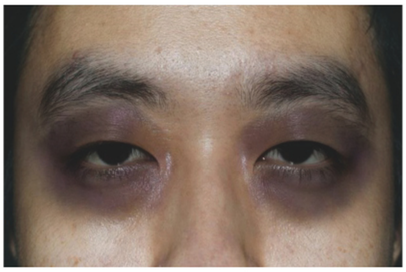
Bruise Vs Hypostasis

Feature	Bruise	Hypostasis(Postmortem staining)
Site	Any site with trauma	Dependent parts of the body
Cause	Trauma	Postmortem changes
Color change	Present	Absent, generally bluish white
Margins	Irregular	Regular
Extravasation	Present	Absent
Blanching	Absent	Present
Incision test	Not washed away (clotted blood)	Washed away
		

Special Types Of Bruises

Ectopic Bruise (migratory Bruise)

- Trauma at a different site, bruise at a different site
- Examples:
  - Raccoon Sign / Black Eye / Spectacle eye
    - → Trauma: Anterior cranial fossa fracture
    - → Bruise location: Periorbital/periocular area
  - Battle Sign
    - → Trauma: Middle cranial fossa fracture
    - → Bruise location: Mastoid tip/posterior auricular area



Racoon sign

Battle sign

Patterned Bruise

- Forms object pattern
- Examples:
  - Tramline/Railway line bruise: Caused by: Lathi/rod/stick
  - Butterfly bruise: Caused by pinching
    - → Associated with Battered Baby Syndrome
  - Coin-shaped bruise (Six penny bruise): Caused by throttling with fingertip pulp

Artificial Bruise

00:12:53

- Criminals produce bruises artificially
- By harming themselves
- Plant juices used:
  - Plumbago
  - Semicarpus anacardium (marking nut)
  - Madar/Calotropis

Diagnosis Of Artificial Bruise

- Site: Accessible parts
- Margin: Regular and well-defined
- Shape: May be irregular
- Content: Acrid serum in blisters, redness, inflammation +
- Blister with itching: Present
- Chemical test: Positive for the respective chemical in the object

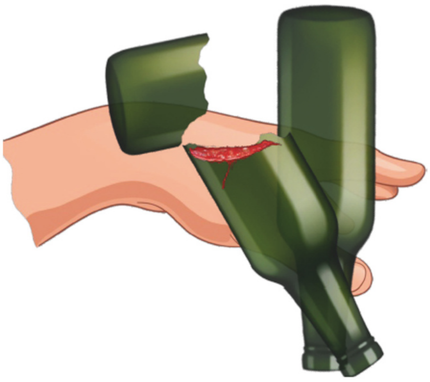
Laceration/tear

00:14:41

FMGE June 2021

NEET PG 2021

FMGE June 2022



- Trauma: Blunt trauma, may be heavy
- Damage: 3-Dimensional injury → Injury with length, width, depth
- Margins: Irregular with contusion
- Floor: Vessels, nerves & hair bulb are crushed → confirmed under magnifying lens
- Structures damaged: Epidermis + dermis + subcutaneous tissue
- Swallow Tail: Tearing at the end, angle → diverging
- Tissue bridges: Tissue and vessels connected by a bridge (one side to another)
- Bleeding: Comparatively less

Types of Laceration

Split Laceration

- Force: Perpendicular impact
- AKA: Incised looking laceration (because of regular margins)
- Seen on the hard surface of the body
    - Skin is close to the bone
    - Less subcutaneous tissue
    - Examples
        → Scalp, Forehead, Eyebrow, Chin, Zygoma, Shin (pretibial region), Iliac crest, Perineum, Posterior aspect of elbow

Avulsion (shearing/grinding Laceration)

- Mechanism: Localized pressure with rotational movement by a heavy weight
- Separation: Skin from deeper tissue
    - Example: Lorry wheel runs over limb (Run-over injuries) →crushed tissues, wide area
- Two categories:
    - Flaying
        → A large area as flap is detached
    - Degloving
        → Skin or subcutaneous tissue comes out from the limb/underlying structures
        → Like a glove

Stretch Laceration

00:19:54

- Force: Tangential force (impact-pull or push) with movement
- Mechanism: Due to the overstretching of the fixed skin
- Force characteristics: Heavy force at an acute angle
- Result: Forms flap of skin in the direction of injury (flap at the far end)
- Tearing is away from the point of impact of the force
- Associated with contusion at the point of impact
- Examples:
    - Kicking with hard boot forms flap (tearing)
    - Commonly seen in a compound fracture (bony fragment comes out)
    - Scalp hitting windscreen

Cut Laceration (chop Wound)

INI CET May 2023 00:21:10

- Cut caused by a sharp edge
- A laceration is caused by a blunt impact
- Weapon: Sharp-heavy-edged
  - Axe
  - Hatchet
  - Chopper

- Cross between incision and laceration
- Sharp and heavy edges of the weapon → tissue and skin cut → margins crushed & bruised (contusion)
- Features:
  - Crushed tissue and hair bulb were seen
  - Underlying bones fractured
  - If gaping is more → Chop wound
- Always homicidal (crushed tissue + bone fracture + sharp margin + gaping)

Tear

- MC type of laceration
- Caused by any irregularly directed hard surface impact (e.g., door handle of a car)
- Result: Tearing of skin
- Site: Can be on skin or viscera

Incised Wound (aka: Cut/slash/slice)

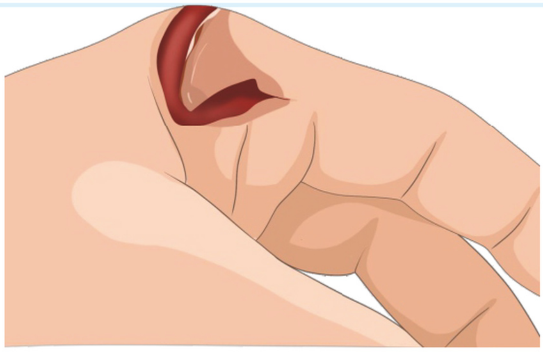
00:23:52

- Weapon: Light, sharp-edged (cutting), parallel to skin surface (Knife, Blade)
- Maximum Dimension: Length > Breadth > Depth
- Margins: Clean cut, regular by naked eye
- Structures (seen under magnifying lens - NOT crushed):
  - Vessels
  - Nerve
  - Hair bulb
- Hemorrhage/Bleeding: Profuse
- Special variant:
  - Laceration looking like an incised wound: Seen in loose skin/tissue area (Axilla, Scrotum)

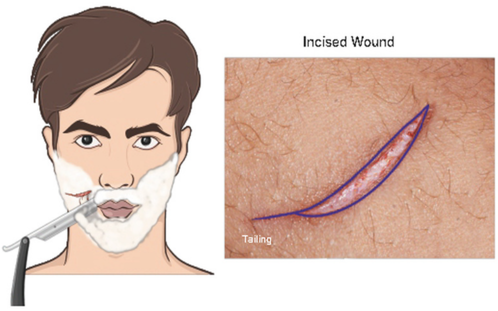
Medico-legal Importance of Incised Wound

Tailing	Beveling
• Phenomenon: Deep at the beginning, shallow (superficial) at the end • Importance: Direction of weapon	• Phenomenon: Oblique strike (angle) → undermined edges • Importance: Position of assailant and victim

Incised Wound (with Tailing)



Beveling



Manner of Death - Incised Wound

Site	Manner
Genitalia	Homicide
Forearm (wrist), Neck, Abdomen	Suicidal (multiple, superficial)

Self-inflicted/suicidal Wounds

- Site: Accessible parts (forearm/wrist, neck, abdomen)
- Nature: Suicidal
- Pattern:
  - Multiple
  - Linear in size and depth
  - Parallel lines
  - Mostly superficial wounds
  - Later deep cut
- Also known as:
  - Hesitational cuts
  - Trial cut
  - Tentative cut
  - Intentional cut

Self inflicted incised wound

Timeline	Finding
48-72 hours	Fibroblasts seen in wounds
3-5 days	Fibrils seen → Collagen fibers seen → Vessels thickened and obliterated
1-2 weeks (>7 days)	Formation of scar

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Age of Incised Wound

Stab Wound

00:28:00
FMGE Jan 2025

- Weapon: Sharp-edged, pointed (Knife, Sword)
- Direction of force: Perpendicular to the skin epidermal layer
- Maximum Dimension: Depth

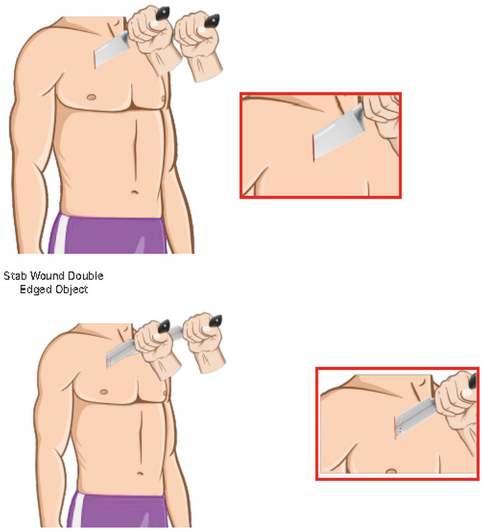
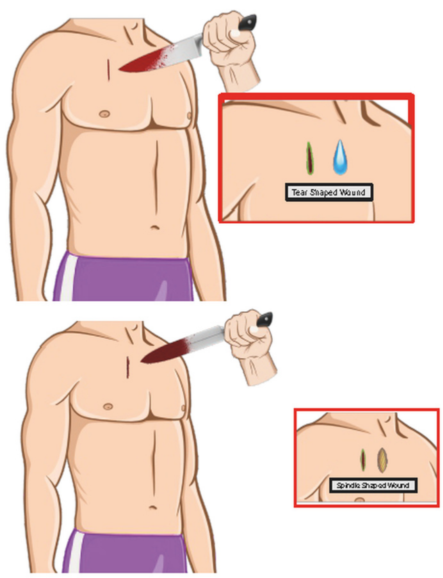
Types Of Stab Wound

- Puncture: Stab on tissue or skin
- Penetrating: Seen in thoracic or abdominal cavities
  - MC organ damaged: Liver
- Perforating: Entry & exit wounds present

Knife - Parts & Dimensions

- Parts
  - Handle
  - Hilt
  - Blade
- Dimensions
  - Length
  - Breadth
  - Thickness
- Relationship with Injury
  - Depth of injury ≈ Length of weapon
  - Length of injury < Breadth of weapon (due to skin stretching)
  - Thickness of weapon = Breadth/Width of injury

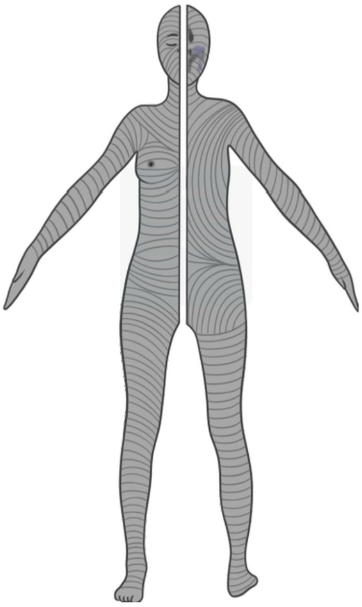
Shape - Single Vs Double-edged Weapon

Feature	Single-Edged Weapon	Double-Edged Weapon
Sharpness	One side sharp, one side blunt	Both sides sharp
Shape of injury	Triangle/wedge, Tear drop	Spindle, Oval
Special feature	Fish-tailing 	- 

- Fish-tailing in a single-edged weapon
  - Formation of the tail is due to the splitting of the skin (one edge of the wound)
  - This splitting is by a blunt edge

Hilt Injuries (patterned Injuries)

- Occurs when: A hilt is present in a weapon and completely penetrates the body
- Types:
  - Hilt abrasion
  - Hilt contusion
  - Hilt laceration



Lines Of Langer - Gaping

- Imaginary lines corresponding to collagen fibers of the body
  - Gives an idea about the gaping of the body
  - Lines of Langer give an idea about the shape and size of the injury
- Relationship with Injury
  - Stab parallel to lines → Gaping less
  - Stab perpendicular to lines → Gaping more

Special Stab Injuries

Hara-kiri / Seppuku

- Common in: Japan
- Weapon: Sword or long-handled knife
- Method: Self-inflicted/suicide
- Site: Abdomen
- Mechanism:
  - The sword hit the abdomen
  - Intra-abdominal Pressure (IAP) becomes very low
  - Evisceration (viscera comes out)
- Cause of death: Cardiac collapse
- Clinical finding: Syncope/Hypotension

CONCEALED PUNCTURE WOUNDS

- Seen in concealed parts of the body
  - Nostrils
  - Fontanelle
  - Axilla
  - Vagina
  - Rectum/ Anal canal
  - Inner canthus of the eye
  - Nape of neck

STOMPING

- Kicking and jumping on the body, leading to contusion

DEFENCE WOUNDS

00:33:00

FMGE July 2023
NEET PG 2022

- Caused during defending

Types

Active Defence Wounds	Passive Defence Wounds

• **MC site**: Palmar surface
• **Mechanism**: Grasping the weapon
• **Specific site**: Injury to the 1st webspace on the palmar surface
	• **MC sites**:
	  ○ Medial or ulnar aspect of forearm
	  ○ Extensor aspect of the forearm or wrist
	  ○ Dorsum of the hand
	• **Mechanism**: Protecting himself

Active Defense Wound 	Passive Defense Wound 

FABRICATED WOUNDS

- Types
  - Self-inflicted: Self-harm to the body
  - Self-suffered: Taking help from others to be hit/inflicted
- Features of Fabricated Wound
  - MC type: Incision
  - Motive: Present
  - Site: Accessible parts of the body
  - Discrepancy between history and injury findings
  - Clothes not involved
  - Defence wound: Absent

OVERKILLING

- **Injuries**: Massive, multiple on the body
- **Cause**: Anger, Rage
- Injuries inflicted more than required to cause death

Yourwish

PYQ

INI CET Nov 2021

Q1. Identify the injury in the image below:

a. Abrasion

b. Laceration

c. Bruise

d. Imprint

Ans. a.Abrasion

INI CET Nov 2022

Q2. Identify the pattern of abrasion shown in the image below.

a. Pressure abrasion

b. Graze abrasion

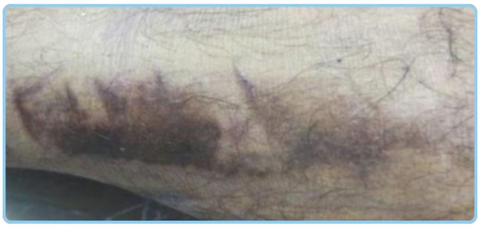
c. Ligature mark

d. Imprint abrasion

Ans. a Pressure abrasion

INI CET Nov 2022

Q3. The image provided shows a wound. What type of wound is it?



a. Contusion

b. Abrasion

c. Laceration

d. Stab wound

Ans. a.. Contusion

Q4. During the examination of the injury, hair bulbs are noted to be crushed. The probable type of wound is:

a. Abrasion

b. Laceration

c. Stab injury

d. None

Ans. b. Laceration

NEET PG 2021

Q5. Identify the lesion shown in the image below:

a. Laceration

b. Incised wound

c. Laceration-looking incised wound

d. Incised-looking laceration

Ans. d.Incised-looking laceration

Q6. During the examination of a victim of assault, you notice a wound with ragged, irregular, and uneven margins with tears diverging at an angle from the end of the main wound and typical swallowtails. Bleeding from this wound is not significant and shows crushed blood vessels and hair bulbs. You would document this wound as a/an.

FMGE June 2022

a. Incised wound

b. Chopped wound

c. Stab wound

d. Lacerated wound

Ans. **d.**Lacerated wound

Q7. Which of the following injuries is not expected in a person brought to the hospital with a history of a road traffic accident (RTA)?

a. Contusion

b. Abrasions

c. Laceration

d. Chop wound

Ans. **d.**Chop wound

Q8. A person was stabbed in his anterior thigh and died. His body was brought in for a postmortem. What type of injury is this?

a. Incised wound

b. Penetrating wound

c. Puncture wound

d. Blunt force injuryr

Ans. **c.** Puncture wound

NEET PG 2022

Q9. Identify the type of wound from the image

a. Defense wounds

b. Antemortem wound

c. Postmortem wound

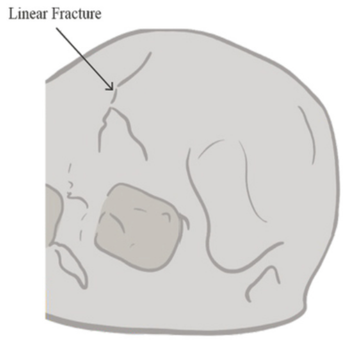
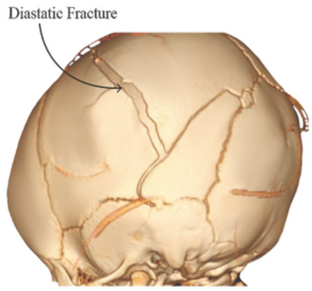
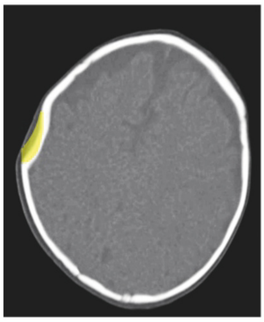
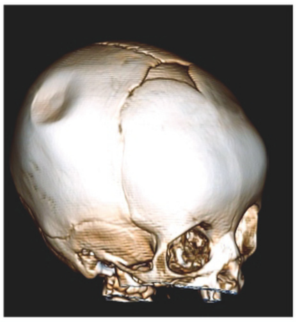
d. Hesitation cuts

Ans. **a.** Defense wounds.

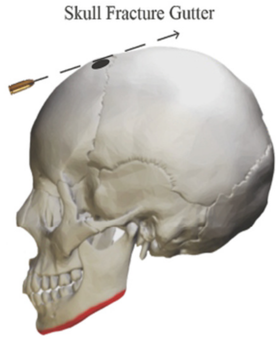
13.REGIONAL INJURIES

SKULL FRACTURE

00:00:10

Fissured/linear fracture	• MC fracture of the skull seen in autopsy 
Diastatic fracture	• Due to sutural separation. • Most commonly involves the sagittal suture. • Commonly seen in young adults. 
Depressed fracture/signature fracture/signature alae fracture	• Caused by a hammer (a heavy weapon with a small striking surface) • Both the outer and inner tables of the skull are fractured and depressed • The shape of the fracture gives an idea about the pattern of the weapon used. 
Pond fracture/pingpong ball fracture/indented fracture	• Seen in the pediatric age group (infants) because the skull bone is elastic • Both the dura and the inner table remain intact • Often caused by obstetric forceps blades 

Yourwish

Glancing bullet/gutter fracture	• Caused by a glancing bullet (an oblique bullet touching tangentially) • Fractures the outer table 
Comminuted fracture	• Caused by a heavy blunt blow • Creates multiple intersecting lines that look like a spider web fracture

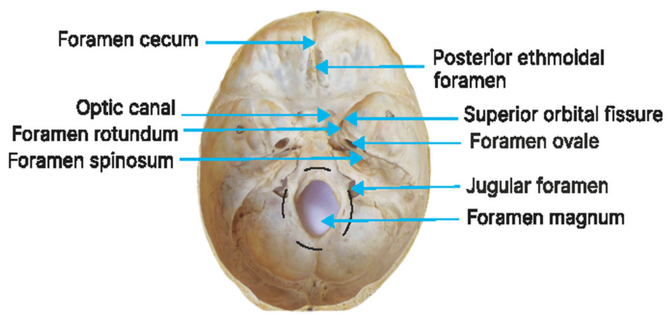
BASE OF SKULL FRACTURE

00:03:05

Ring Of Foramen Fracture

- Fracture surrounding the foramen magnum.
- Occurs due to a fall from a height (falling on feet or vertex).
- Occurs due to a blow on the chin or vertex.

Base of Skull

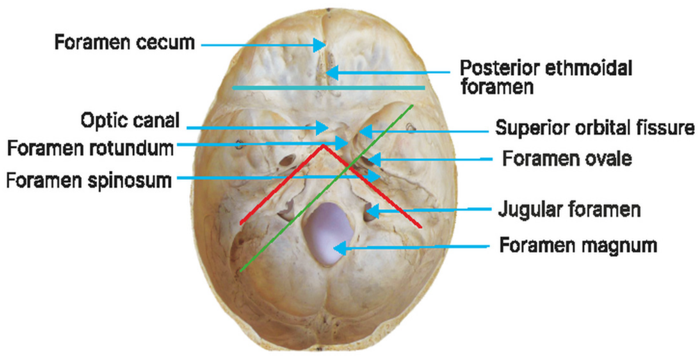


Motorcyclist Fracture / Hinge Type 1 Fracture

FMGE 2021

- Common in motorcyclists not wearing a helmet
- Caused by heavy force to the skull coming from one side to another (mostly temporal area)
- Type 1: Hinge fracture
  - The fracture line starts from the petrous ridge → sella turcica → contralateral petrous ridge
  - Displays the "nodding face" sign

Base of Skull



FACIAL AND ORBITAL FRACTURES

Battle's Sign: Posterior Auricular Ecchymosis Or Bruise

- Example of a Migratory bruise or ectopic bruise
- Middle cranial fossa fracture
- Mastoid area is involved

Blowout Fracture

- Caused by blunt trauma
- Fracture of the orbital wall
- Can be the medial, posterior, or floor of the orbital wall

COUP V/S COUNTER COUP INJURY

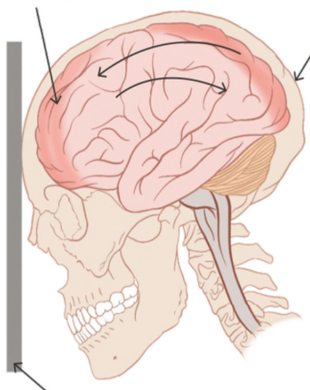
00:06:01

Coups	Countrecoup
Seen in the side of the impact	Seen in the opposite side of impact
Common organs involved are the Brain, Heart, lungs	
Common in Mobile-head	

Theories For Coup And Countercoup Injuries

- **Rotation**
  - Maximum shearing strain on the opposite side → hematoma or injury

- **Pressure gradient**
  - Mobile head → pressure gradient produces vacuum on the opposite side stretching of vessels → injury
- **Skull deformation/struck hoop theory (most accepted)**
  - Compression at the site of impact → bulging on the opposite side (a compensatory mechanism) → counter coop injury



Coup Vs Countercoup Injury

- The most common surface where countercoup injury is seen is: Frontal Lobe(Rough surface)
  - Coup injury in the occipital region → contrecoup injury in the frontal region
  - Coup injury in the frontal region → contrecoup injury not seen in the occipital region
  - Coup injury in the temporal region → contrecoup injury in the contralateral/ipsilateral temporal region but the contralateral surface
  - In mild/no coup injury → there can be severe contrecoup injury

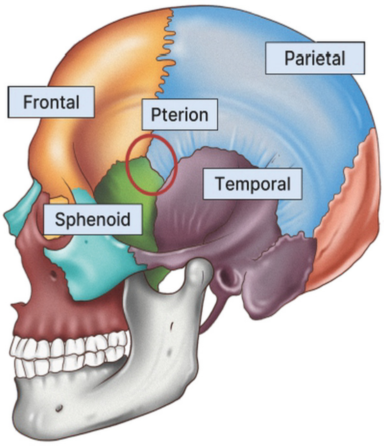
Yourwish

INTRACRANIAL HEMORRHAGES

00:09:44

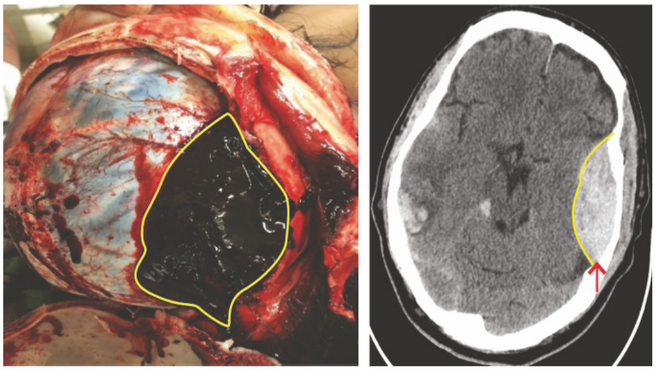
- 4 Types: There are 3 meninges (Dura, Arachnoid, Pia)
  - Epidural: Between skull and dura.
  - Subdural: Between dura and arachnoid.
  - Subarachnoid: Between arachnoid and pia.
  - Intracerebral / Intraparenchymal: Within the brain tissue

Space	Name	Blood vessel causing hemorrhages
Between skull vault and dura mater	Epidural space-EDH	Middle meningeal artery
Between arachnoid and dura mater	Subdural space -SDH	Bridging veins(drain into dural venous sinus and subarachnoid space)rupture
Between arachnoid and pia mater	Subarachnoid -SAH-CSF	Artery of circle of willis
Brain tissue	Intra-cerebral / Intraparenchymal	Middle cerebral artery



- Pterion: Junction point of the frontal, parietal, sphenoid, and temporal bones

Epidural Hemorrhage (Edh) / Extradural Hemorrhage



- NCCT: Hyperdense, biconvex, or lenticular-shaped area.
- Occurs due to Rupture of the Middle Meningeal Artery.
- Exclusively caused by Trauma
- Site: Pterion
- Mainly Coup Injury
- Death- Minimum amount is 100 ml → cause compression of the brain and respiratory failure →death.
- Lucid interval: EDH>SDH

Lucid Interval

- Phase of consciousness between two phases of unconsciousness.
- Person commits a crime during a lucid interval → responsible for the crime
- A person can act as a witness or write down a will in lucid intervals
- Because of no proper examination done by a doctor, a CT scan is not advised to rule out EDH and if a patient dies then this doctor can be charged with Medical Negligence.
  - Punishable under BNS 106 (2 years imprisonment and fine)

Treatment

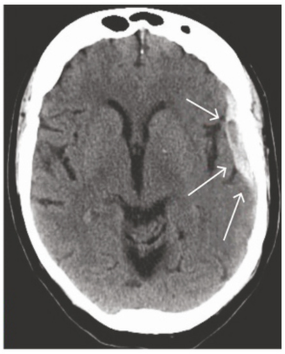
- Aspiration
- Burr and Hole
- Craniotomy

Heat Hematoma (Burn Hematoma)

- Must be differentiated from EDH.
- Caused by severe burns.
- Bilateral, chocolate brown in color, honeycomb appearance.
- Pathology: Caused by contraction of the dura mater and rupture of the dural venous sinuses

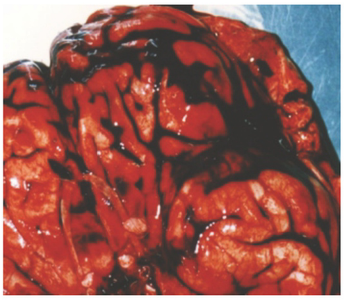
Subdural Hemorrhage

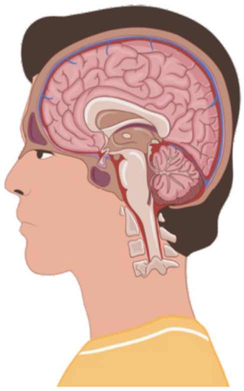
- SDH is concavo-convex in shape (Sickle-shaped).
- Concave on the brain side.
- Rupture of the Bridging veins.
- Most commonly caused by Trauma.
  - Even minor Trauma can lead to SDH
  - 100-150 ml of blood is Fatal.
- Causes:
  - Non-Traumatic Reason: Alcohol intake
  - Boxing
- Common in Children (crosses suture) and elderly people
- Seen in Shaken Baby Syndrome, Part of Battered Baby Syndrome.
- NCCT
  - Acute: 0 to 3 days. Can be hyperdense.
  - Sub-Acute: 3 days to 3 weeks - can be iso-dense.
  - Chronic: More than 3 weeks - can be hypodense



- Sub-dural Hygroma: When CSF goes from Subarachnoid to Subdural Space.
- EDH: Convex on the brain side and Limited by suture Lines
- SDH: Concave on the brain side and not limited by Suture Lines.
  - Most common symptoms are mental confusion, drowsiness, dilation of the pupil (ipsilateral), and contralateral involvement of Hemiparesis.
  - Rx: Decompression

Subarachnoid Hemorrhage

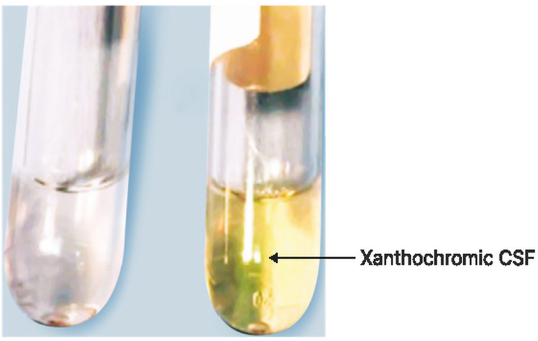




- Most traumatic intracranial hemorrhage
- Cause
  - Trauma:
    - → Most common cause
    - → Artery ruptured is the Anterior Communicating Artery (Circle of willis)
  - Non-trauma → Berry(saccular) Aneurysm
- Most Common Symptom: Thunderclap Headache(worst, excruciating)
- Other Symptoms are
  - Nausea
  - Vomiting
  - Sudden Loss of Consciousness
  - Photophobia
  - Seizures

Diagnosis

- NCCT: Blood is present in the subarachnoid space.
- Lumbar puncture can show blood in CSF → Xanthochromia (seen in 4-6 hours, yellow in color d/t bilirubin)



Treatment

- Endovascular Coiling/Clipping

Sah V/S Sdh

- Water Test is done to differentiate between SAH v/s SDH.
- Water is poured
  - Blood is washed off → SDH
  - Blood is not washed off → SAH

Yourwish

Yourwish

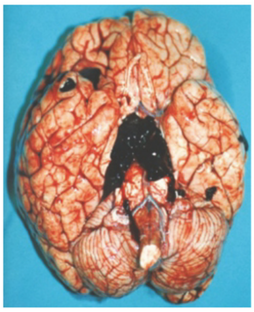
Important Information

Punch Drunk Syndrome/Dementia- Pugilistica/Chronic Traumatic Encephalopathy

- Common in boxing injuries. (Repeated trauma at same site)
- It becomes chronic SDH
- Symptoms
  - Short-term memory loss is noticed
  - Disorientation to time, place, and person
  - Depression and mood change can be seen
  - Parkinson's symptoms: Tremors, and stiffening of muscles can be seen.
- On autopsy: Cerebral atrophy and neurofibrillary tangles can be seen

Ich(Intra-Cerebral/Intra- Parenchymal Hemorrhage)

00:20:18



- Occurs due to rupture of the Middle Cerebral Artery.
- Most Common non-Traumatic Hemorrhage.
- Most common cause: Increased Blood Pressure (Hypertension)
- Most common site: Putamen
- Diffuse Axonal Injury (DAI)
  - Axonal bulb/retraction bulb. (visible after 12 hours)- "transected axon".
- Duret hemorrhage→ Hemorrhage of midbrain and pons
- Kernohan's Notch (indentation) → result of raised intracranial pressure

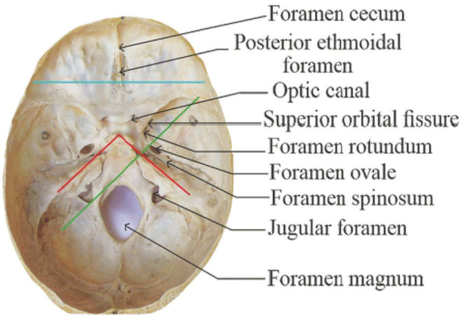
SHAKEN BABY SYNDROME

- Also called Infantile Whiplash Syndrome
- Repeated Shaking → Injury due to Forced Hyperextension of Neck
- Common injury
  - Dot-Blot Hemorrhage: Intraocular Bleed
  - Subdural Hemorrhage
  - Encephalopathy

ROAD TRAFFIC ACCIDENT

00:23:28

Motorcyclist Injuries



- Hinge type-1 fracture
  - Petroud ridge →sella tursica—>petrous ridge
- Tailgating A/K/A running
  - Running into TRUCK/LORRY
  - Most common injury: Head injury / Decapitation

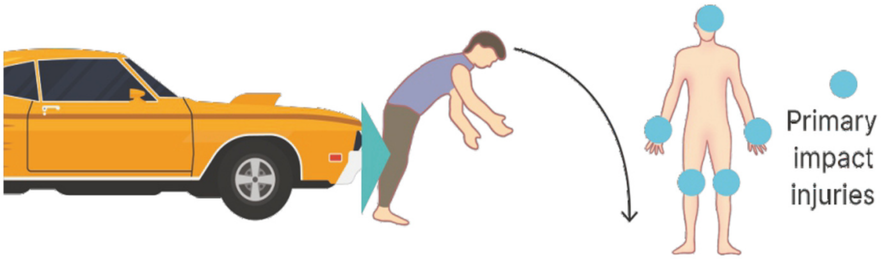
Pedestrian Injuries

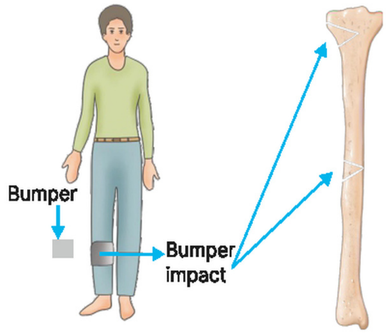
- Primary impact injuries
  - First contact→ Leg is injured
- Secondary impact injuries
  - Second impact from same vehicle
- Tertiary impact injuries A/K/A secondary injuries
  - Impact by object other than same vehicle

Primary Impact Injuries

INI CET May 2023, Nov 2022
FMGE June 2024

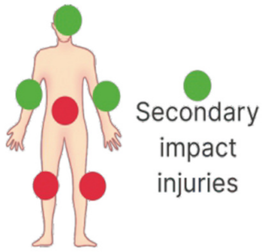
- Bumper injuries to the leg
- Injuries on body
  - Abrasion
  - Contusion
  - Laceration
- Bumper fracture: Tibia plateau fracture, Fibula fracture, Femur fracture
  - Wedge shaped
  - Adult → tibia
  - Child→femur





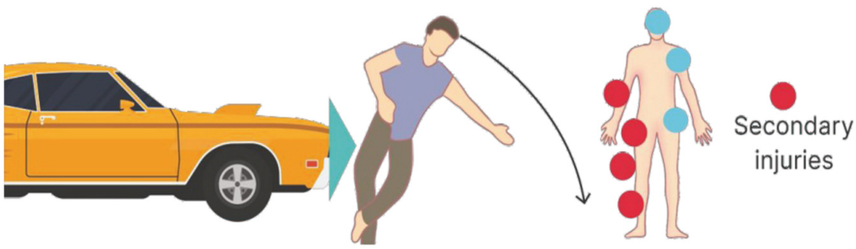
Secondary Impact Injuries

- Caused by Bonnet, Windshield
- MC type
  - Head
  - Cervical
  - Skeletal injury



Tertiary Impact Injuries/Secondary

- The victim hits the ground or other objects.
- Most commonly causes head injuries and skeletal fractures.
- Results in multiple grazed abrasions, lacerations, and tire marks if run over.



Rollover Injuries

INI CET May 2025

- Caused by Low Chassis Vehicle (Car)
- Victim is rolled on the ground by vehicle
- Grazed abrasions
- Skeletal fractures
- Chassis cause pattern abrasions
- Hot exhaust cause burning
- Grease stains

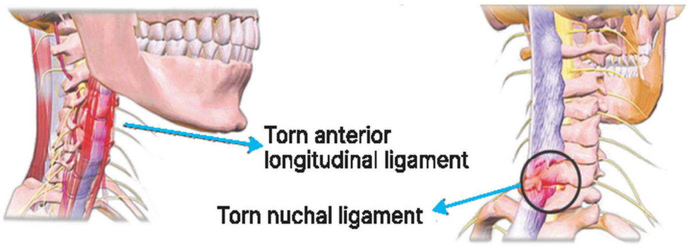
Run Over Injuries

- Caused by High Chassis Vehicle (Truck/Lorry)
- Vehicle run over the victim
- Tyre mark seen
- Patterned abrasions/bruises seen
- Grazed abrasions
- Avulsion (flaying) and crushing injuries due to heavy weight of the vehicle
- Burning ,blackening,grease stains due to hot exhaust

Car Occupants Injuries

Car Driver Injuries

- Windshield injury (broken)
  - Sparrow foot marks by shattered glass on face
    → Type: Multiple superficial punctate lacerations
  - Dicing injury: Glass → Face
- Neck injuries
  - Cervical fracture
  - Whiplash injury
    → Soft tissue injuries without fracture
    → E.g., muscle and ligament
    → It is d/t Violent neck movement
    → Type-acceleration: hyperextension → hyperflexion
    → Deceleration-sudden stop →hyperflexion →hyperextension
    → More common & dangerous hyperextension
    → Injuries: Contusion of soft tissue,cervical spine
    → Level of C5 -C6 fracture



- Steering Wheel Injuries (DRIVER)
  - Sites: Elbow, Forearm, Hand, Sternum fracture, Ribs fracture
  - Patterned bruises: chest
  - Organs: Lungs, Heart, Aorta

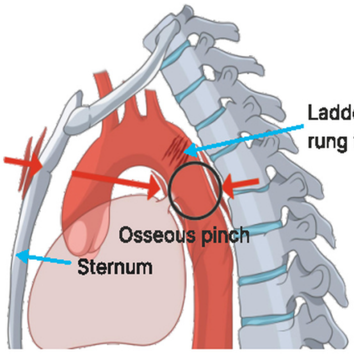
Direct Impact

- Torsion force → Aorta
- Aorta compressed between sternum and thoracic vertebrae→ osseous punch
- Ladder rung tear: isthmus → rupture →transverse tear in intima

Yourwish

Deceleration Injury

- Shearing and stretching force tears the aorta.



Seat Belt Injuries

FMGE Jan 2024

- Seat belt syndrome
- Seat belt sign is a patterned bruise
- Intra abdominal injuries due to deceleration and compression
  - MC mesentery > hollow viscous organs like the small intestine (duodenojejunal flexure or ileocecal junction).
- Lumbar vertebrae fracture present: Chance fracture / Fulcrum Fracture

Injuries To Front Seat Passenger

- Windshield injury present
- Whiplash injury → NECK
- Seat belt injury+ (Patterned bruise → Left shoulder)
- No steering injury signs present
- Dashboard injury (3P)
  - Patella fracture, Femur fracture
  - Posterior cruciate ligament injury
  - Posterior dislocation of Hip → Sciatic nerve

ERROR FILES

00:35:12

Pedestrian Injuries

- Primary impact injuries: first contact is leg
- Secondary impact injuries: same vehicle- 2nd impact
- Tertiary impact injuries / Secondary injury: Impact by object other than same vehicle

Edh Vs Heat Hematoma (Bbbe)

Feature	EDH (Extradural Hematoma)	Heat Hematoma (BBBE)
Cause	Trauma	Heat / burn
Laterality	Always unilateral	Can be bilateral
Color	Reddish	Chocolate brown
Source	Middle meningeal artery rupture	Rupture of dural venous sinuses due to dural contraction
Appearance	–	Honeycomb appearance

Yourwish

PYQ

00:36:10

Q. In a seat belt injury, which of the following organs is most commonly affected?

FMGE Jan 2024

a. Liver
b. Spleen
c. Pancreas
d. Hollow viscus

Ans: **d. Hollow viscus**

Q. Identify the type of fracture in a patient who sustained a road traffic accident resulting in fractures of both the tibia and fibula.

FMGE June 2024

a. Bumper Fracture
b. Patella sleeve fracture
c. Depressed skull fracture
d. Cervical fracture

Ans: **a. Bumper Fracture**

Q. Name the type of skull fracture?

a. Depressed fracture
b. Hinge fracture
c. Pond fracture
d. Ring fracture

Ans: **b. Hinge fracture**

Q. What type of fracture is caused by a hammer?
a. Linear
b. Depressed
c. Hinge
d. Ring

Ans: **b. Depressed**

Q. A 42-year-old patient, a case of a Road Traffic accident presented with EDH due to involvement of the Middle Meningeal Artery. Where will the impact of collision be?
a. Pterion
b. Angle of Mandible
c. Lambdoid Suture
d. Nasion

Ans: **a. Pterion**

Q. Most common Non-traumatic Intra cranial Hemorrhage is:

a. EDH

b. SAH

c. SDH

d. ICH

Ans: **d. ICH**

Q. Xanthochromia is seen in:

a. EDH

b. SAH

c. SDH

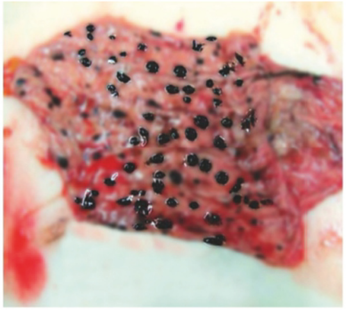
d. ICH

Ans: **b.SAH**

14. THERMAL INJURIES

HYPOTHERMIA

INI CET NOV 2021, NEET PG 2021 00:00:06

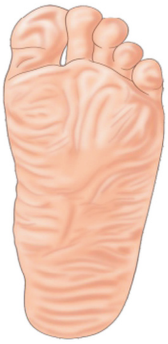


- Temperature <35°C
- Common in old, alcoholic, and ill
- Features
- Clouding of consciousness
- Disorientation
- Reflexes lost
- RR, HR, and BP decreased
- Skin: Pallor, white death
- Postmortem lividity: Bright pink
- Stomach mucosa: Black, necrosed, with a Wischnewski spot

3 Phenomenon

1. SKIN: Erythema pernio and CHILBLAINS
2. Paradoxical undressing:
    - Looks like homicide after sexual assault
    - Core blood shifts to the peripheral B.V (relaxed), thus feeling warm
    - T.R.C: Stopped
3. Hide and die phenomenon: Disoriented
    - Looks like homicide after robbery
    - Table, almirah, wardrobe

Localized Effect

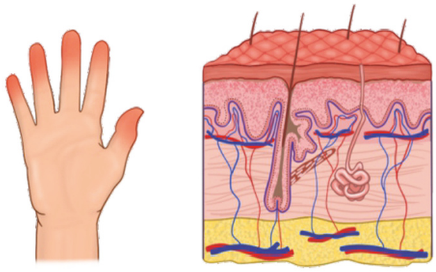
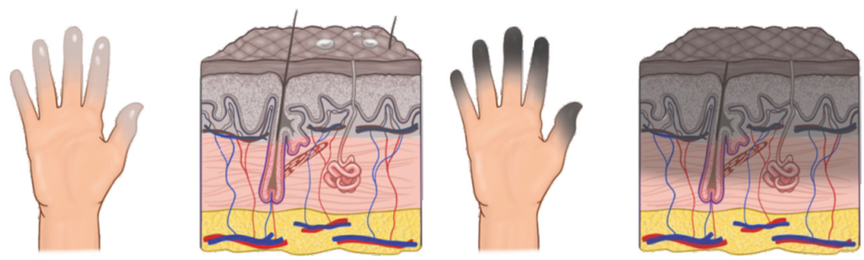


Moist Cold

- Trench foot, AKA immersion foot
- Seen in sailors, soldiers, and trenches
- Temperature: 5-8°C
- Mechanism: Vasoconstriction causing red, cyanosed, necrotic, gangrene

Dry Cold

FROST NIP	FROST BITE
• Non-permanent	• Permanent damage at 2.5°C
• Non-freezing	• Freezing
• Numbness	• Superficial: numbness, burning, itching, blister • Deep: blister (hem fluid), necrosis, gangrene

• Red/purple/pale skin 	• Ice crystal: hard/waxy/color skin 
• Tingling and Itching	• Ischemia and gangrene, hard and black in 2 weeks
• Mechanism: Vasoconstriction	• MC areas: nose, ear, face 
• Management: Rewarming	• Management: Rewarming, protection, antibiotics, and TT

HEAT INJURIES

00:04:48

INICET NOV 2024

HEAT CRAMP	HEAT EXHAUSTION	HEAT STROKE
• AKA Miner's cramp, Fireman's cramp • Mechanism: Increased sweating, loss of water, loss of electrolytes • Tx: fluid and electrolyte	• AKA Heat syncope/prostration • Mechanism: Increased sweating causes decreased venous return, Cerebral hypoperfusion, and vascular collapse	• AKA Sunstroke/thermic fever and heat-hyperpyrexia • Causes: Sunlight, humidity, infarction, muscle activity, and temperature >40.5°C/ 104°F, causing no sweating

	Heat exhaustion	Heat stroke—MC
CBT	Normal	Increased
Pupil	Dilated	Constriction
Skin	Cold and moist	Dry and hot
Sweating	Present	Anhidrosis
Management	IV fluid	Remove clothes, ice, fluid, AC/fan.
PM finding		Edema and reduction of Purkinje fibers, cerebellum

Yourwish

LOCAL HEAT INJURY

00:07:44

- Minimum temperature: 44°C for 5-6 hours

Dry heat (FLAME)	Moist heat (SCALD)
• Singeing of hair • Blackening + • Blisters ± • Circumference • Red line + • At or above contact 	• Liquid/steam above 60°C; for full thickness it's >70°C • Splashing, sodden, and bleached of skin • Lines of redness present with vesicles • Charring, singeing, and ulceration are absent • Scalding can occur through clothes • Clothes worsen the damage • Below the contact 

CORROSIVE/CHEMICAL

00:09:57

- Ulcerated patches that are free from blister
- Splashing +
- Hairs are not singed
- Red line of demarcation- Absent
- Show distinct coloration
- Below the contact

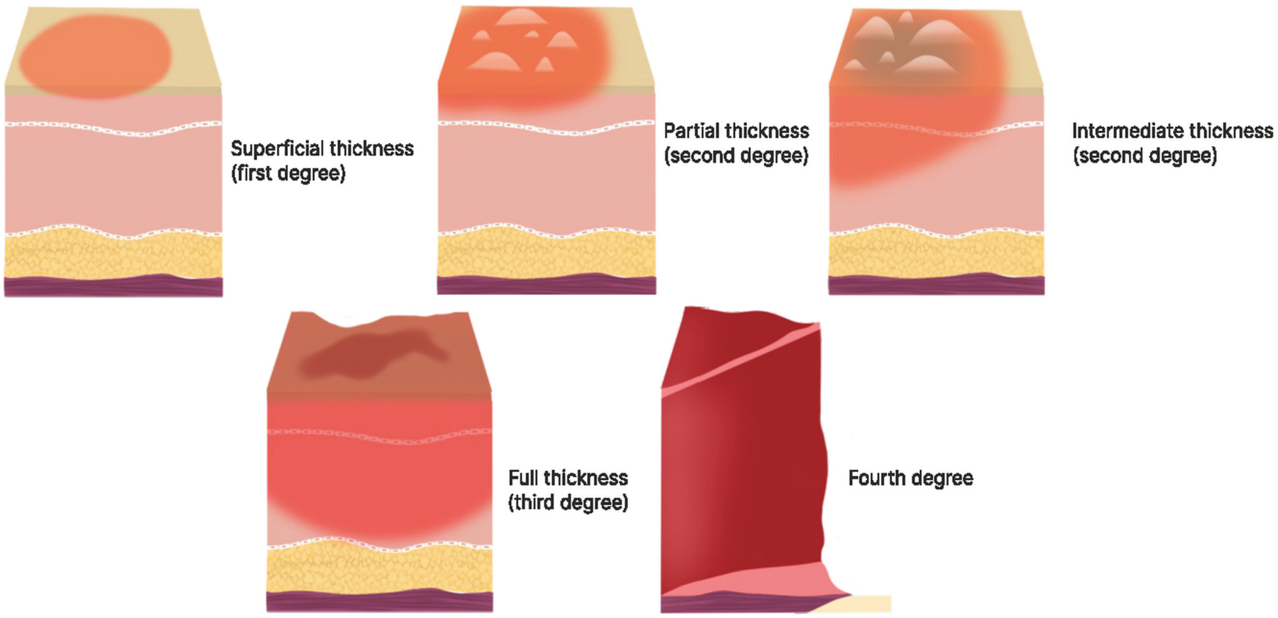
Classification

- Dupuytren's: 1°-6°C
- Wilson:
  - 1°: Epidermal
  - 2°: Dermo-epidermal, most painful (nerve exposed)
  - 3°: Deep, painless, and nerve ending lost
  - 4°: Charring of tissue (complete)

WILSON CLASSIFICATION			
	Epidermal	Dermo-epidermal	Deep (E+D+SCT)
Erythema	+	+	White, yellow
Pain	+	+	Painless
Healing	1 week: spontaneous	2-3 weeks (scar)	Heals to eschar (contracted skin)
Scar	-	+	Black, eschar
Blister	-	+	-

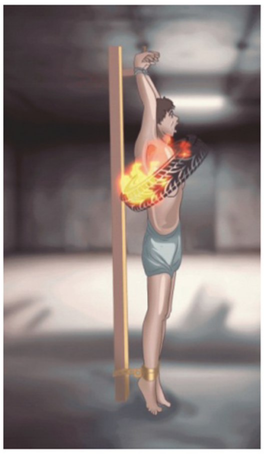
Yourwish

Classification of Burns



Necklacing

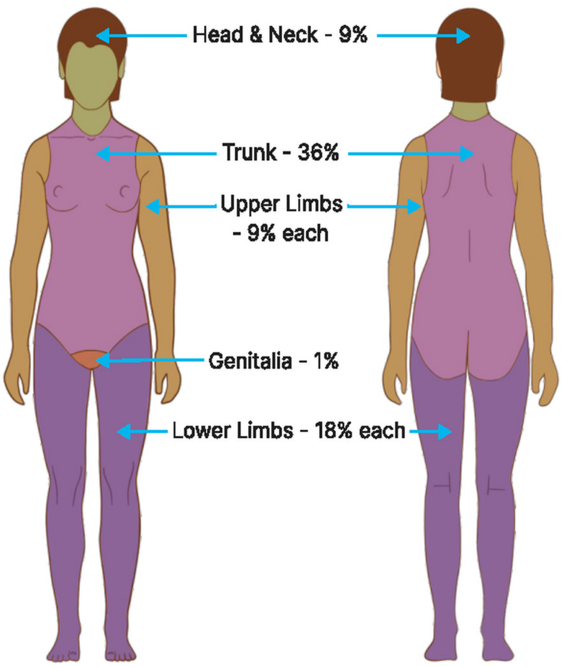
- Homicidal burn in South Africa
- A tyre is burnt



RULE OF 9/WALLACE

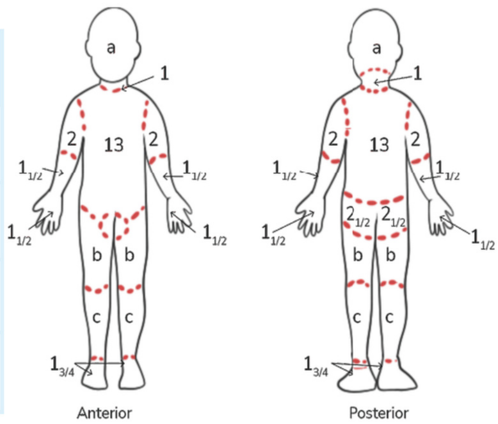
FMGE JAN 2024, JUNE 2025 00:12:40

- Head and neck: 9% (Head + neck: 7% + 2%)
- Upper limb: 9% + 9%
  - Arm + forearm + hand: 4% + 3% + 2%
- Chest
  - Anterior: 9%
  - Posterior: 9%
- Abdomen
  - Anterior: 9%
  - Posterior: 9%
- Right lower limb
  - Anterior: 9%
  - Posterior: 9%
- Left lower limb
  - Anterior: 9%
  - Posterior: 9%
- Lower limb
  - Thigh 10% + leg 5% + foot 3% for each lower limb



LUND AND BROWSER'S CHART: CHILDREN

AGE					
Body part	0 yr	1 yr	5-9 yr	10-14 yr	15 yr onwards
a = $\frac{1}{2}$ of head	9 $\frac{1}{2}$	8 $\frac{1}{2}$	6 $\frac{1}{2}$	5 $\frac{1}{2}$	4 $\frac{1}{2}$
b = $\frac{1}{2}$ of 1 thigh	2 $\frac{3}{4}$	3 $\frac{1}{4}$	4	4 $\frac{1}{4}$	4 $\frac{1}{2}$
c = $\frac{1}{2}$ of 1 lower leg	2 $\frac{1}{2}$	2 $\frac{1}{2}$	2 $\frac{3}{4}$	3	3 $\frac{1}{4}$



Infant
- Head and neck: 18%
- Each lower limb: 13.5%

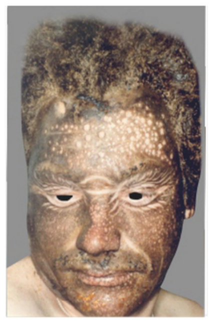
Rule Of Palm
- Palm: 1% BSA, patchy

Parkland Formulae
- Crystalloid, Ringer's lactate
- 4 ml x kg x % TBSA
- Half: 8 hours
- Remaining half: next 16 hours

CAUSE OF DEATH

00:15:43

- Immediate: Asphyxia, carbon monoxide poisoning, neurogenic shock
- Early (48 hours to 3-4 days): Hypovolemic shock, acute renal failure
- Late (4-5 days): Septic shock
- Overall: Septic shock
- MC bacteria: Pseudomonas
- PM finding
  - Smell of kerosene and petrol
  - Rigor mortis, livor, and algor mortis are not assessed
  - Crowfeet sign: sparing of skin near the eyes (as it is closed) → Antemortem burn sign

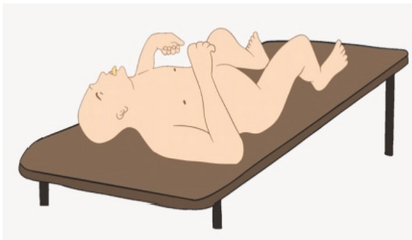


	Antemortem (before death)	Post-mortem (after death)
Line of redness	Present	Absent
Base	Erythemic	Pale
Vital R	Present	Absent
Enzymatic reaction	Present • Positive in the periphery • Negative in the center	Absent

Blister	Albumin + Cl^- present	Air + thin bluid present
CO - Hb (>10mg%)	Increased	Normal
Carbon shoot particle	Trachea: most characteristic	Absent
CN^-	Increased	Absent
Curling ulcer	1^{st} part of the duodenum	Absent

Non-specific Finding: Am/pm - Heat

Pugilistic Attitude, Aka Boxing/fencing/defence/heat Stiffening

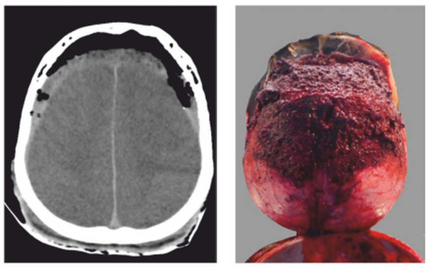


- Contraction of muscles
- Temperature >65°C
- Mechanism: Coagulation of muscle protein
- Mistaken for rigor mortis

Heat Rupture

- Mechanism: Dehydration and coagulation of the skin, causing splitting of the skin
- Skin and underlying muscles ruptured
- Area: Skin, joint, fleshy
- Blood vessels and nerves are intact, and bleeding, bruising, and vital reactions are absent
- If margins are irregular, they are mistaken for laceration
- If margins are regular, mistaken for incision

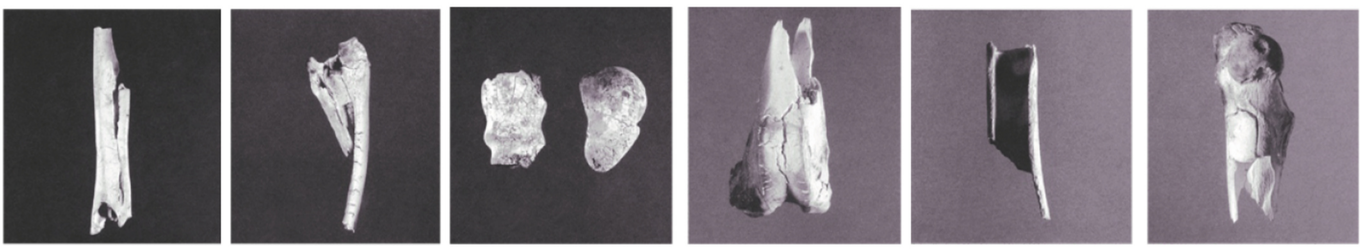
Heat Hematoma



- Above dura-epidural
- Mechanism: Dural venous sinus rupture
- Brain: Chocolate brown, bilateral, burn, honeycomb
- Mistaken as EDH by trauma, d/t rupture of the middle meningeal artery

Heat Fracture, Aka Thermal Fracture

- Mechanism: Drying and dehydration of the bones
- Skull: Can cross suture line, does not involve suture line
- Long bones: Street and avenue #
- Mistaken for traumatic #



Puppet Organs

- Mechanism: Shrunken, firm, and fixed
- D/t dehydration

ELECTROCUTION

00:24:15

INICET NOV 2025

- Accidental, homicidal, and judicial (in the USA)
- **AC is more dangerous (4-5 times) than DC**
- **AC causes** Tetanoid contraction
- More important
  - Fatality proportional to voltage
  - Fatality proportional to amplitude
- Grasps the wire- Hold-on spasm (10-20 mA)

Cause of Death

- MCC: Ventricular fibrillation (cardiac)
- The brainstem is causing respiratory failure
- The diaphragm is going to spasm, causing respiratory failure
- Resistant tissue: Dry skin > bone > moist skin
- Dangerous circuit: Right-hand entry to left-foot exit

Pm Finding

- Rigor mortis early
- Local hemorrhages and tears in muscles
- Pit-like defects in hair, superficial arcing
- Molten metal: Current pearl, deep in the soft tissue/S.C.T
- Molten calcium phosphate from bone, called "bone pearls" or "wax drippings," is detected in radiological investigations
- Rhabdomyolysis causing myoglobinuria

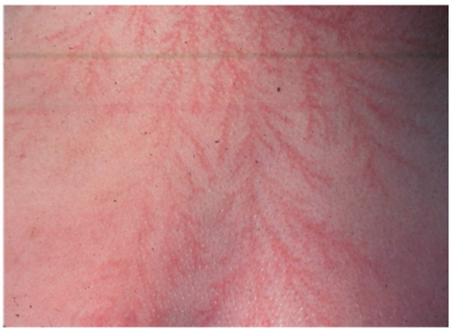
Electric Mark

Low voltage and firm contact (heat generated)	Loose contact with high voltage
• Joule burn, which causes endogenous burn • Shape: oval, round, crater • Central depressed blister • Periphery: raised margins (pale-blanching) • Coagulation of dermis • Elongation of epidermal cells  	• ARC dancing causing multiple punched-out, pitted, circular burns: crocodile burns • Loose contact with air gap: exogenous flash/spark 

Yourwish

LIGHTENING

00:28:35


- DC high voltage
- Accidental electric discharge from clouds
- Mostly affects the shoulder, flanks
- Kiran: keraunographic marking
- Filigree burn
- Arborescent marking (branches of lead)
- Lichtenberg markings
- Mechanism: Denaturation of RBC, causing Hb stain
- Seen up to 24 hours
- Difference from marbling: pink, erythematous, superficial, does not follow the blood vessel wall pattern

Theory of Lightning By Spencer

- Direct effect due to direct hitting the person with high voltage
- Side strike- Object-victim
- Superheated air: Burning
- Expanded and compressed air
- Sledgehammer effect: Air compressed in front of lightning
- Other injuries/effects
  - Flame- Burn effect
  - Blunt trauma/head injury

	Antemortem	PM-burn
Vital R	Periphery positive and central negative	Absent
Enzymatic R		

MCQs

00:32:42

Q. Paradoxical undressing is seen in:

INI CET NOV 2021

a. Heat stress
b. Voyeurism
c. Hypothermia
d. LSD overdose

Ans. c. Hypothermia

Q. Which among the following is not seen in heat exhaustion?

INICET NOV 2024

a. Loss of thermoregulatory mechanism
b. Altered sensorium
c. Orthostatic hypotension
d. Core body temperature below 105 f

Ans. a. Loss of thermoregulatory mechanism

Q. The characteristic "crocodile burns" pattern seen in the image is most commonly associated with

a. Electrical injury (high voltage)
b. Mummification
c. Adipocere formation
d. Coagulation burns

Ans. a. Electrical injury (high voltage)

Q. A person comes to the OPD with a burn injury to the right thigh. On examination, a soddened injury is seen along with erythema, blisters, and a line of demarcation that extends down the limb. What is the most likely cause of the injury?
a. Electric burn
b. Chemical burn
c. Dry heat
d. Moist heat

Ans.: d. Moist heat

Q. Which of the following is true about crocodile burn?
a. Loose contact with low-voltage current
b. Firm contact with low-voltage current
c. Loose contact with high-voltage current
d. Firm contact with high-voltage current

Ans. c. Loose contact with high-voltage current

Q. The heat hematoma in the extradural space is due to rupture of:
a. Middle meningeal artery
b. Venous sinuses
c. Extradural capillaries
d. All of the above

Ans. b. Venous sinuses

Q. Which of the following is not true about filigree burns?
a. They are superficial
b. They are not associated with burning
c. The tortuous markings correspond to the vascular channels
d. Only seen in lightning

Ans. c. The tortuous markings correspond to the vascular channels

Q. Which of the following is true about the cause of the given finding?
a. Lightning strike
b. Electrocution
c. Marbling
d. Trickling down of acid

Ans. a. Lightning strike

15. FORENSIC BALLISTICS

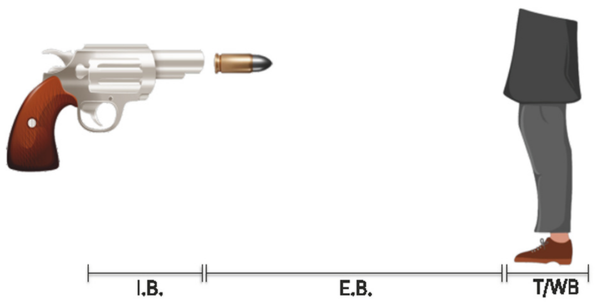
BALLISTICS

00:00:06

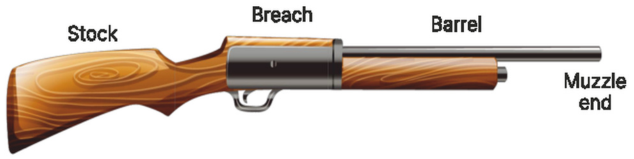
Types of Ballistics

INICET 2024

Type	Description
Proximal (Internal)	Study of projectile inside the firearm barrel
Intermediate (Exterior)	Study of projectile from muzzle to the target
Terminal	Penetrate their target
Wound ballistics	Penetration in living tissue



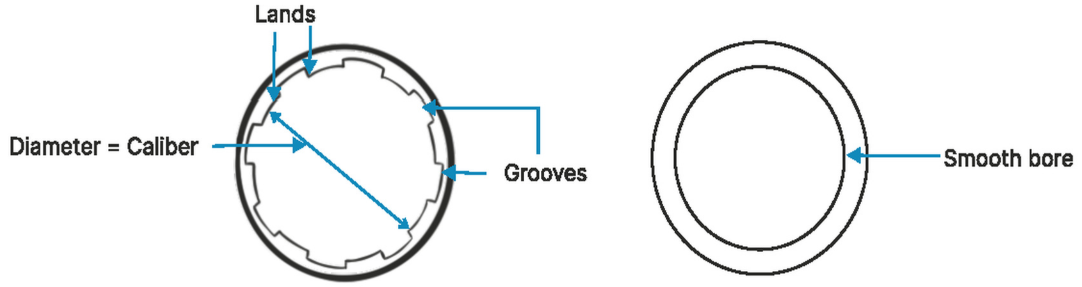
Parts of A Firearm



Classification of Firearms

FMGE 2024

Rifled weapons	Smoothbore weapons
• Barrel contains lands and grooves • Bullet fired one at a time • Higher range and accuracy	• Barrel interior smooth • Fires multiple pellets • Shorter range

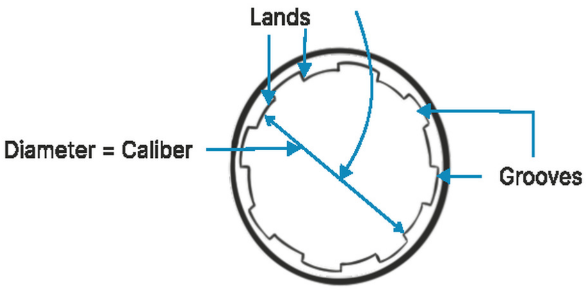


Advantages of Rifling (Land/ Groove)

- Provides spin and rotation to bullet
- Increases accuracy & range
- Reduces wobbling
- Provides gyroscopic stability
- Enhances wound power

<table>
<tr><th>Caliber/gauge</th><th>Bore/gauge</th></tr>
<tr><td>

- Rifled weapon
- Distance between two opposite lands inside the barrel



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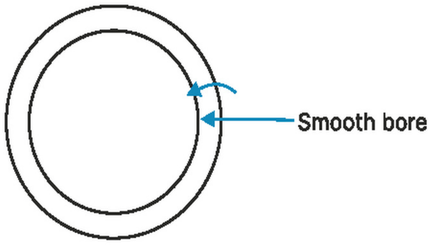
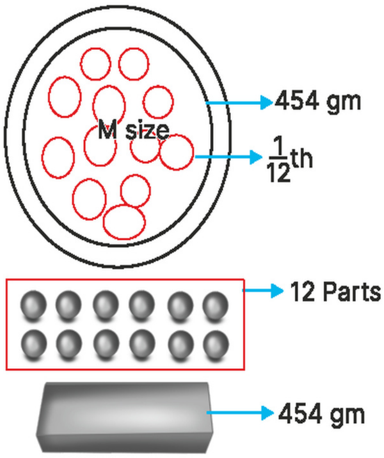
- Used for smoothbore weapons
- Number of balls / pellet of equal size /weight that can be made from 1 pound (454 g) of lead



- Higher bore number → smaller pellet size
  - 24 bore: 454 g lead divided into 24 pellets
  - 36B → 1/36
  - 18B → 1/18



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</table>

Helixometer

- Instrument used to examine inside of firearm barrel
- Main components: Prism, Lens, Electric light

Shotgun Modifications

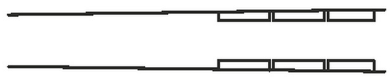
- Shotgun = **smoothbore weapon**
- Range can be increased by two modifications.
  - Paradox Gun
  - Choking

Yourwish

Paradox Gun

NEET PG 2022

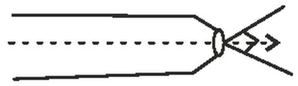
- Muzzle end is rifled
- Produces spin and rotation
- Increases range and accuracy



Paradox Gun

Choking

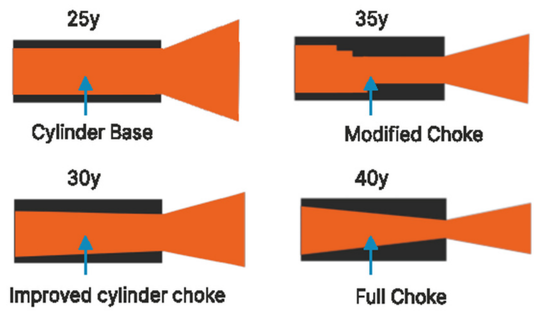
- Muzzle end is constricted to
  - Reduces the rate of spread of shot
  - Increase velocity of the pellet



Choking

Types of Choking

- Cylinder base
  - Range ≈ 25 yards
- Improved cylinder
  - Range ≈ 30 yards
- Modified choke
  - Range ≈ 35 yards
- Full choke
  - Range ≈ 40 yards

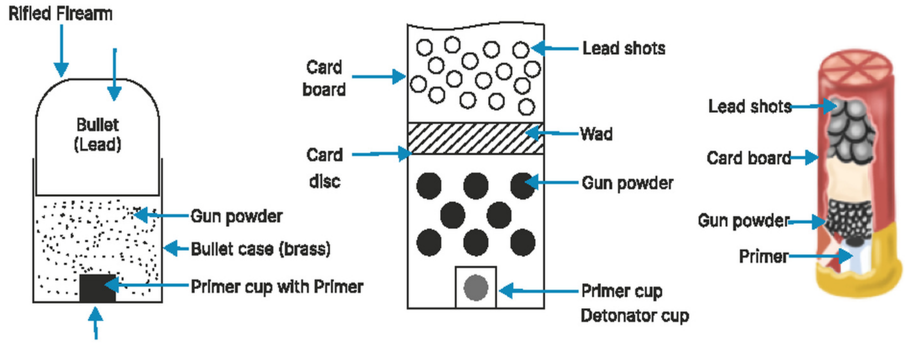


Range of Firearms

- Shotgun range ≈ 50 yards
- Revolver ≈ 200 yards
- Pistol ≈ 400 yards
- Military rifle ≈ 1000-3000 yards
- Air rifle:
  - Mechanism: Air compression, No gunpowder present
  - Therefore: Burning, Blackening, Tattooing absent

Cartridge

- Three main parts
  - Primer
  - Propellant
  - Projectile



Wad Function In Shot -Gun

- Separates pellets from gun -powder
- Seals air
- Acts as piston & lubricant

Lead Shot Types

Based On Composition

- Three types
  - Soft → Pure lead
  - Hard → Lead + antimony
  - Steel → Steel

Lead Shot Based on Size

- Three types:
  - Dust shot: Smallest
  - Bird shot: Medium
  - Buck shot: Largest size

Primer Composition

- Mnemonic: **BLAST**
  - **B** → Barium nitrate
  - **L** → Lead
  - **A** → Antimony sulfide
  - **S** → Styphnate compound
  - **T** → Tetracene
- Function:
  - Primer explodes → produces flame
  - Flame ignites gunpowder

GUNPOWDER TYPES

00:09:45

INICET 2023

Feature	Black gunpowder	Smokeless gunpowder
Composition	• PO: Potassium nitrate (75%) • C: Charcoal (15%) • So: Sulfur (10%)	• Single base: Nitrocellulose • Double base: Nitrocellulose + Nitroglycerin • Triple base: Nitrocellulose + Nitroglycerin + Nitroguanidine
Gas Production	3000-4000 cc per gram	~12,000 cc gas
Smoke	More smoke	Less smoke
Power	Less power	More power

Semi-Smokeless Powder

- Composition:
  - 80% black powder
  - 20% smokeless powder

Gunpowder Fineness

- Marked as: FG, FFG, FFFG
- Rule: More F → finer powder → greater power

Tests For Gunshot Residue

Mnemonic: **HANDS**

- **H** → Harrison & Gilroy test
- **A** → Atomic absorption spectroscopy
- **N** → Neutron activation analysis
- **D** → Dermal nitrate test (Paraffin test)
- **S** → Scanning electron microscopy

Important Points

- Scanning electron microscopy: Most specific test
- Dermal nitrate test
  - Detects nitrates only
  - Not used nowadays

Elements Detected In Gsr Tests

- Harrison & Gilroy test
  - Detects: Antimony, Barium, Lead
- Atomic absorption spectroscopy
  - Detects: Antimony, Barium, Copper, Lead
- Neutron activation analysis
  - Detects: Antimony, Barium, Copper

SEQUENCE OF FIRING

00:11:58

- Trigger pulled
- Hammer moves up and released
- Hit on firing (percussion pin)- moves
- Primer - ignition
- Flame
- Gunpowder ignites
- Gas pressure increases
- Projectile expelled from barrel

Pull the trigger → Hammer moves upward and released → Firing pin moves forward and strikes percussion cap

↓

Primer-Igniton → Flame → Gunpowder ignites

↓

Gas or smoke is produced in a small compartment → Projectiles are projected out

Bullet

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- Main factor determining damage: Mass < Velocity
- Large round bullet → ↑Damage
- Bullet should be picked by hand with gloves in crime scene

TYPES OF BULLETS

	Type	Description
1	**Souvenir Bullet**	Bullet lodged in tissues, surrounded by fibrous capsule, can cause chronic lead poisoning

Yourwish

2	**Frangible Bullet**	Fragments on impact Composed of copper
3	**Tumbling Bullet**	Bullet rotates end-over-end
4	**Duplex Bullet**	Two bullets in one cartridge
5	**Tracer Bullet**	Contains illuminating substance, allows visual tracing of bullet path
6	**Incendiary Bullet**	Contains phosphorus, produces fire on impact
7	**Yawning**	Slow irregular
8	**Tandem/Piggyback**	No. of bullets come out - two
9	**Plastic Bullet**	Made of polyvinyl chloride, used for riot control
10	**Poison Bullet**	Contains poisons such as: Curare, Ricin

Ricochet Bullet

- Bullet deflected after striking an object before entering the body.
- Critical ricochet angle: around 30°
- Abrasion collar absent
- Burning, blackening, tattooing absent

Semi-Jacketed Bullet

- Bullet partially covered with copper jacket.
- Nose portion not jacketed
- Expands inside tissues
- Examples:
  - Dum-dum bullet → from top → jacket is removed
  - Hollow-point bullet

Kennedy Phenomenon

- Surgical alteration of gunshot wound by surgeon (Wash, wipe, open) or death after surgery causing difficulty in determining → Entry vs exit wound, Range of fire

RAYALASEEMA PHENOMENON

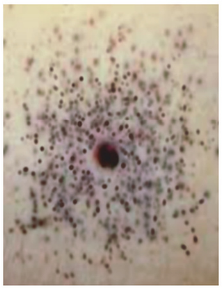
- Bullet artificially implanted in a stab wound to confuse investigation.
- To mislead investigating officer and forensic doctor

DISCHARGE FROM GUN-EFFECTS

00:17:16

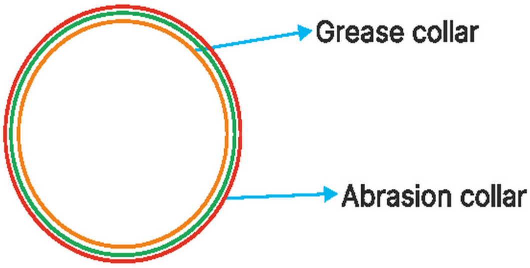
- Flame Produces: Burning, Singeing, and Charring of hair
- Smoke Produces: Blackening, Smudging
- Unburnt gunpowder Produces: Tattooing, Peppering
- Projectile (bullet / led shots/ wad) Produces: Entry wound, Exit wound

Tattooing Vs Blackening

Tattooing	Blackening
• Caused by gunpowder particles • Cannot be wiped off by wet cloth 	• Caused by smoke deposition • Can be wiped off 

ENTRY WOUND

Rifled Firearm



- Grease Collar / Bullet wipe / Dirt collar
  - Deposited grease from bullet
  - More specific
  - Seen on inner surface
- Abrasion Collar
  - Caused by friction and rotation / Spin of bullet
  - Located outer margin of entry wound

METALLIC FOULING

- Tiny metallic fragments deposited around entry wound
- Source
  - Surface of bullet
  - Interior of firearm barrel

RANGE OF FIRE

00:19:35

Range	Rifle	Shotgun
Flame burning	7 cm	15 cm
Smoke blackening	30 cm	45 cm
Gun powder tattooing	60-90 cm	60-90 cm
WAD	–	2 m

Contact Shot

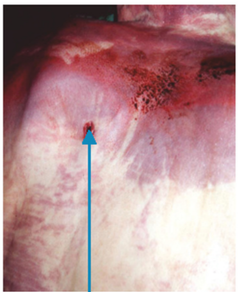
- A star-shaped (stellate) lacerated wound seen in contact gunshot injuries

Feature	Contact	Close shot	Near / Intermediate	Distant
Muzzle impression	+	-	-	-
Shape of wound	Stellate / Cruciate	Circular	Circular	Circular
Burning / Blackening / Tattooing	Inside track	BBT+	BT/TT+	BBT (-)
Abrasion / Grease collar	+	+	+	+

Tattooing   Burning + Blackening + Tattooing   Contact shot

Entry Wound Vs Exit Wound

Feature	Entry Wound	Exit Wound
Size Contact Muzzle impression (Contact)	Usually smaller Large +	Usually larger Small -
Margins	Inverted	Everted
Abrasion collar & Grease collar	Present	Absent
Burning/Blackening/Tattooing	Present	Absent
Bleeding	Less bleeding	More bleeding
Cherry red colour (due to CO)	Present	Absent
Fat and soft tissue expulsion	Absent	Present



Entry wound

Exit wound

BULLET FINGERPRINT

00:22:37

- Marks on bullets that are used to identify weapons.

Primary Marking

- Decided by Rifling barrel (Land/Groove)
- Model of weapon (GUN)
- Gross, class characteristic
    - Same brand (1000 guns) → same caliber → same marking

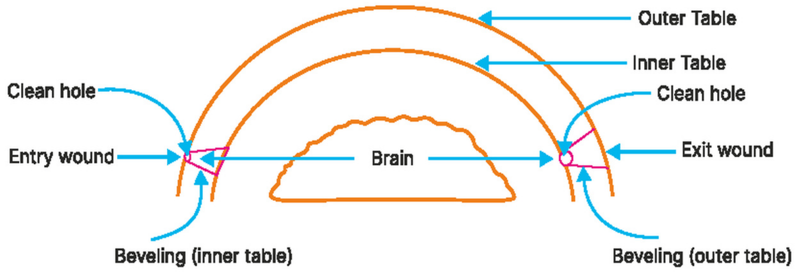
Secondary Marks

- Individual characteristics
- Caused by irregularities in barrel
- Produced by:
    - Manufacturing defects
    - Wear and tear
    - Cleaning scratches
- Seen by Comparison microscope

BEVELING OF SKULL

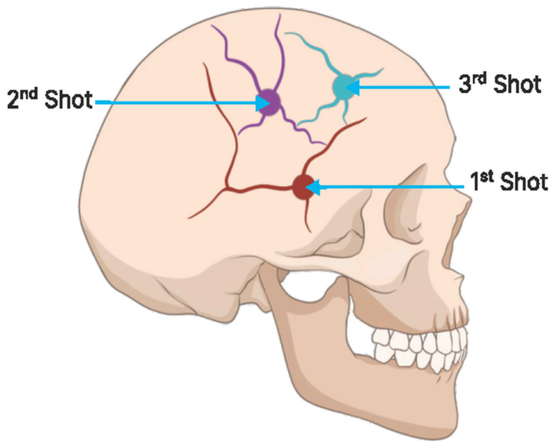
00:24:14

- Cone-shaped bone erosion in skull due to bullet passage
- Entry Wound in Skull: beveling seen at inner table
- Exit Wound in Skull: beveling seen at outer table



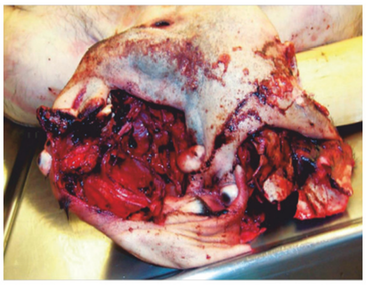
Puppe's Rule

- Used to determine sequence of bullet shots.
- Fracture line from later bullet does not cross earlier fracture line
- Helps determine: Order of firing



Kronlein Shot

- Occurs in close range firearm injury to skull
- Skull burst open & Brain evisceration



SHOTGUN RANGE

- Gunpowder travels up to 60-90 cm
    - Till 1 m BBT+
- Pellet dispersion starts after 2 meters
- Complete dispersion after 4 meters
- Wad injury up to 2 meters

Contact shot

Intermediate range

Distant range

Shotgun Lead-Shots	Contact Shot	Close Range (< 1 m)	Near Range (1-2 m)	Intermediate Range (2-4 m)	Distance Range (> 4 m)
Appearance	Stellate 	Round	Rat-hole	Satellite	Individual holes
Muzzle impression	+	-	-	-	-
Burning / Blackening / Tattooing	BBT → Inside track	BBT+	BT / TT+	TT / BBT (-)	BBT (-)

Billard Ball Effect Vs Balling /Welding

- Billiard Ball Effect
    - Dispersion of pellets
    - Because of ricochet / resistance
    - Indicates distant range
- Bowling / Welding Effect
    - Pellets melt and stick together
    - Produces large entry wound resembling intermediate range

Range	5 metres	10 metres	15 metres	20 metres
Cylinder	20 cm	50 cm	60 cm	75 cm
Half choke	13 cm	30 cm	40 cm	50 cm
Full choke Dispersion in Cm	8 cm	25 cm	35 cm	45 cm

BLAST INJURIES

00:29:27

Types of Blasting

- Air Blast
  - Explosion occurs in air
- Underwater Blast
  - Explosion occurs in water
- Solid Blast
  - Explosion occurs in mines or solid ground

Blast Products

- Blast Wave (Air Wave / Shock Wave) → Caused by sudden air compression
  - Responsible for Primary Blast Injury
- Flying missiles / Projectiles / Objects → Hitting body
  - Responsible for secondary Blast Injury
- Lifted and thrown around → Hit → ground
  - Responsible for Tertiary Blast Injury
- Miscellaneous → Building collapse, burn, flame
  - Responsible for Quaternary Blast Injury

Primary Blast Injury

- Also called barotrauma / blast wave
- Organs affected mainly hollow organs
- Most commonly affected organ ear
- Most common structure injured tympanic membrane → ossicle → Bleeding, perforation
- Lung → blast lung (alveoli, capillary) → **most fatal**
- GIT → vomiting, perforation, hematemesis, melena

Secondary Blast Injury

- Caused by flying missiles or fragments
- Marshall Triad
  - Bruises
  - Abrasions
  - Punctate laceration

Tertiary Blast Injury

- Body is displaced → Impact with ground → Skeletal fracture

Quaternary Blast Injury

- Building collapse → Traumatic asphyxia → Burn and flames

Quinary Blast Injury

- Caused by
  - Exposure to environmental contaminants released during explosion
  - Chemicals: Cl, SAVIN
  - Radiation → nuclear bomb
  - Virus and bacteria

MOST COMMON ORGANS INJURED

00:32:26

- Blunt trauma
  - Most common organ → Skin
- Penetrating trauma
  - Most common organ → Liver
- Air blast injury
  - Most common → Tympanic membrane
- Most fatal blast injury
  - Lung rupture

Underwater Blast

- Head Above Water: Most affected organ → Gastrointestinal tract (Especially colon)
- Head Below Water: Most affected structure → Tympanic membrane

BOMB

- Incendiary Bombs are composed of
  - Phosphorus
  - Magnesium
  - Produce Fire And Intense Heat
- Molotov Cocktail
  - Improvised Petrol Bomb
  - Bottle half-filled with petrol with cloth wick (rag) inserted

ERROR FILES

00:33:22

Feature	Contact	Close shot	Near / Intermediate	Distant
Muzzle impression	+	-	-	-
Shape of wound	Stellate / Cruciate	Circular	Circular	Circular
Burning / Blackening / Tattooing	Inside track	BBT+	BT / TT+	BBT (-)
Abrasion / Grease collar	+	+	+	+

PYQ

00:34:35

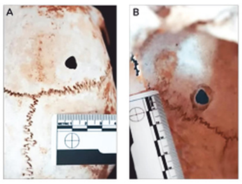
INICET May 2024

Q. Identify the source of the trauma given in the image below.

a. Bullet

b. Rod

c. Axe



d. Scissor

Ans: (a) Bullet

Q. During measurement of a rifled barrel weapon, the caliber depends on? FMGE Jan 2024

a. Distance between two opposite lands
b. Distance between two opposite grooves
c. Number of lead pellets
d. Mass and velocity

Ans: (a) Distance between two opposite lands

Q. What causes the blackening around a gunshot entry wound? INICET May 2023

a. Smoke particles
b. Unburned gunpowder
c. Muzzle of firearm
d. Fire effect

Ans: (a) Smoke particles

Q. During a forensic autopsy, a gunshot victim is examined, and the doctor observes that the firearm injury has a stellate shape. What will be the range of gunshot?

a. Close shot
b. Contact shot
c. Near shot
d. Distant shot

Ans: (b) Contact shot

Q. The most common organ injuries in air blast shock waves will be?

a. Intestine
b. Lungs
c. Kidney
d. Heart

Ans: (b) Lungs

Q. The triad of abrasions, contusions, and lacerations is most diagnostic of which of the following?

a. Firearm injury
b. Bomb blast injury
c. Road Traffic Accident (RTA)
d. Strangulation

Ans: (b) Bomb blast injury

Q. Marshall's triad (punctate lacerations, bruises, and abrasions) is seen in which type of blast injury?

a. Primary blast injury

b. Secondary blast injury

c. Tertiary blast injury

d. Quaternary blast injury

Ans: (b) Secondary blast injury

Yourwish

16. MEDICAL JURISPRUDENCE

MEDICAL JURISPRUDENCE

00.00.05

- Application of law during medical practice
- It is a legal responsibility of a doctor that arises during the practice of medicine

Indian Medical Act

- 1952
- First schedule → for Indian Medical graduate (IMG)
- Second schedule → for Foreign Medical graduate (FMG)
- Third schedule
    - Part 1 → IMG not included in the first
    - Part 2 → FMG not included in the second

Medical Etiquette

- Courtesy observed between members of the medical profession

Medical Ethics

- It is a set of moral principles (conduct) that guide members of the medical profession while dealing with patients, society, the state, and the country
- Patient rights, do good, not to do bad, equally

Serious Professional Misconduct

- AKA Infamous conduct
- Any conduct which might be regarded as disgraceful/dishonorable

Warning Notice For Infamous Conduct

- Alcohol
- Addiction
- Adultery
- Association with an unqualified person
- Advertisement
- Abortion
- Bribe
- Covering or assisting an unqualified person
- Dichotomy (fee splitting of the patient) → commission
- Euthanasia
- False certificate
- Gift

Disciplinary Control

- Done by the State Medical Council

- Committee of doctors decides whether it is ethical or unethical
- Following actions can be taken
    - Warning to the doctor
    - Temporary suspension
    - Penal erasure/professional death sentence → Erasure of the name of a doctor on the medical register
- Doctor can appeal to the central health ministry

Euthansia

00:04:18

- AKA mercy killing/painless death
- Done in a disease that is incurable/terminal
- Euthanasia breaches Article 21 → Right to life
- Netherlands was the first to legalize euthanasia

Types

- Active Euthanasia
    - Drugs like Phenobarbitone, Thiopentone, and opium are given
- Passive Euthanasia
    - Life-sustaining medical intervention and the life support machine are removed
    - Legalized in India
- Types based on the will of the patient
    - Voluntary with will
    - Non-voluntary → Not able to give will → as the patient is in a coma
    - Involuntary without will

Living Will

- Advance medical directive
- A person with a terminal/incurable disease makes a document for treatment options
- A person who can make a will
    - Person age >18 yrs, sound mind
    - Signed by 2 witnesses
    - Nominated representative → can be a doctor or a relative
    - Attested by a first-class Judicial magistrate
- If two living wills are made, then the last one is valid
- Steps
    - Treating doctor
    - Medical board- Signed by 3 doctors
    - Collector
    - First-class Judicial magistrate

Professional Secrecy

00:06:50

- The doctor is obliged to maintain the secret of the patient
- If a doctor discloses without the consent of the patient, it is punishable
- Exception of professional secrecy → Privileged communication

PRIVILEGED COMMUNICATION

- The doctor is obliged to communicate with the patient or to the concerned authority

- Crime (suspected) → Police/Magistrate
- Infectious disease → Relative
- Venereal disease → Partner
- Interest of the doctor to publish about the case, surgeries performed, with photo consent from the patient obtained
- Court of law → Doctor explains to the court in case of medical negligence
- Disease of the servant is to be reported to the employer
  - Color blind → Train locopilot
  - Epilepsy → Pilot
- Interest of the patient
  - Patient having a psychotic disease with suicidal thoughts to be informed of the relative
- Negligence/Notifiable disease
  - TB, Cholera, Plague to be notified to the health department

Consent

00:09:40

NEET PG 2022
INICET Nov 2025

- It is a part of the Indian Contract Act-13
- Medical examination to be done with consent
  - If done without consent, then called Assault as per 130 BNS
- Any procedure, such as a blood transfusion, is to be done with consent
- Examination of the victim should be done with consent
- Examination of the accused can be done without consent
- Examination of a prisoner can be done without consent
- An arrested person can request an examination
- Mass immunization does not require consent
- Contraceptives, sterilisation, and artificial insemination → consent from both husband and wife is needed

Types

- Express consent → Verbal/written consent
- Implied consent → Gesture/act
  - E.g, recording the BP of a patient
- Written Informed consent → Best
- Blanket /open /blind consent
  - Doctor or a hospital can do anything to the patient without mentioning anything specifically
  - It is not valid in India
- Substituted consent
  - Consent by parent/close relative

Exceptions of Informed Consent

- Emergency situation
- Therapeutic privilege
- When a patient waives his right of informed consent to Doctor/Relative
- Mass immunization
- Medicolegal autopsy
- Convicted prisoner and examination of the accused
- Doctrine of Extended Consent, unanticipated condition

Yourwish

Age lmit

- Physical examination - 12 years
- Surgery examination - 18 years

Full Disclosure

- Everything needs to be disclosed to the patient, like Disease, Treatment, follow-up, and complications.

Therapeutic Privilege

- Exception of full disclosure → Therapeutic privilege
  - In a psychotic patient with suicidal thoughts, it is informed to the relative

Doctrine of Informed Refusal

- The patient has the right to refuse examination and treatment
- Needs to be documented

Medical Negligence

00:14:10

- AKA professional negligence or malpraxis
- Absence of skill, care
- Gross or willful negligence
- **4D**
  - Duty
  - Dereliction → Wrong prescription/standard care is not provided
  - Direct causation
  - Damage

Types

- Civil negligence
- Criminal negligence
- Contributory negligence

	Civil	Criminal
Negligence	• Lack of care/skill	• Gross/willful
Burden of Proof	• Patient	• Doctor
Punishment	• Fine • Compensation	• Fine • Punishment according to 106 BNS for 2 years
Trial by	• Civil/Consumer court	• Criminal
E.g	• Wrong prescription- either dose, information	• Instrument inside the operated site following surgery • Amputation of the left leg, but gangrene in the right leg is found • Wrong patient • Surgery performed after alcohol intake

Contributory Negligence

- Negligence by both doctor and patient (Tt, follow-up, History)
  - Patient didn't give proper history, treatment was not completed, and follow-up was not done
- Defence only in a civil case
- Burden of proof on the doctor
- It is a partial defence

Limitations

- Last clear chance doctrine
  - The doctor had the last clear chance to prevent complications but failed to prevent damage
  - E.g- The responsibility of the doctor is to ask the patient for a change of dressing after 7 days following surgery to prevent infection, but the doctor fails to inform
  - The doctor is responsible
- The avoidable consequences rule
  - It is the negligence of the patient that aggravated the damage already caused
  - E.g- Doctor informed about the change of dressing needed after 7 days following surgery to prevent infection, but the patient fails
  - Patient is responsible

Defense Against Negligence

- Doctor was not on duty
- According to the Standard, doctor duty was discharged
- Therapeutic misadventure
  - Even after all precautions during treatment, diagnosis and experiment, there was a Unintentional, accidental mishap that caused damage
  - Burden of Proof is by the doctor
  - Applicable in both Civil and criminal cases
- Error of judgment
  - At the time the decision was made, it did not seem wrong
- Contributory negligence
  - Negligence of both the doctor and the patient
  - Applicable in civil cases
- Res Judicata
  - **THE THING HAS BEEN JUDGED**
  - If the question of negligence has already been decided in court, it can not be allowed in another proceeding
  - Applicable in a civil case
- Res Indicata
  - The time limitation to file a civil case is 2 years

Doctrine Of Res Ipsa Loquitur

- Thing/fact which speaks for itself → Sufficient to prove the negligence
- It includes → Act of omission and lack of standard of care and treatment
- E.g
  - Failure to remove the swab during the operation
- Proves for both civil and criminal negligence

INICET July 2021

DOCTRINE OF COMMON KNOWLEDGE

- Variant of Res Ipsa Loquitur
- It includes only the act of omission
- E.g
- Following the injury, TT was not given
- In dehydrated patients, fluids were not given

Calculated Risk Doctrine

- Every method of treatment /procedure employed had an unavoidable risk/own risk of damage
- Even after giving reasonable care → Damage was caused
- It acts as a defense against negligence

Novus Actus Interveniens

- It is the new act intervening
- The responsibility of damage/death may pass from the original incident to a later negligent action of a doctor
- E.g → X stabbed Y and was taken to the hospital. Following this, the doctor gave a blood transfusion, electrolytes, and drugs were administered. Death and damage were caused

Vicarious Liability

- Liability for the act of another
- Employer is responsible → for his and employees' negligence
- There must be a relationship between the employer and the employee
- E.g → The hospital is first answerable for the act produced by the doctor

Medical Mal - Occurrence

- Despite good medical attention and care → Damage occurs in some cases
- Occurs due to Biological variations, Adverse drug reaction/not responding properly
- It acts as a defense for doctors

Composite Negligence

- Patient suffers injury due to the negligent act of more than one person

Product Liability

- It refers to the Physical agent that causes damage
- It includes a defective medical instrument
- Burden of proof about the safety → On the manufacturer

Borrowed Servant Doctrine

- The employer is responsible for the negligent act of the temporary employee as well
- E.g → Surgery HOD asked an act to be performed by the medicine JR. Later, it caused negligence, then surgery HOD is responsible

LOCO PARENTIS

- Consent can be given by a legal authority like Police/warden/guardian, in place of a parent

Paternalism

- To adopt some measures by healthcare providers without disclosing the nature of illness or the proposed treatment for the patient's best interest

Maintenance Of Medical Records

- IN patients - 3Y
- Routine cases after completion of treatment - 6Y
- After death - 3Y
- Medico Legal document - 10Y
- Copy has to be given within 72 hrs

Test For Medical Nefligence

- Bolam test
  - It states that if a doctor has acted according to proper and accepted practice
  - The standard of care should be judged by one's own peers
- Bolitho test (Modified Bolam Test)
  - The defence and its body of opinion must be reasonable and responsible/logical

DECLARATION

00.32.32

Declaration	Definition
Geneva	Oath
Tokyo	Torture → Istanbul Protocol (Turkey)
Sydney	Death
Oslo	Therapeutic Abortion
Helsinki	Human Experimentation
Venice	Terminal Illness
Lisbon	Rights Of Patient
Malta	Hunger Strike → Starvation
Washington	Biological Warfare
Ottawa	Child Health
Hong Kong	Old Abuse
Taipei	Tissue And Data- Research

ERROR FILES

00.31.33

- Res Judicata
  - **THE THING HAS BEEN JUDGED**
  - If the question of negligence has already been decided in court, it can not be allowed in another proceeding
  - Applicable in a civil case

Yourwish

- Res Indicata
    - Time limitation to file a civil case is 2 years
- Implied consent → Gesture/act
    - E.g, recording the BP of a patient

MCQs

00.32.07

Q. When a doctor fails to prevent the damage resulting from the negligent act of the patient, even after getting sufficient time, it is known as

A. Contributory negligence

B. Novus actus interveniens

C. Avoidable consequences rule

D. Last clear chance doctrine

Answer: **D**

Q. If a healthcare professional is found guilty of professional misconduct, they must provide the patient's records promptly upon request, within

A. 72 hours

B. 48 hours

C. 24 hours

D. 7 days

Answer: **A**

Q. To adopt some measures without disclosing the nature of illness or the proposed treatment is known as

A. Blanket consent

B. Extension doctrine

C. Paternalism

D. Vicarious liability

Answer: **C**

Q. When the civil negligence case against a physician was not instituted within 2 years of receipt of the damage, the case cannot be reopened in any court. It is known as

A. Res indicata

B. Res judicata

C. Res ipsa loquitur

D. Res vires

Answer: **A**

Q. Under what BNS, charge of criminal negligence is framed, and what is the punishment?

A. 206, imprisonment up to 3 years with or without a fine

B. 206, imprisonment up to 2 years with or without a fine

C. 106, imprisonment up to 3 years with or without a fine
D. 106, imprisonment up to 2 years with or without a fine

Answer: **D**

Q. A patient was admitted to a hospital and was being treated for 1 month. After one month, he died. For how long will the hospital have to keep the medical records of the patient?
A. 1 year
B. 3 years
C. 5 years
d. 7 years

Answer: **B**

Q. Fee-splitting by a doctor is known as
A. Conduct money
B. Dichotomy
C. FIR against the patient for not paying the fee
D. Res ipsa loquitur

Answer: **B**

Q. What type of consent is obtained when a patient agrees to a procedure after being informed about its benefits and complications? NEET PG 2022
A. Informed consent
B. Implied consent
C. Opt-out
D. Passive consent

Answer: **A**

17. ASPHYXIAL DEATH

ASPHYXIA

00:00:10

- **Asphyxia** means:
  - Lack of oxygen to tissues
  - Pulselessness

Types Of Asphyxial Death

- Hanging
- Strangulation
- Drowning
- Suffocation

Classical Triad Of Asphyxia (Cpc)

C – Cyanosis

- Bluish discoloration of the skin- **Peripheral cyanosis**
- **Deoxyhemoglobin >5%**
- **Sites**
  - Nose tip
  - Nail bed
  - Earlobe

P – Petechiae

- Small hemorrhages (0.1-2 mm)
- D/t capillary & venule rupture
- **Sites**
  - Eyelids
  - Conjunctiva
  - Skin
  - Mucous membrane
  - Visceral pleura & peritoneum

C – Congestion

- Cause: Increased capillary permeability
- Affected organs
  - Liver
  - Lungs
  - Skin

Classical Pentad (Quintet)

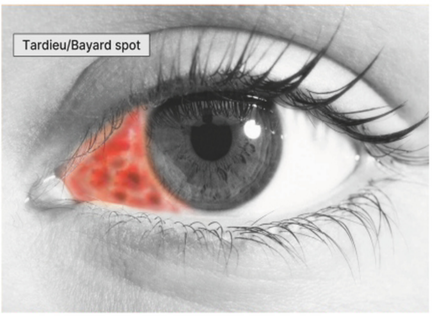
- CPC + 2 more:

- Right ventricular enlargement
- Increased postmortem fluidity of blood

Prinsloo & Gordon Artifact

- Neck dissection should be done LAST to avoid the Prinsloo & Gordon artifact
- Prinsloo & Gordon artifact- Hemorrhage on the anterior aspect of cervical spine, posterior to trachea and esophagus
- Blood extravasates into the neck tissues

Tardieu Spots



- AKA Bayard spots
- **Mechanism-** Acute rise in venous pressure leads to petechial hemorrhages in the eye / visceral pleura
- **Sites**
  - Eyes
  - Visceral pleura

Structures Compressed In Neck (Jctv)

Structure	Pressure Needed	Cause of Death
Jugular Vein (J)	~2 kg	Venous congestion
Carotid Artery (C)	~5 kg	Cerebral anemia/ ischemia/anoxia
Trachea (T)	~15 kg	Asphyxia
Vertebral Artery (V)	25-30 kg	Cerebral ischemia

HANGING

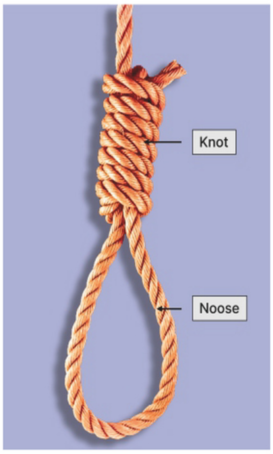
00:03:30

- Suspension of the body by a ligature, causing neck compression
- **Constricting force-** Body weight

Types Of Hanging (Based On Manner)

Suicidal	• Most common type • Fatal period- 3-5 mins 
Homicidal	• Lynching ○ Mob lynching- MC • Lynch came from Charles lynch • Lynchings were common in North America 

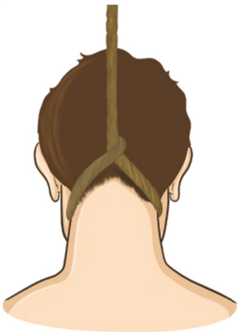
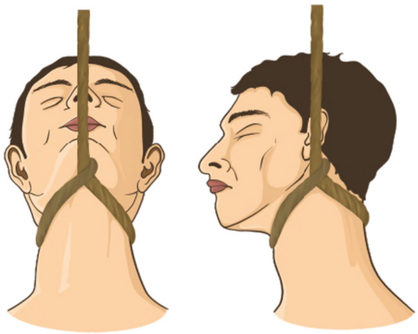
Accidental	• Unintentional suspension 
Judicial Hanging	• Common in India • Death penalty 



Parts Of The Ligature Material

- Knot
- Knoose

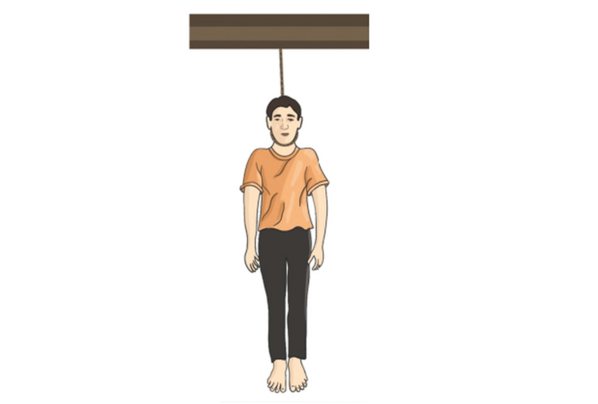
Types Of Hanging- Based On Knot Position

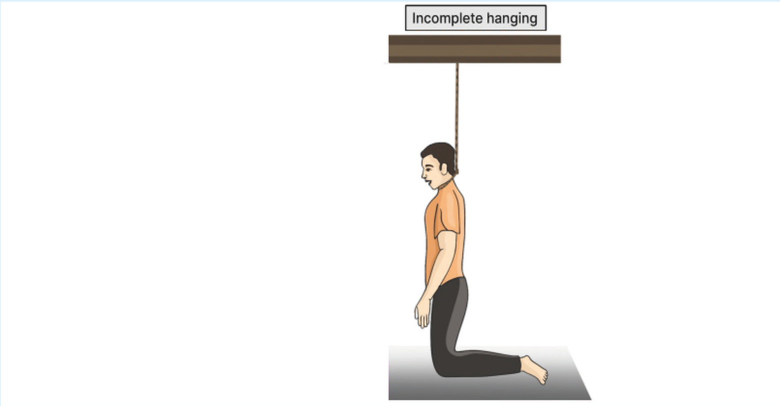
Typical Hanging	Atypical Hanging
• Knot at occiput 	• Knot at any other site 

Types Of Hanging- Based On Suspension

Complete Hanging	Partial Hanging

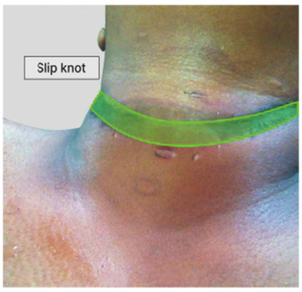
• Body fully suspended
• No part touching ground
• Constricting force- Entire body weight
	• Some body part touching the ground
	• Constricting force
	  ○ Only the head weight (4-5 kg) acts
	  ○ Compresses the jugular vein, causing venous congestion, leading to death





Causes Of Death In Hanging

Most common cause	• Asphyxia + Venous congestion
Other Causes	• Carotid artery compression • Reflex vagal inhibition • Cervical spine fracture
Delayed causes	Death after a few hours • Hypoxic ischemic encephalopathy (most common) • Aspiration pneumonia • Laryngeal edema • Infarction



Ligature Mark & Pm Findings

Types Of Ligature Mark

- Fixed knot- Oblique
- Slip knot- Transverse

Pm Findings

- Ligature mark is the most specific external finding on the neck
- Above thyroid cartilage (85%)
- Complete or incomplete- Depends on the knot
- Pressure abrasion > patterned abrasion
- CPC in asphyxial death
- Face congested- Deep in partial hanging due to venous congestion
- PM staining- Glove & stocking distribution

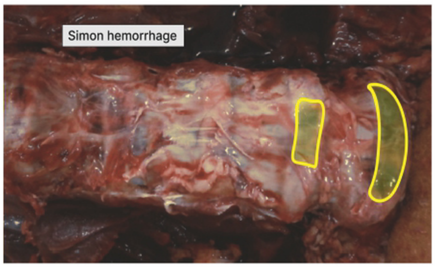
Characteristics Of Ligature Mark

- Pale, white, glistening, parchment-like, yellow color
- Internal dissection- White, glistening
- No hemorrhage in the surrounding tissue

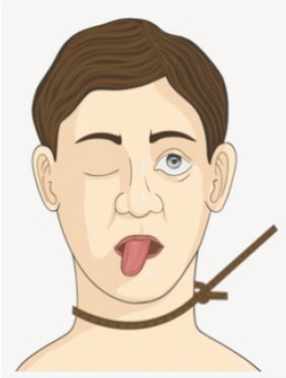
Amussat's Sign

- In a long, sudden drop like a judicial hanging
- Horizontal split of media/adventitia of carotid artery - Amussats sign

Simon Hemorrhage
- Hemorrhage into the outer layer of the intervertebral disc of the lumbar & lower thoracic vertebrae

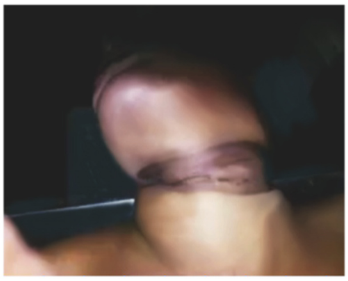


Special Signs In Hanging
Dribbling Of Saliva
- Most characteristic finding of antemortem hanging
- Saliva flows from the angle of the mouth
- Usually, the opposite side of the knot d/t Submandibular gland compression or Pterygopalatine ganglion stimulation
- Absent in postmortem hanging



La Facies Sympathique
- Due to cervical sympathetic stimulation
- Same side of the knot
- Dilated pupil
- Open eye

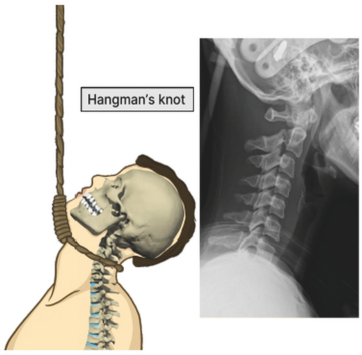
Fracture In Neck
- Antemortem hanging- Hemorrhage, contusion in the surrounding tissue of the fracture
- Fracture of the superior horn of thyroid- Seen in 50% cases
- Hyoid bone fracture
    - Seen in 15-20% cases above 40 yrs as it is calcified
    - At the junction of the inner 2/3rd & the outer 1/3rd
    - AKA Abduction fracture, Outward fracture, or Anteroposterior compression fracture



Sexual Asphyxia/Kotzwainism/Autoerotic Asphyxia
- Autoerotic asphyxia- Partial hanging
- Accidental male, Age young adult
- Associated Perversions: Masochism, transvestism
- Mechanism: Ligature causes partial carotid occlusion → Cerebral ischemia → Erotic hallucination → Masturbation → Release the pressure
- Common in young adults
- Cause of death- Persistent pressure leading to asphyxia
- Crime Scene Clues: Naked body, pornography present, semen discharge
- Important Point: Accidental, not suicidal

Judicial Hanging
- Sudden long drop

- Hyperextension of the neck
- Hangman's knot- ideal site is below the chin
- In India, the ideal site is below the angle of the mandible
- C2 vertebra fracture (Hangman's fracture)
- Brainstem damage/rupture



STRANGULATION

00:13:44

- Constriction of the neck without suspension
- Mostly homicidal > Accidental

Types Of Strangulation

Ligature Strangulation	• Rope/ligature used
Manual Strangulation	**AKA Throttling** • Elbow/forearm compression
Mugging	• Elbow/forearm compression 
Bansdola	• Two sticks used
Garroting	• Judicial strangulation • AKA Spanish windlass • Seen in Spain & Turkey
Palmer Strangulation	• Using palm pressure 

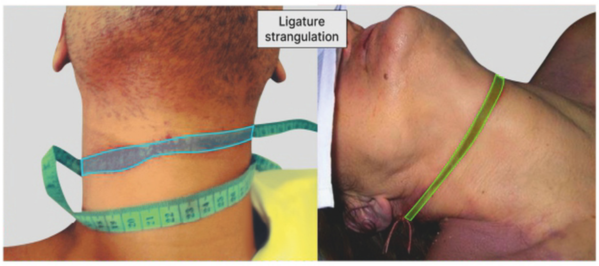
Causes Of Death In Strangulation

- Asphyxia
- Cerebral anoxia
- Vagal inhibition
- Fracture of the cervical vertebra

Ligature Strangulation

External Findings (Neck)

Yourwish



- Ligature mark
  - Complete
  - Transverse
  - At or below the thyroid cartilage
- Periligature injuries present
- Asphyxial signs (CPC) are more prominent
- Face congested
- Petechial hemorrhages (face & conjunctiva)
- Bleeding from the nose & ear
- Signs of struggle present

Internal Findings

- Contusion & hemorrhage of neck muscles
- Injury to the tonsil & glands
- Fracture of thyroid cartilage (most common)

Throttling (Manual Strangulation)

- Always homicidal

External Findings

- No ligature mark
- Crescentic nail abrasions
- Fingernail marks (semicircular)
- Six penny bruise (finger tip bruising)
- **Other Findings**
  - Face congestion
  - Petechiae
  - Subconjunctival hemorrhage
  - Bleeding from the nose & mouth

Internal Findings

- Bruises/contusions in soft tissues, neck muscles, and glands
- Hyoid Fracture
  - Adduction fracture (inward compression)
  - Opposite of hanging (abduction)
- Cricoid Fracture- Rare but most specific

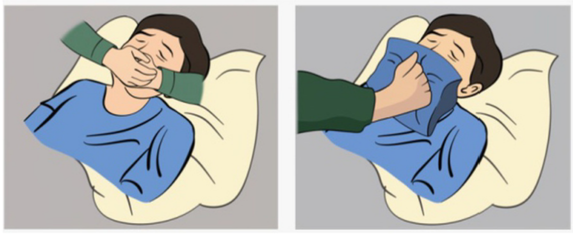
SUFFOCATION

00:17:49

- Obstruction of the airway passage
- Purest form of asphyxia

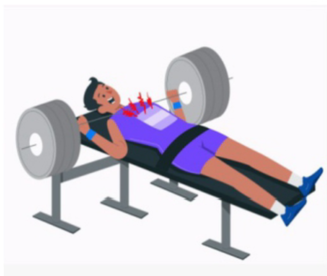
Yourwish

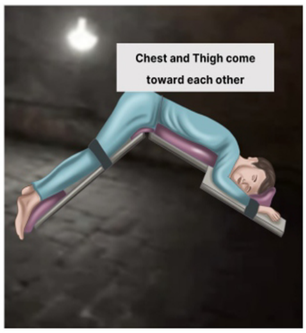
Types Of Suffocation

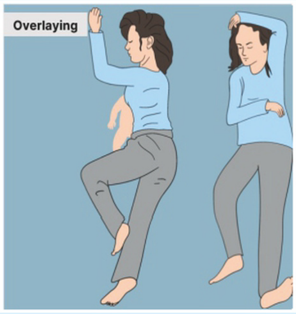
Smothering	• Mouth & nose blocked (hand/pillow)
	• MANNER
	  ○ Accidental- Infant in bedding
	  ○ Homicidal- Elderly
	  ○ Perioral injuries
	  ○ Fingernail abrasions
	  ○ Lip contusion
	  ○ Frenulum laceration
	  ○ Suicidal smothering → rare
	

Choking	• Airway obstruction by a foreign body
	• Accidental
	• Cause of death
	  ○ Asphyxia
	  ○ Vagal inhibition
	  ○ Laryngospasm
	• Management- Heimlich maneuver
	  ○ Upward + inward thrust

Gagging cloth/paper gag	• Mouth (Oro Pharynx) • Homicidal (unintentional)
Café coronary	• Term given by Haugen • Food bolus obstruction in the airway • Seen in Obese / intoxicated individuals • Cause of death- Suppressed gag reflex causes Vagal inhibition leading to cardiac arrest

Traumatic asphyxia (parthes syndrome)	• Mechanical fixation of the chest
	• Seen in trauma. Examples
	  ○ Road traffic accident
	  ○ Railway accident
	  ○ Stampede
	  ○ Earthquake
	• **Masque ecchymotique** - Line of Demarcation
	  ○ Upper part → cyanosed, congested, ecchymotic
	  ○ Lower part → pale d/t lack of venous return
	

Positional asphyxia	• **Example - JACKKNIFE POSITION**
	  ○ Chest + thigh approximated
	• **Mechanism**
	  ○ Abdominal organs compress diaphragm
	  ○ No lung expansion
	  ○ Asphyxia
	

Overlaying	• **Accidental** • Mother lies over infant → suffocation	

Burking	• Named after Willian Hare & Willian Burke
	• Combination of:
	  ○ Smothering
	  ○ Traumatic asphyxia
	• Homicidal
		

Wedging	• Body trapped between **two objects**	

DROWNING

00:23:02

- Body submerged in liquid/water
- Mostly accidental

Wet Drowning (Typical)

- Water enters the lungs

Classification Based On Water Amount

Less Water

- 3-4 ml/kg
- Causes Loss of pulmonary surfactant & cerebral hypoxia
- Cause of death- Hyopxia

More Water (10-12 Ml/Kg)

Feature	Fresh Water Drowning	Sea Water Drowning
Mechanism	Water enters circulation	Water rich in salts
Effects	Hemodilution, hemolysis	Hemoconcentration
Electrolyte Changes	Hyponatremia, hyperkalemia	Sodium ↑ and potassium are normal
Pulmonary Edema	Absent	Present

Cause of Death	Ventricular fibrillation	Bradycardia
Fatal period	4-5 minutes	8-10 minutes

Dry Drowning

- Definition: No water enters the lungs
- Mechanism: Reflex laryngospasm
- Cause of Death: Asphyxia

Hydrocution

- Cold Water Drowning
- Also called: Immersion syndrome, submersion syndrome
- Temperature: <5°C
- Stimulated Areas: Skin, nose, ears, epigastrium
- Mechanism: Reflex vagal inhibition
- Cause of Death: Cardiac arrest

Delayed Drowning

- Also called: Secondary drowning, post-immersion syndrome
- Time: Death after >24 hours
- Causes:
  - Pneumonia
  - Metabolic acidosis
  - Electrolyte imbalance
  - Hypoxic ischemic encephalopathy
  - ARDS

Post-Mortem Findings In Drowning

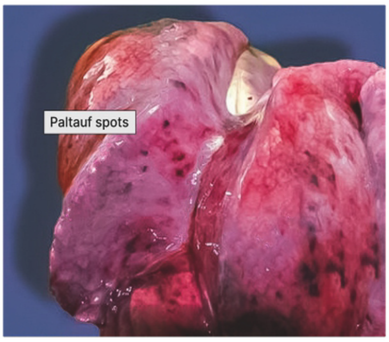
00:26:36

Ante-Mortem Drowning

- Died in the water

<table>
<tr><td>External findings</td><td>Cadaveric spasm
Most characteristic finding
Hands tightly holding:
Grass
Sand
Objects
Frothing
Fine, white, leathery, copious froth
From nose & mouth
Water + mucus + air → churning effect
</td></tr>
<tr><td>Internal findings</td><td>Lungs
Voluminous
Spongy & crepitant
Rib markings present</td></tr>
</table>

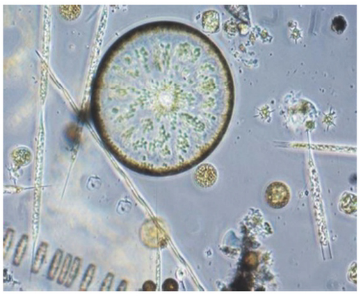
Yourwish

	Emphysema aquosum • Seen in a conscious person • Alveolar dilatation • Thinning & rupture • Lungs heavy with mucoid frothy water **Edema aquosum** • Seen in an **unconscious person** • Passive water entry • No churning **Paltuf's hemorrhage (pals)** • P - subpleural • A - anterior surface • L - lower lobe • **Mechanism- forced respiration → capillary rupture**  **Other findings** • Mud/sand in the stomach • Water in the intestine

Non-Specific Findings (Both Am & Pm)

Cutis anserina (goose skin)	• Due to the erector pili contraction
	• **Seen in**
	  ○ Antemortem → true contraction
	  ○ Postmortem → rigor mortis

Washerwoman hand	• **3 hours** → wrinkling • **12 hours** → swelling • **24 hours** → bleaching • **3-4 days** → skin peeling 
Floatation time	• Summer → ~24 hours • Winter → 1-2 weeks

Diatom test	• Unicellular algae
	• **Types**
	  ○ Freshwater → **Oligohalophilic**
	  ○ Seawater → **Polyhalophilic**
	• **Properties**
	  ○ Silica covering
	  ○ Resist:
	    → Acid
	

Yourwish

	→ Alkali → Putrefaction ○ Best organ- Bone > Femur → Visceral- spleen, brain ○ Acid digestion test (Nitric acid) ○ Only diatoms <60 microns penetrates alveolar capillary
Gettler test	• Chloride test of heart chambers • Fresh water- Right side $Cl^- \uparrow$ • Sea water- Left side $Cl^- \uparrow$ • Difference >25% is significant

ERROR FILE POINTS

- Hyoid fracture
  - Throttling > Hanging > Ligature
- Thyroid cartilage fracture
  - Most common in ligature strangulation
- Cricoid fracture
  - Rare but specific for throttling
- Perioral injury
  - Smothering
- Neck abrasions + contusion
  - Throttling
- Café coronary
  - Cardiac arrest

PYQs

00:33:05

Q. An 18-year-old boy is rushed to the emergency room after choking on a bone while eating. He is conscious and responsive, but unable to speak. What is the next appropriate step in management?

a. Bag and mask ventilation

b. Endoscopic removal

c. Deliver 5 back slaps and 5 chest compressions

d. Perform Heimlich maneuver

Ans: **d. Perform Heimlich maneuver**

Q. Identify the finding that is seen in antemortem drowning?

a. Cadaveric spasm

b. Pugilistic attitude

c. Washerwoman's hand

d. Emphysema aquosum

Ans: **a. Cadaveric spasm**

Q. The dead body shows the following findings as in image. What is this case?

a. Mugging
b. Burking
c. Garrotting
d. Bansdola

Ans: **b. Burking**

Q. Identify the type of homicide:

a. Mugging
b. Burking
c. Garroting
d. Bansdola

Ans: **b. Burking**

Q. During autopsy, a body shows curved scratch marks below the right angle of the mandible, three grouped bruises on the left side of the neck below the thyroid cartilage, and additional bruises over the head, posterior shoulder, backside of the trunk, and hip crests. Fracture of the superior horn of the thyroid cartilage present. What is the most likely cause of death?

a. Throttling
b. Garroting
c. Mugging
d. Ligature strangulation

Ans: **a. Throttling**

Q. What is the most likely cause of death in a body with a horizontal ligature mark completely encircling the neck and located below the thyroid, with no dribbling of saliva?

a. Throttling
b. Ligature strangulation
c. Gagging
d. Hanging

Ans: **b. Ligature strangulation**

18. IDENTIFICATION

CORPUS DELICTI (BODY OF OFFENCE/ESSENCE OF CRIME)

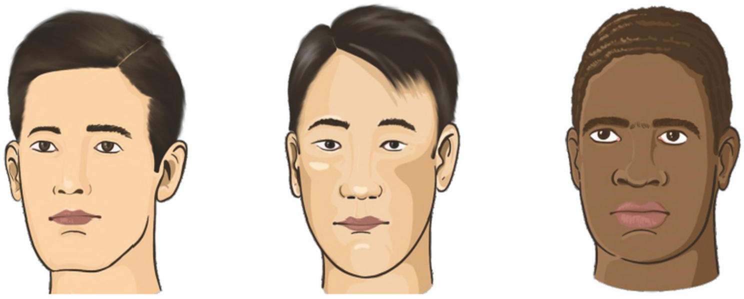
00:00.20

- Essential elements that prove the occurrence of a criminal act
  - Crime
  - Reason/Motive
  - Source of evidence → Dead body, Crime scene, Physical evidences
- All are required to establish that a crime has been committed

RACE DETERMINATION

00:00.34

- Negroid → African descent
- Mongoloid → Japanese
- Caucasoid → European, Chinese, Aryan.



Caucasoid Mongoloid Negroid

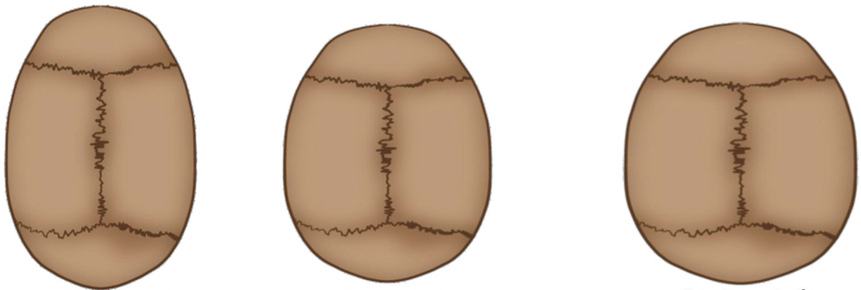
Cephalic Index

FMGE 2025

- Most Important for Race
- Cephalic Index = (Breadth of Skull / Length of Skull) × 100
- Classification:

Type	Range	Racial Association	Memory Aid
Dolichocephalic (Du-Dolico)	70-74.9%	Negro, Pure-Aryan	Breadth is minimum
Mesocephalic (Mesati)	75-79.9%	Indian, China, Euro	MICE mnemonic
Brachycephalic (Brachy)	80-84.9%	Mongol	Breadth is maximum

- Brachycephalic shape is due to the early fusion of the coronal suture



Dolichocephalic 70 -74.9%

Mesocephalic 75 -79.9%

Brachycephalic 80-84.9% Due to early fusion of Coronalsuture

Yourwish

Other Indices For Race Determination

- B - Brachial Index
  - Formula: (Radius length / Humerus length) × 100
- C - Crural Index
  - Formula: Tibia length / Femur length
- C - Cephalic Index
  - For skull measurements (as above)
- I - Intermembral Index
  - Formula: (H + R) / (F + T)
  - Where: H=Humerus, R=Radius, F=Femur, T=Tibia

• Orbit Negro **Square** Mongol **Round** Caucasian(3) **Triangular**
• Palate Rectangular Round Triangular

Racial Differences In Skull Features

Feature	Negro	Mongol (Everything is GOL in Mongol.)	Caucasian
Orbit	Square	Round	Triangular
Palate	Rectangular	Round	Triangular

Racial Differences In Teeth

- Caucasian Features:
  - Carabelli's cusp → Present on maxillary molar
- Mongoloid Features: Set the Gol
  - Shovel-incisor (incisor teeth shaped like a shovel)
  - Enamel pearl → Found on premolar
  - Taurodontism → "Bull tooth" (big tooth with)
  - Absent 3rd molar (wisdom tooth)
- Negroid Features: More cusps on teeth

Racial Differences In Hair

00:03:51

Attribute	Cross-section	Fragmented Medulla	Cuticle
Mongoloid	Cylindrical	Non-fragmented	Thick
Caucasian	Round-oval	Fragmented (F)	Medium
NEgroid	Elliptical	Fragmented (F)	Absent

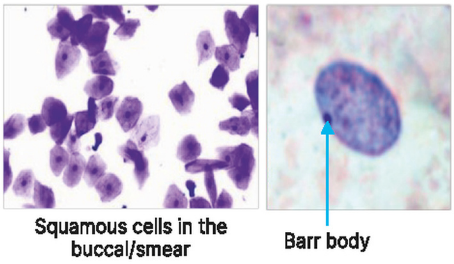
SEXUAL DIFFERENTIATION

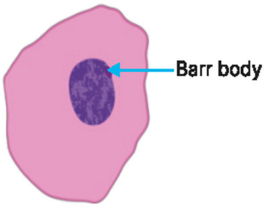
00:04:45

- Methods for Sex Determination
  - External morphology
  - Sex chromatin (Barr body, Davidson-Smith body)
  - Sexing of skeletal remains in the dead
  - Gonadal biopsy → Confirmatory method

Sex Chromatin

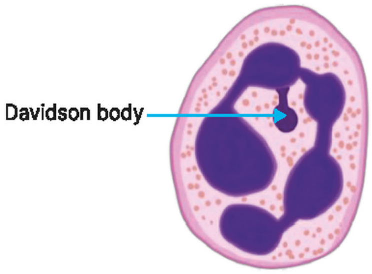
Barr Body





- Source Tissues:
  - Buccal smear (MC)
  - Hair follicle nucleus
  - Squamous cells
- Characteristics:
  - Plano-convex appearance
  - Represents an inactivated X chromosome
- Normal Values:
  - Female (FM): 20-80%
  - Male (M): 0-4%

Davidson-smith Body (drumstick Appearance)



- Location: Neutrophil (polymorphonuclear leukocyte)
- Appearance: Extra lobe resembling a "drumstick."
- Normal Values:
  - Female: 0-6%
  - Male: Absent/rare
- Davidson-Smith's body is more reliable than Barr's body

Special Staining:

- Feulgen reaction: Uses Acriflavine → X chromosome → appears Yellow
- Quinacrine staining: Y chromosome → appears as a fluorescent body

Sexing From Skeletal Remains

INICET 2021, 2025

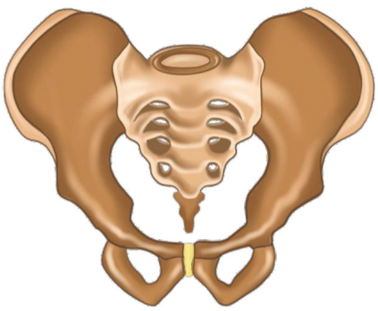
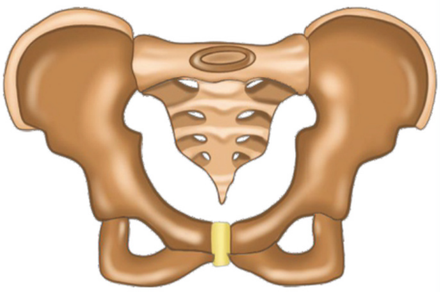
Krogman Table

Method	Accuracy
Entire skeleton	100%
Pelvis and skull	98%
Pelvis alone	95%
Skull alone	90%
Long bones alone	80%

Skeletal Features For Sex Determination

Skull Features

Feature	Male	Female
• Bones	Large, heavy	Small, light
• Prominence (ridges) ○ Glabella ○ Supraorbital ridge ○ Zygomatic arch	More prominent	Less prominent

• Frontal, Parietal eminence	Less prominent	More prominent
• Orbit	Square	Round
• Forehead	Steep	Vertical
• Palate	U-shaped, large	Parabolic, vertical
• Angle	Less	More
○ Sub-pubic angle	70-75°	75-90°
○ Mandible	<125	>125 (more obtuse)
• Obturator foramen shape	Square/Oval	Round/Triangular
• Chin	Square	Round
• Chilotic line	More	Less
• Sacrum	Long, narrow	Broad
• Sciatic notch index (best)	Less (4-5)	More (5-6)
• Sacral index	↓	↑
• Sternal index	<95	>95
• Washburn index	↓	↑
• Ischiopubic index	↓	↑
• Corpobasal index (B1S/BBS)	More	Less
• Chilotic line index	More	Less
• Pelvis inlet shape	Heart 	Round 
• Pelvis type	Funnel	Bowl
• Size	Narrow, deep	Wide, large, shallow
• Greater sciatic notch	Inverted	Wide
• Ischial tuberosity	Inverted	Everted
• Preauricular sulcus	Rare/absent	Frequent, broad, deep
• Pelvis (3° sex characteristics)	Less marked	More marked
• Sacrum (repeat context)	Long, narrow	Short, broad
• Sternum length (Ashley's rule)	>149 mm	<149 mm

Yourwish

- Everything is round in females.
- Everything large and prominent in males
  - Except that the frontal and parietal eminences are prominent in females
  - The greater sciatic notch is prominent in female
- All indices are higher in females.
  - Except for the corpus callosum index and the chilotic line index, it is more in males.
- The best index is the sciatic notch index
- The best parameter is the greater sciatic notch

Ashley's Rule

- The length of the sternum is >149 mm in males, <149 mm in females

Hyrtls Law

- In Male, the body of the sternum is longer and more than twice the length of the manubrium

AGE DETERMINATION OF FETUS

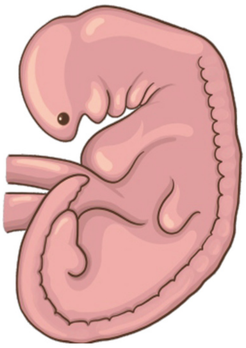
00:10:42

Crown-heel Length (chl) Methods

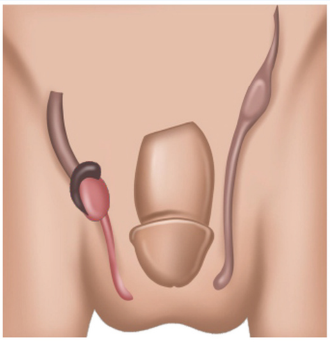
INICET 2021

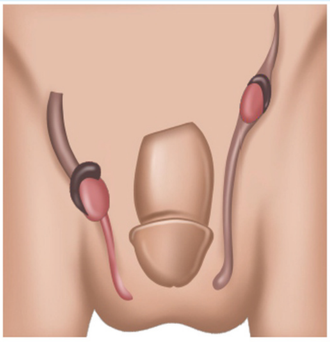
- Rule of Hasse
  - For <5 months of gestation
  - Month = (√Crown-Heel Length)
- Morrison's Rule
  - For >5 months of gestation
  - Month = Length / 5

Fetal Development Timeline

Month	Developmental Features	
1st Month	Limb buds appear	
2nd Month	Webbing of hands and feet	

Yourwish

3rd Month	Nails appear Neck development Pupillary membrane appears Nail+	
4th Month	Lanugo hair appears Sexual differentiation visible	
5th Month	Scalp hair appears	
6th Month	Eyebrows and eyelashes appear	
7th Month	Eyes open Pupillary membrane disappears Testis descends through the external inguinal ring	
8th Month	Nail grows up to the tip of fingers Left testis descends into scrotum	

9th Month	The right testis descends into the scrotum	

Appearance Ossification Centres

NEET PG 2025
FMGE 2023

Appearance of ossification centres	Bone/Structure	Note
5-6th week	**Clavicle**	1st bone to ossify
5th month	Calcaneum	
7th month(viability) SevenTh	Sternum (2/3rd) Talus	
36 weeks (9th month)	3: Cuboid Capitate 6: **Femur (Lower end)** - 3 centers	
Full term	Tibia (Upper end)	

Elbow Joint

Memory Aid - "CRITOE":

Age of appearance of the centre	Structure
1 year	Capitulum
3-4 years	Radial head
6 years	Inner condyle (Medial epicondyle)
8 years	Trochlea
10 years	Olecranon
11-12 years	External condyle (Lateral epicondyle)

Carpal Bones Ossification (lateral To Medial)

00:13:50

Scaphoid (5Y+)	Lunate (4Y+)	Triquetral (3Y+)	Pisiform (12Y)
She	Look	To	Pretty (9-12Y)

Trapezium (6Y)	Trapezoid (6Y)	Capitate (1Y)	Hamate (2Y)
Try (5-6Y)	To	Catch (2M-1Y)	Her (3M-2Y)

Fusion of Bones

00:14:50

Pelvis And Other Bones

Structure	Age of Fusion
Try (Tri-radiate cartilage + Acetabulum)	13-15 years
Iliac crest	20 years (18-20)
Inner end of clavicle	21 years (18-22) → Last bone to fuse
Ischial tuberosity	22 years

Limb Fusion Comparison

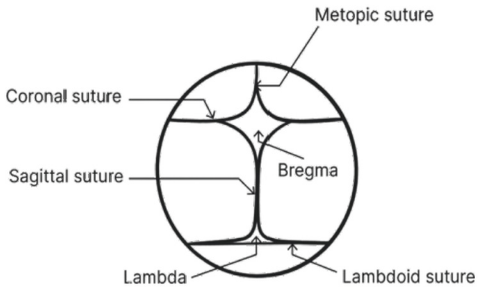
Joint	Upper Limb	Lower Limb
Proximal	Shoulder - 18 years	Hip - 17-18 years
Middle	Elbow - 16 years	Knee - 18 years
Distal	Wrist - 18 years	Ankle - 17-16 years

- General rule:
  - Upper limb fusion age: 18
  - Lower limb fusion age: 17
  - Females: Fusion occurs 1-2 years earlier than males

Skull Fontanelles

00:15.43

- Four Main Fontanelles:
  - Anterior fontanelle (Bregma)
    → Closes at: 18 months
    → Memory aid: ANT-ATN-18M
  - Posterior fontanelle (Lambda)
    → Closes at: 2-3 months
  - Lateral Fontanelles (Total 4):
    → Sphenoid fontanelle (Anterolateral)
      – Closes at: 2 months
    → Mastoid fontanelle (Posterolateral)
      - Closes at: 12-18 months



Skull Sutures - Lateral Skiagram

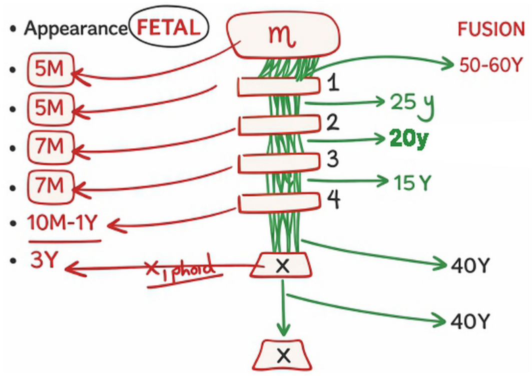
Suture	Fusion Age	Additional Notes
Metopic	9 months	1st suture to close Mai toh pehli : methopic
Sagittal	30-60 years	Best suture for age estimation • Posterior 1/3: 30-40 years • Anterior 1/3: 40-50 years • Middle 1/3: 50-60 years

Yourwish

Coronal	40-60 years	• Upper half: 50-60 years • Lower half: 40-50 years
Lambdoid	45-70 years	• Overall: 45-50 years • Upper half: 50-60 years • Lower half: 60-70 years
Parieto-temporal	60-70 years	
Pterion	65 years	
Squamo-temporal	>80 years	Last suture to close
Masto-occipital	80 years	
Basiocciput with Basisphenoid	18-21 years	

Sternum Fusion

Stage	Appearance in fetal months
Manubrium	5 months
First piece	
Second piece	7 months
Third piece	
Fourth piece	10 months - 1 year
Xiphoid	3 years
Complete fusion	
Upper segments	



- Manubrium fuses with the first piece at 50-60 years
- Xiphpid fuses with the fourth piece at 40 years
- 4th piece fuses with 3rd at 15 years
- 3rd piece fuses with 2nd at 20 years
- 2nd piece fuses with its at 25 years

Other Bone Fusion

Bone/Structure	Age
Sacrum (becomes a single bone)	21-25 years
Two halves of the mandible	2 years
Patella	14 years
Crista scapulae	10-50 years
Greater cornu of hyoid (fuses with body)	40-60 years

- Best Bone for Age Determination in 3rd - 5th decade : Pubic symphysis

DENTITION - AGE DETERMINATION

00:18.38

Dental Formula

- Temporary (Deciduous) Teeth - Total 20:

$$\begin{array}{cccc|cccc} M & PM & C & I & I & C & PM & M \\ 2 & 0 & 1 & 2 & 2 & 1 & 0 & 2 \\ \hline 2 & 0 & 1 & 2 & 2 & 1 & 0 & 2 \end{array}$$

- Permanent Teeth - Total 32:

$$\begin{array}{cccc|cccc} M & PM & C & I & I & C & PM & M \\ 3 & 2 & 1 & 2 & 2 & 1 & 2 & 3 \\ \hline 3 & 2 & 1 & 2 & 2 & 1 & 2 & 3 \end{array}$$

Where: I = Incisor, C = Canine, M = Molar ,PM=Pre molar (0 = No premolars in temporary dentition)

Sequence Of Eruption - Temporary Teeth

INICET 2022

- Memory Aid: I - M - C - M

Tooth Type	Age of Eruption
I (Incisors)	6 months
M (1st Molar)	12-14 months
C (Canine)	18 months
M (2nd Molar)	24 months (20-30 months)

- First Tooth Eruption Sequence:
  - LCI (Lower Central Incisor) → 6 months
  - UCI (Upper Central Incisor) → 7 months
  - ULI (Upper Lateral Incisor) → 8 months
  - LLI (Lower Lateral Incisor) → 9 months
- Complete Temporary Dentition:
  - All 20 temporary teeth erupt by 24 months (2-2.5 years)

Sequence Of Eruption - Permanent Teeth

- Memory Aid: "Mummy Is In Pain; Papa Can Make Medicine"

Age	Tooth	Mnemonic
6-7 years	1st Molar	Mummy
7-8 years	Central Incisor	Is
8-9 years	Lateral Incisor	In
9-10 years	1st Premolar	Pain
10-11 years	2nd Premolar	Papa
11-12 years	Canine	Can
12-14 years	2nd Molar	Make
17-25 years	3rd Molar (Wisdom tooth)	Medicine

Mixed Dentition (6-11 Years)

- In 6-11 years, 24 total teeth are present (P+T)

Age	Permanent (P)	Temporary (T)	Total
2 years	0	20	20T
6 years	4	20	4P + 20T = 24
7 years	8	16	8P + 16T = 24
8 years	12	12	12P + 12T = 24
9 years	16	8	16P + 8T = 24
10 years	20	4	20P + 4T = 24
11 years	24	0	24P
12-14 years	28	0	28P
17-25 years	32	0	32P

Types Of Permanent Teeth

- Successional Teeth (20 total)
  - Teeth that come in place of temporary teeth
- Superadded Teeth (12 total)
  - No replacement
  - Added as extra teeth
  - Includes: Molars (all 12 molars are superadded)

Other Methods For Age Estimation By Teeth

Stack Formula

- Age group: Infant
- Criteria: Dry weight/height ratio

Boyde's Method

- For babies/neonates
- Based on striations in enamel (incremental lines)
- Incremental lines can be seen by
  - Electron microscope: at 1-2 days
  - Naked eye: at 3 weeks

Gustafson Method

00:25:20

- For Age >25 Years
- Most common tooth used: Anterior incisor
- Unsuitable tooth: 3rd molar (wisdom tooth)
- SCRIPT - Six Criteria:

- S - Secondary dentin formation
- C - Cementum apposition
- R - Root resorption
- I - Attrition (wear)
- P - Paradentosis (gum regression)
- T - Transparency of root → Best and most important criteria

DENTAL CHARTING SYSTEMS

Palmar Notation (zsigmondy's Method)

- Quadrant Division:
  - RU | LU
  - ————
  - RL | LL

Right Upper Quadrant								Left Upper Quadrant							
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
Right Lower Quadrant								Left Lower Quadrant							

- Where: RU = Right Upper, LU = Left Upper, RL = Right Lower, LL = Left Lower
- Numbering:
  - Permanent teeth: 1-8
  - Temporary teeth: A-E

Haderup's Dental Notation System

- Symbols:
  - Upper teeth: + (plus sign)
  - Lower teeth: - (minus sign)
- Numbering:
  - Permanent: 1-8
  - Temporary: 1-5

Universal Notation (cunningham's)

- Permanent Teeth (1-32):
  - Start from the upper right 3rd molar (1)
  - End at lower right 3rd molar (32)
  - Sequence: 1 (upper right) → 16 (upper left) → 17 (lower left) → 32 (lower right)
- Temporary Teeth (A-T):
  - **A-J:** Upper arch (right to left)
  - **K-T:** Lower arch (left to right)

FDI NOTATION

- Fédération Dentaire Internationale
- Most Commonly Used Method
- Prefix System:
  - Permanent teeth quadrants: 1, 2, 3, 4
  - Temporary teeth quadrants: 5, 6, 7, 8
- Tooth numbering within each quadrant: 1-8 (permanent) or 1-5 (temporary)
  - Example:
    → Tooth 11 = Upper right central incisor (permanent)
    → Tooth 48 = Lower right 3rd molar (permanent)

Modified Fdi Notation

- Same quadrant system as FDI (1, 2, 4, 3 for permanent; 5, 6, 8,7 for temporary)
- Uses the same prefix system
- Modified visualization/recording method

Important Information

- Bicuspid = Premolar (2 cusps)
- Molar = Four or five cusps

STATURE ESTIMATION BY BONE LENGTH

00:28.44

- Best bone for stature: femur
- Formulas:
  - Karl and Pearson's formula
  - Trotter and Gleser formula

Bone Length Formula (trick: Fittur)

- General Pattern: Multiply bone length by a factor, then add a constant
- First 4 bones add **0.8**, Last bone (Radius) adds **0.4**
- Example:
  - Femur length = 30 cm → Stature = 30 × 3.7 = 111 cm
  - Humerus length = 30 cm → Stature = 30 × 5.3 = 159 cm.
- The vertebral column constitutes 35% of the stature

Bone	Factor	Add	% of stature
F - Femur	3.7		27
T - Tibia	4.5	+0.8	22
H - Humerus	5.3		20
U - Ulna	6.1	+0.4	
R - Radius	6.5		

Bony Fragments

- Formula: Steele & McKern formula (for bony fragments)
- Instrument: Osteometric board (for measuring bone length)

MEDICO-LEGAL SIGNIFICANCE OF AGE

00:31.27

Age Limit	Significance
<14 years	Not employed in any factory (Factory Act)
14-18 years	Can work in non-hazardous occupations with: Fixed hours with a fitness certificate
<18 years	Juvenile
18 years	Age of majority Age for voting Age for license Age for marriage (girls)
21 years	Age for marriage (males) Below 21: Procuring a girl for sex = kidnapping

FINGERPRINTING

- AKA dactylography/Galton system
- Most reliable method because
  - Not inherited
  - Quetelet Rule: Even in identical twins, fingerprints are different

Time	Development
12 weeks	Fingerprints appear
24 weeks	Complete

Yourwish

- These are the epidermal papillary ridges
- First Fingerprint Bureau: Kolkata (1897)
- First used by: William Herschel (1858)
- Classification by Galton
- Fingerprint development in the fetus

Types Of Fingerprints

Type	Description	Visibility
1. Visible	On blood, ink	Visible
2. Latent/Chance	Invisible or barely visible	Need development
3. Plastic	On soft surfaces (soap, cheese, wax)	Visible impression

Latent Fingerprints

Surface	Method	Trick
Fabric	5% Silver nitrate	Fabric = Five percent
Paper	Vapour of Iodine and Osmium tetroxide	Paper with vaPour
Glass	Electron microscope	

Fingerprint Patterns

00:34:00

- Trick: Love Wife And Children

Pattern	Frequency	Description	Trick Word
Loop	MC (60-65%)	Like a hairpin, Ridge returns to the same side	Love
Whorl	2nd MC(30-35%)	Like concentric circles	Wife
Arch	3rd (5%)	Like a mountain, Ridge goes to the opposite side	Children (And)
Composite	Least common (1-3%)	Mixed pattern	Children

Core And Delta

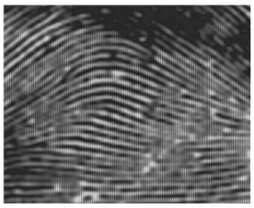
Term	Definition	Location
Core	The point where the ridge returns	Center of the loop
Delta	The point where the ridge converges from 3 directions	Triangular convergence point

Core And Delta Count By Pattern

Pattern	Has "O"	Cores	Deltas
LOOP	O-O (two O's)	1	1
Arch	No O	0	0
WhORl	One-Two-Two	1-2	2

Loop

Arch



Whorl

Matching Fingerprints - Three Levels

Level	What to Check	Study Name	Details
Level 1	Type of fingerprint		Loop/Whorl/Arch/Composite
Level 2	Ridge pattern	Ridgeoscopy	End of ridge, bifurcation Ridge pattern is known as Minutiae
Level 3	Pores on the ridge	Poroscopy	Pore size(sweat gland), number, shape, and location
	Edges of the ridge	Edgeoscopy	

- Sequence:
  - Tell the type of fingerprint
  - Study ridge pattern (Ridgeoscopy/Minutiae)
  - Study pores (Poroscopy) and edges (Edgeoscopy - most important)
- Minimum comparison points: 10-12 points (varies by state/country)
- Histological section depth: 0.6 mm

Altered Fingerprints

- Complete Loss of Pattern: Celiac diseases
- Incomplete Pattern: Dermatitis
- Ridge Alteration: SEA

Condition	Effect
Scleroderma	Ridge alteration
Eczema	
Acanthosis nigricans	

- Pattern retained but distance changed: All India Rank(AIR)

Condition	Effect	Trick
Acromegaly	Pattern retained, distance between ridges changed	**A**ll
Infantile paralysis (Polio)		**I**ndia
Rickets		**R**ank

- No fingerprints: Trick: A-B-Z
  - Adermatoglyphia
  - Baran Syndrome
  - Zinsser Cole SYN
- Permanent loss of fingerprints
  - Leprosy
  - Radiation
  - Electric burn or Charring

Important Information

- For Civil Cases:
  - Male: Left thumb
  - Female: Right thumb
- For Live Fingerprints:
  - OFTIR technique (Optical Frustrated Total Internal Reflection
- Computerized Automated Rating is known as Biometric fingerprinting.

Poroscopy

- Discovered by: Locard
- One fingerprint (1 mm): 9-18 pores

PALATOSCOPY / RUGOSCOPY

00:40:52

- Study of palatal rugae (hard palate)
- Discovered by: Allen
- Location: Anterior 1/3rd of the hard palate (not soft palate)
- Types of Rugae:

Type	Size	Trick
Primary rugae	5-10 mm	Primary = Punch (5-10)
Secondary rugae	3-5 mm	In between
Tertiary rugae	0-3 mm	Tertiary = Three (2-3)

CHEILOSCOPY

00:41:25

- Study of lip prints
- Discovered by Suzuki (C for Car, Suzuki Car)
- Stained by:
  - Aqua print
  - Cyano-acrylate(We require AC in the car)
- Types of Lip Ridges (Sir FIRU or S-FIRU):

Type	Description
S	Straight grooves
F	Forked or Branched
I	Intersecting
R	Reticular
U	Undifferentiated

TATTOO MARKS

00:42:04

- Dyes Used:
  - Vermilion, Indigo, Prussian blue, Cinnabar, Cadmium
- Injected into the dermis, travels to the lymph nodes
- Hence detected by a regional lymph node biopsy
- Significance of tattoo marks
  - Religion
  - Politics
  - Homosexuality
  - Identification
  - Places visited
  - IV drug abusers
- Tattoo Removal Methods (Trick: ABCDE):

Age of Tattoo	Method
Old tattoo marks	Infrared rays (Also used for handwriting)
Faded tattoo marks	UV rays

Method	Full Form
A	Abrasion
B	Burn (more burn)
C	Chemical or Caustic
D	Dry ice (CO_2)
E	Electrolysis and Enzyme (Papain) and Excision

- Famous Case Tattoo mark: Sydney Shark Arm Case

PODOGRAM

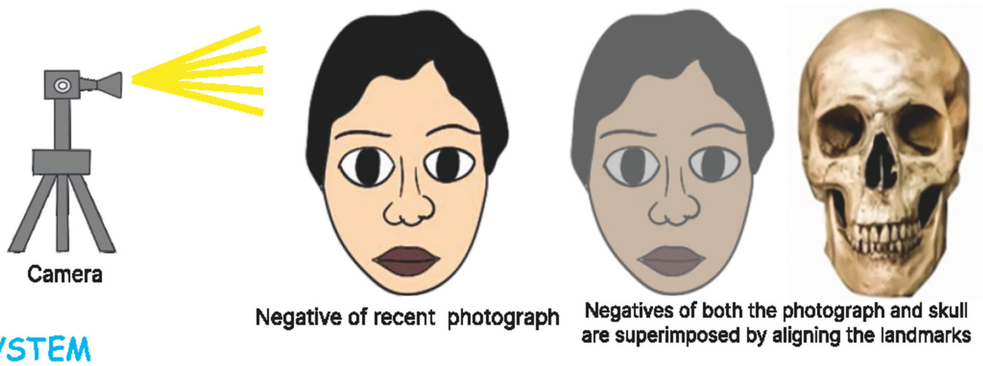
00:43:31

- Study of Footprints
- Used mainly in: Maternity hospitals (for newborn identification)

SUPERIMPOSITION TECHNIQUE

00:43:44

- This is a screening test only
- For confirmation: Need DNA analysis
- Process:
  - Take the skull bone of a deceased/unidentified person
  - Take a photograph (or negative) of the missing person
  - Overlay and match anatomical landmarks
- If matched → Proceed to DNA confirmation



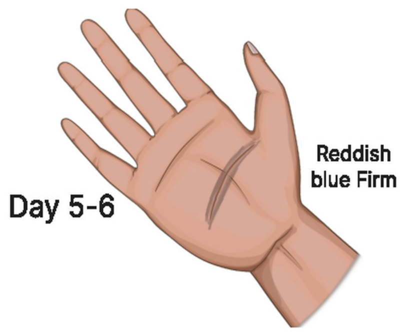
BERTILLON SYSTEM

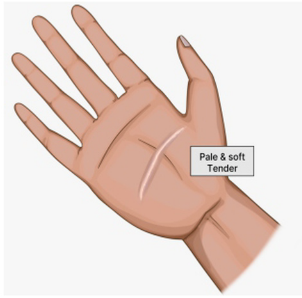
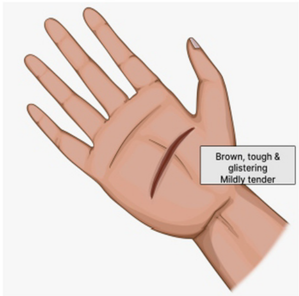
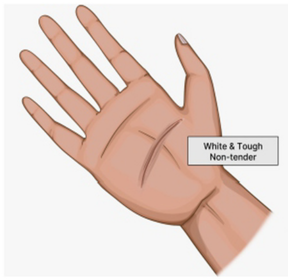
00:44:44

- AKA Portrait Parlé / Anthropometry
- Used for Missing person identification
- Four Criteria:

Criterion	Details
1. Body Measurements	Height, length (Anthropometry)
2. Descriptive Data	Complexion, hair color, eye color
3. Body Marks	Scar marks, mole marks, tattoo marks
4. Photographs	

SCAR MARKS

Time Period	Appearance	Characteristics
5-6 days	Red, blue, firm	Angry scar 

2 weeks - 2 months	Pale, soft, vascular	Tenderness present 
2-6 months	Brown, tough, glistening	Mild tenderness (still present) 
>6 months	White, tough, non-tender	Non-vascular 

OTHER IDENTIFICATION METHODS

- Frontal Sinus:
  - Size, shape, and symmetry
  - Useful up to: 15 years of age
  - Very useful identification method
- Concealed Sex:
  - Famous Case: Colonel Victor Barker (Hidden sex case)

ERROR FILES FOR IDENTIFICATION

- Female Skeletal Features
  - General Rule: In females, all structures are small. Except
    - → The greater sciatic notch is larger in females compared to male
- Female Bone Shapes
  - General Rule: In females, all structures, such as the foramen, orbit, chin, and mandible, are round
  - Except
    - → The obturator foramen is triangular in female
    - → Remember: ONT = Obturator spelling NoT round
- Bony Index Values
  - General Rule: All bony index values are higher in females

- Except (2 indices higher in male) - Trick: MC:
  → M for Male
  → C for Corpo-basal index (of sacrum)
  → C for Linea aspera index (Chilotic line index)
- Fingerprint Core and Delta

Pattern	Cores	Deltas	Memory Aid
Loop	1	1	L-O-O-P → One-One
Arch	0	0	No "O" → No-No
Whorl	1-2	2	One-Two-Two

PYQ

Q. During a forensic examination, a skull bone was brought by police whose cephalic index 85 skull belongs to which race? FMGE Jan 2025

A. Negroes
B. Aryan
C. European
D. Mongoloids

Ans.: D Mongoloids

Explanation: Cephalic index 85 falls in the Brachycephalic range (80-84.9%), which is characteristic of Mongoloid race.

Q. Which trait is a feature of the FEMALE skull? INICET Nov 2021

A. Larger teeth
B. Mastoid medium-large
C. Mandible Rounded
D. Zygomatic is more pronounced

Ans. C Mandible Rounded

Explanation: The female skull has a rounded mandible/chin, while the male has a square chin. All other options (larger teeth, large mastoid, pronounced zygomatic) are male features.

Q. 10-year-old child presenting for dental examination - expected number of permanent and temporary teeth?

A. 20 & 4
B. 24 & 0
C. 16 & 8
D. 12 & 12

Ans. A 20 & 4

Explanation: From the mixed dentition table at 10 years: 20P + 4T = 24 total teeth

Q. Match tooth type with age of eruption:

A. Canine -? B. Lateral incisor -? C. First molar - ? D. Third molar -?

1. 6-7 years
2. 8-9 years
3. 11-12 years
4. 17-25 years

- A. A-1, B-3, C-2, D-4
- B. A-3, B-4, C-1, D-2
- C. A-3, B-2, C-1, D-4
- D. A-2, B-3, C-4, D-1

Ans. C A-3, B-2, C-1, D-4

Explanation: Using "Mummy Is In Pain Papa Can Make Medicine":

Q. Most reliable criterion among Gustafson's criteria for age estimation?

- A. Root resorption
- B. Paradentosis
- C. Translucency of root
- D. Attrition

Ans. C Translucency of root

Q. When do fingerprints first develop during intrauterine life?

a. 12-16 weeks
b. 20-24 weeks
c. 28-32 weeks
d. 32-36 weeks

Ans. A 12-16 weeks

Q. Following the death of a 40-year-old male patient, his relatives mention that he had a tattoo on his body. However, upon autopsy, no tattoo is observed on the skin. What is the best location to check for the presence of the tattoo?

a. Spleen
b. Artery
c. Lymph node
d. Liver

Ans. **C** Lymph node

Q. In a forensic investigation, the police recover a beheaded skull bone and receive a photograph of a missing person from their relatives. These two samples can be analyzed using which technique?

a. Fingerprint
b. DNA Fingerprint
c. Superimposition
d. Cheiloscopy

Ans. **C:** Superimposition

Q. A 30-year-old man is accused of sexually abusing a girl. The mother insists her daughter is under 18, but the daughter claims she is already 18. To legally verify her age, which combination of X-rays would provide the most reliable information?

INICET May 2025

a. Elbow and shoulder

b. Sternum and medial end of clavicle

c. Wrist, medial end of clavicle, and pelvis

d. Skull and Sternum

Ans. **C:** Wrist, medial end of clavicle, and pelvis

Yourwish

19.THANATOLOGY

THANATOLOGY

00:00:05

- Thanatology: Study of death

Types Of Death

Somatic/Clinical Death	Molecular / Cellular Death
• Complete and irreversible cessation of respiration, circulation, and brain function • Pupil reaction absent	• Death of individual cells and tissues after somatic death

Supravital Interval

- Time interval between somatic death and cellular death
- Organ harvesting for transplantation is performed during this period

Zasko's Phenomenon

- Upward movement of the patella when the lower one-third of the quadriceps muscle is struck with a hammer.
- Occurs 1-2 hours after death
- Also called tendon reaction

Bichat's Mode Of Death

- Depending on dysfunction
  - Asphyxia
  - Syncope
  - Coma

Atria Mortis (gateway Of Death)

- Respiration
- Circulation
- Brain function
- Stopping of any of these → Somatic death

Suspended Animation- Dissolved Oxygen

- Person appears dead but is actually alive
- Signs of life are minimal but not absent
- CPR can revive the person

Causes Of Suspended Animation

- After anesthesia
- Newborn babies
- Barbiturate poisoning

- Cholera
- Concussion/brain injury
- Cachexia (TB, cancer)
- Drowning
- Electrocution
- Hypothermia/hyperthermia
- Sunstroke
- Shock
- Insane
- Insulin coma
- Typhoid
- Trance (yoga)- Voluntary

POSTMORTEM CHANGES

00:03:20

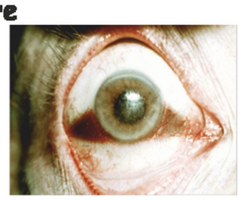
- Taphony (Decay to preservation)

Signs Of Death

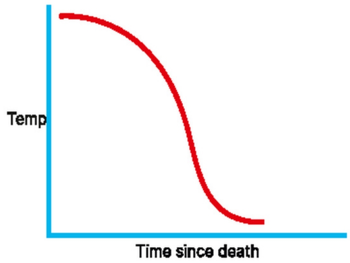
Type	Examples
Immediate signs	Insensibility, loss of voluntary power, cessation of respiration & circulation
Early signs	Algor mortis, rigor mortis, livor mortis, loss of skin elasticity
Late signs	Putrefaction, adipocere formation, mummification

Eye Changes After Death

FMGE June 2024

1. Kevorkian sign / Railroad Phenomenon Kevorkian sign-Segmented retinal vessels within minutes to one hour after death 	• Also called the train-track appearance • Segmented retinal vessels are seen due to cessation of circulation • Appears within minutes to 1 hour • Seen by ophthalmoscope • The earliest eye sign of death
2. Intraocular Pressure	• Normal: ~20 mmHg • Falls to zero within ~2 hours after death • Eyeball becomes soft and flaccid
3. Corneal Changes	• Hazy cornea: ~1 hour after death • Opaque cornea: ~6 hours after death
4. Tache Noire 	• Scleral discoloration is seen when eyes remain open after death • Initially yellowish, later brownish-black • Appears 3-6 hours after death • Helps estimate time since death

5. Vitreous Humor changes	• Biochemical changes useful for **estimating time since death.** o Potassium ↑ o Hypoxanthine ↑ o Glucose ↓ INI CET Nov 2021 FMGE Dec 2021 FMGE Jan 2025 • Formulas used for Potassium estimation o Stuners formula o Madeas formula



Algor Mortis

- Cooling of the body after death
- Begins ~15 minutes after death.
- Measured using a rectal Thanatometer
- Length: 25 cm
- Range: 0-50°C
- Ideal site: Rectum
- **Cooling Curve**- Body temperature vs time shows an sigmoid/inverted S-shaped curve.
  - Isothermal phase
  - Steep decline
  - Gradual decline

Formula To Calculate Time Since Death

00:07:30

- **TSD** = $\frac{NBT-RT}{ROF}$

Where:

- TSD: Time since death
- NBT: Normal body temperature
- RT: Rectal temperature
- ROF: Rate of fall of temperature

Rate Of Fall Of Temperature

Summer	Winter
• 0.75°F/hour • 0.4°C/hour	• 1.5°F/hour • 0.6°C/hour

Postmortem Caloricity

- Temporary rise in body temperature after death

Causes (sss Rule)

Cause	Similar conditions	Mechanism
• Sunstroke	• Pontine Hemorrhage	• Heat regulation failure
• Strychnine poisoning	• Tetanus	• Muscle activity increased
• Septicemia	• Cholera	• Bacterial activity increased

Postmortem Lividity (livor Mortis)

00:09:25

Other Names

- Hypostasis
- Livor mortis
- Postmortem staining
- Sugillation
- Vibices

Mechanism

- After death → venous blood settles in dependent parts
- Causes bluish-purple discoloration

Location

- Present in dependent parts of the body
- Absent in pressure areas

Visible after two hours

Timeline

- Begins: 30 minutes
- Visible: ~2 hours
- Maximum: 6-12 hours
- Fixation: 7-8 hours
- Persists until decomposition: After decomposition skin turns green

Distribution Based on Body Position

- Supine position: Back
- Prone position: Front
- Hanging: Hands & feet (glove and stocking pattern)
- Running water: Absent

Medicolegal Significance

- Time since death
- Position of the body after death
- Cause of death

Color Changes In Poisoning

- Color of lividity may suggest cause of death.

Cause	Color of Lividity
Carbon monoxide	Cherry red
Cyanide	Bright red / Brick red
Hypothermia	Bright pink

Hydrogen sulfide	Blue-green
Opium poisoning	Black
Phosphorus, Aniline, Nicotine, Nitrobenzene	Chocolate brown
Methanol	Purple
Clostridium perfringens infection	Bronze

Rigor Mortis

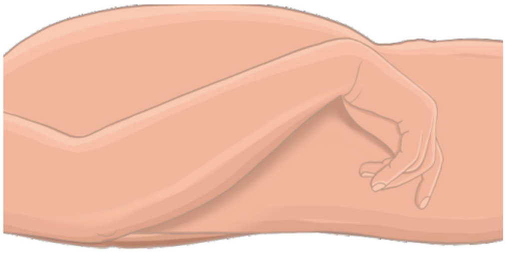
00:12:18

NEET PG August 2024

- AKA Cadaveric rigidity
- Stiffening of muscles after death due to ATP depletion.

Stages Of Muscle After Death

Primary Relaxation (Primary Flaccidity)	• Occurs immediately after somatic death • Actin and myosin are separated • Muscles relaxed

Rigor Mortis	• Occurs due to ATP depletion
	  o Begins when ATP falls to ~85%
	  o Maximum when ATP falls to 15-30%
	• Actin and myosin remain attached
	• Causes stiffness in muscles
	• Features:
	  o Stiffening
	  o Shortening
	  o Opacification of muscle fibers
	• Begins 1-2 hours after death
	• Involves all muscles (voluntary & involuntary)
	
	Begins after 1-2 hours of death
	
	
	Direction of Spread (Nysten's Law)
	• Head → Toe
	• First Muscle Involved- Myocardium
	• First External Muscle- Upper eyelid
	• Sequence:
	  o Eyelids → Neck → Lower jaw → Face → Chest → Upper limbs → Abdomen → Lower limbs → Fingers and toes
	Rule of 12
	• 1st 12 hrs- Appears in all body muscles
	• Next 12 hrs- Remaining body muscles
	• Next 12 hrs- Disappears from all body muscles
	• Total duration: **36-48 hours**
	• Disappears in the same order in which it appeared
	Factors Affecting Rigor Mortis
	• **Age**
	  o **Absent in fetus < 7 months**
	  o Lack of actin-myosin filaments.
	• **Seasonal Variation**
	  o **Summer:** 18-36 hours
	  o **Winter:** 24-48 hours

Condition	Onset	Duration
Violent Death: Firearm, cut throat	Early	Short
Strychnine Poisoning	Early	Long
Arsenic Poisoning	Late	Long
Wasting Diseases (TB, Cancer, Typhoid)	Early	Short

Secondary Relaxation	• Occurs due to decomposition • Muscle proteins break down • Muscles become flaccid again

Other Types Of Postmortem Stiffening

Heat Stiffening	• Also called Boxer attitude, Pugilistic attitude, Fencing attitude, Defense attitude **Features:** • Occurs when the temperature is >65°C • Caused by the coagulation of muscle proteins • Normal rigor not seen • Persists after decomposition • Seen in burns and high-voltage electric shock
Cold Stiffening	• Occurs below -5°C • Due to the freezing of body fluids/hardening of subcutaneous fat • Normal rigor is seen • In warm atmosphere, it disappears
Gas Stiffening	• Occurs during decomposition • Caused by gas accumulation • Appears 2-3 days after death

Cadaveric Spasm

00:17:28

INI CET Nov 2023
FMGE Jan 2023
FMGE June 2024

- Also called Instantaneous rigor or Cataleptic rigidity
  - Instant stiffening of muscles at the moment of death

Mechanism

- Same as rigor mortis (ATP depletion)
- Occurs in muscles actively contracting before death

Key Features

- Occurs **immediately after death**
- **Primary relaxation absent**
- Involves **small group of muscles**

Medico-legal Importance

- Helps determine the **manner of death**
- Examples:
- **Suicide:** Weapon grasped in hand
- **Drowning:** Grass or weeds clenched in hand

Causes Of Cadaveric Spasm

- Asphyxial deaths
- Brain injury
- Cerebral injury
- Drowning
- Dinitrocresol poisoning
- Extreme exhaustion
- Firearm injuries
- Fear or emotional stress

Cadaveric Spasm Vs Rigor Mortis

Feature	Cadaveric Spasm	Rigor Mortis
Onset	Immediate	1-2 hours
Muscles involved	Small group	Whole body
Primary relaxation	Absent	Present
Electric stimulus	Response present	No response
Significance	Manner of death	Time since death
Breakability	Cannot be broken	Can be broken

Decomposition

00:20:28

- Late sign of death
- Surest sign of death
- Two Main Processes
  1. Autolysis
  2. Putrefaction

Autolysis

- Self-digestion of tissues by **lysosomal enzymes**
- Features
- First occurs in the brain
- Earliest sign → clouding of the cornea
- Maceration in intrauterine death

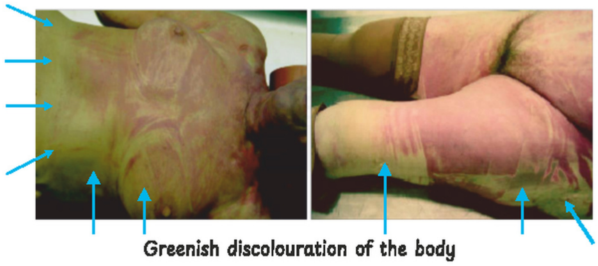
Putrefaction

FMGE Dec 2021

- Decomposition due to bacterial activity
- Most common organism: Clostridium perfringens (Clostridium welchii)
- Main enzyme: Lytic enzymes
- Stages of Putrefaction
  1. Color changes
  2. Gas formation
  3. Liquefaction

Colour Changes

- First Internal Change
  - Reddish-brown discoloration of the aortic endothelium
- First External Change
  - Greenish discoloration of the right iliac fossa
  - Cecum contains the maximum bacteria
- Mechanism:
  - Bacteria release H_2S
  - Combines with hemoglobin → **Sulfhemoglobin**
- **Time of Appearance**
  - Summer: 12-18 hours
  - Winter: 1-2 days



Greenish discolouration of the body

After 12 to 18 hours in summer and 1-2 days in winter

FMGE Jan 2025

MARBLING

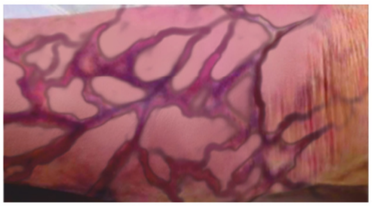
00:23:28

Mechanism

- Involves chest, shoulder, neck, thigh, abdomen
- Superficial veins are stained or prominent
- Linear branching
- Greenish brown
- D/t Sulfhemoglobin formation

INI CET Nov 2022

Prominent in 36-48 hours



Features

- Appears 24 hours after death
- Prominent at 36-48 hours
- Corresponds to the vascular changes
- Gives time since death

Filigree Burn

- Seen in lightning injuries
- D/t denaturation of proteins
- Colour changes- Pink, erythematous
- Does not correspond to the vascular changes

Maggots

00:24:29

- Larvae of flies such as Musca domestica
- Appears in 1-2 days after death and earlier in rainy season
- Prefer: Natural body openings to lay eggs
- Study of Maggots- Forensic entomology
- Study of poison in maggots- Entomotoxicology
- Gives idea about time since death

Life Cycle

- **Summer**- Total cycle: 5-10 days
  - Maggots → 1-2 days
  - Pupae → 3-6 days
  - Adult fly → 3-6 days
- **Winter**- Total cycle: 8-20 days

Postmortem Purge

- Gas formation in the abdomen
- Expulsion of blood stained froth, & Gastric contents from the mouth & nostrils
- Seen around **2-3 days** after death

Postmortem Luminescence

- Light emitted from the dead body
- Caused by:
- Photobacterium (bacteria)
- Agaricus / fungal organisms

Other Late Decomposition Signs

Change	Time
Post-mortem purge/Gas stiffening	2-3 days
Uterine & anal prolapse	2-3 days
Hair & teeth loosen	2-3 days
Skin peeling (glove & stocking pattern)	3-5 days
Separation of ununited sutures	3-5 days
Liquefaction / colliquative necrosis	5-10 days

Sequence Of Organ Putrefaction

Mnemonic: "Lata sis living in BHU"

Early organs- Lata	• Larynx • Trachea
Intermediate organs	**sis** • Stomach • Intestine • Skin **Living** • Liver • Lungs
Last organs- BHU	• Brain • Heart • Uterus **Last organs to decompose** • Female: Non-gravid uterus • Male: Prostate • Skin, muscle, tendon • **Overall last organ-** Bone/tooth

Yourwish

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Important Points of Putrefaction

- Liver (in 24-36 hrs)- Honeycomb/foamy appearance
- Ideal range: 21-38°C
- Begins around 10°C
- Poisons That Inhibit Putrefaction **(Mnemonic: MSC)**
  - Metallic poisons- Arsenic, Antimony
  - Strychnine
  - 3 C's- Cyanide, Carbon monoxide, Carbolic acid
- **Amino Acid Changes in Decomposition**
  - First to disappear: Proline & Hydroxyproline
  - Last to disappear: Glycine
  - If <7 amino acids present → bone ~100 years old

Casper's Dictum By Taylor

00:29:00

- Shows the rate of decomposition in different environments

Mnemonic: AWEsome

Environment	Time
Air	1 week
Water	2 weeks
Earth (soil)	8 weeks

Modifications Of Putrefaction

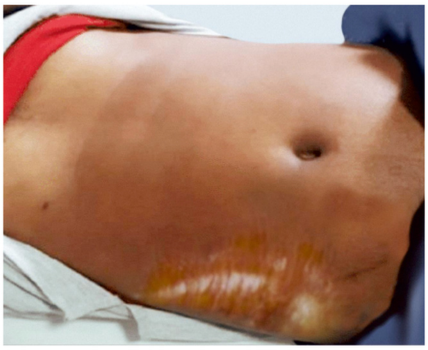
00:29:25

INICET Nov 2025
NEET PG August 2024

- Two main types:
  - Adipocere formation
  - Mummification

Adipocere

- AKA Grave wax, Saponification
- Occurs in:
  - Warm & humid climate
  - Damp soil
  - Bodies in water
- Enzyme- Intrinsic lipase
- Bacteria involved- Clostridium welchii
- Mechanism
  - Fat hydrolysis
  - Hydrogenation of fatty acids- Palmitic acid, Oleic acid, Stearic acid
  - These combine with Calcium & Ammonium to form soap-like substance (adipocere)
- Common Site- Fat-rich areas
  - Face, Buttocks, Abdomen, Breast, Thigh
- Appearance
  - Fresh adipocere- Soft, Moist, Greasy, White, Rancid butter appearance
  - Old adipocere- Dry, Hard, Brittle, Yellow
- Smell- Ammonical offensive smell
- Pseudo smell- Clothes



After 3 days to 3 months

- Timeline- Begins 3-4 days, Complete 3 months
- Fetus <7 months- Absent
- Important Features
  - Gives idea about climate
  - Preserves body structures
  - Helps in identification and TSF

MUMMIFICATION

00:31:50

- Second type of decomposition
- Dehydration and drying of body tissues
- **Climate**
  - Hot
  - Dry environments
- **Natural features are preserved. Mechanism**
  - Loss of >70% body weight
  - Severe dehydration
  - Body becomes shrunken and leathery
- **Time Required**
  - 3 months - 12 months
- **Favoring Factors**
  - Arsenic
  - Antimony in soil
- **Smell**- Odorless or faint smell
- **Features**
  - Body features preserved
  - Identification easier
  - Helps estimate & time since death
- Mummification is seen in intrauterine death when:
  → Amniotic fluid is scanty
  → Blood and oxygen supply are reduced

EMBALMING

00:33:18

- AKA Thanatopraxia
- Artificial preservation of the dead body within 6 hours.

Embalming Fluid Components

Component	Substance
Preservatives	Formalin / Formaldehyde / Methanol
Antiseptic	Phenol
Wetting agent	Glycerin
Anticoagulant	Sodium citrate
Buffer	Sodium carbonate/Cl
Vehicle	Water

Methods Of Embalming
- Arterial method
- Cavity method
- Surface method
- Hypodermic method
- **Best Method-** Discontinuous injection and drainage

Important Points
- High-pressure, low-volume injection
- Best vessel: Femoral artery
- Should be done after post-mortem
- Embalming before autopsy may alter the cause of death

Preservation of Unknown Bodies
- Must be preserved for at least 72 hours
- To allow identification by relatives

Stomach Emptying Time
- Helps estimate time since last meal.
- If identifiable food present → eaten within ~2 hours

Type of Meal	Time
Light meal	1-2 hours
Medium meal	3-4 hours
Heavy meal	5-8 hours

ANTEMORTEM VS POSTMORTEM BLISTERS

00:35:55

Feature	Antemortem Blister	Postmortem Blister
Content	Albumin + chloride	Gas / clear fluid
Base	Erythematous	Pale
Redness	Present	Absent
Vital reaction	Present	Absent

Error Files
- First organ to decompose- Larynx & trachea
- Last to be decomposed is brain, heart, & kidney
- In femal last organ to decompose is the non-gravid uterus
- In male last organ to decompose is the prostate
- Overall, the last organ is the bone/Tooth
- First muscle with rigor mortis: Myocardium
- First external muscle: Upper eyelid

Yourwish

PYQ

Q. Which of the following eye signs can be appreciated in the image? FMGE June 2024

a. Tache noire

b. Kevorkian sign

c. Corneal changes

d. Vitreous humour changes

Ans. a. Tache noire

Q. Identify the following post-mortem change: INI CET Nov 2021

a. Tattooing

b. Sugillation

c. Putrefaction

d. Decomposition

Ans. b. Sugillation

Q. What is the first postmortem change that occurs in a dead body? FMGE Dec 2021

a. Maggot formation

b. Putrefaction

c. Greenish discoloration of the right iliac fossa

d. Mummification

Ans. c. Greenish discoloration of the right iliac fossa

Q. A body brought for autopsy is cold and has developed rigor mortis in all 4 limbs and livor mortis at the back/fixed, but no signs of putrefaction. What will be the estimated time since death? FMGE Jan 2025

a. 12-24 hrs

b. 6-12 hrs

c. 24-48 hrs

d. 36-48 hrs

Ans. a. 12-24 hrs

Q. Post-mortem examination of a dead body reveals contraction of the hands with absent primary relaxation. What is this suggestive of? FMGE July 2023

a. Rigor mortis

b. Livor mortis

c. Cadaveric spasm

d. Algor mortis

Ans. c. **Cadaveric spasm**

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Q. Identify the postmortem change given in the following image. INICET Nov 2022

a. Marbling

b. Tattooing

c. Lividity

d. Filigree burns

Ans. a. Marbling

Q. Sequence of rigor mortis is? NEET PG August 2024

a. Center to periphery

b. Head to foot

c. Foot to head

d. Simultaneously

Ans. b. Head to foot

Q. Identify the finding that is seen in antemortem drowning? FMGE June 2024

a. Cadaveric spasm

b. Pugilistic attitude

c. Washerwoman's hand

d. Emphysema aquosum

Ans. a. Cadaveric spasm

Q. A vegetable vendor with no criminal history went missing and was found dead a week later with advanced decomposition. How would you identify the body? FMGE June 2024

a. General recognition

b. DNA profiling

c. Dental records

d. Fingerprints

Ans. b. DNA profiling

Q. Which of the following is true regarding adipocere formation? NEET PG August 2024

a. Preservation by saponification

b. High temperature needed

c. Cool and dry climate needed

d. Occurs within minutes to hours

Ans. a. Preservation by saponification

20. TOXICOLOGY

TOXICOLOGY VS TOXINOLOGY

00:00:10

- Toxicology: Study of poisons.
- Toxinology: Study of toxins (plant or animal toxins).
- Founder of Modern Toxicology: Orfila
- Father of Modern Toxicology: Paracelsus

POISON CLASSIFICATIONS

00:00:24

Ideal Homicidal

- Primary choice: Thallium.
- Most commonly used: Arsenic and Aconite.

Properties

- Colorless, odorless, and tasteless.
- Produces slow and gradual death.
- Signs and symptoms resemble natural diseases.
- No post-mortem changes.
- No antidote.
- Rapidly destroyed in the body (undetectable by doctors).

Ideal Suicidal Poison

- Primary choice: Cyanide.
- Most commonly used: Organophosphates (OP), Opium, and Barbiturates.

Properties

- Cheap and easily available.
- Highly toxic and tasteless.
- Produces a painless death.

LEGAL AND MEDICAL RESPONSIBILITIES

00:01:38

Informing The Police

- Police must be informed in cases of:
    - Homicide.
    - Any suspicious poisoning.
    - Unknown cases of poisoning.
    - Suspicion of suicide.
- Police notification is not mandatory for an attempt of suicide
- Dying Declaration should be arranged if the person is of sound mind.
    - Section 26 BNS.

Ndps Act 1985

- Narcotic Drugs and Psychotropic Substances Act.
- Included drugs (LMP COPI):
  - LSD
  - Methamphetamine
  - Phencyclidine
  - Cocaine
  - Cannabis
  - Poppy

Punishments

- Possession (small amount): 6 months imprisonment or ₹ 10,000 fine.
- Commercial use: 10-20 years imprisonment and ₹ 1-2 lakh fine.
- Consumption: 6 months rigorous imprisonment + ₹ 20,000 fine.
- Illegal cultivation: 10 years imprisonment + ₹ 1 lakh fine.

Drug And Cosmetic Rule - 1945

- Schedule C: Biological drugs.
- Schedule E: Poisons.
- Schedule F: Blood, sera, and vaccines.
- Schedule G: Hormonal drugs.
- Schedule H: Drugs prescribed by Registered Medical Practitioners (RMP).
- Schedule J: Drugs not to be advertised (e.g., AIDS, Diabetes, Blindness).
- Schedule X: Drug abuse/addictive drugs.

TOXICOLOGICAL ANALYSIS

00:04:10

Viscera Preservation

- Viscera to be preserved:
  - Stomach and its contents.
  - Small intestine (30 cm) and its contents.
  - Liver (500 grams) with the gallbladder.
  - Half of each kidney
  - Half of the spleen.
- Fluid Samples: Blood (100 ml) and Urine (100 ml).

Chemical Preservatives

- Blood: Sodium fluoride and Potassium oxalate.
- Urine: Toluene or Thymol.
- Viscera:
  - MC for Toxicological Analysis: Saturated solution of common salt.
  - Ideal: Rectified spirit (expensive).

Contraindications Of Rectified Spirit

- Phenol
- Alcohol

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- Paraldehyde
- Phosphorus
- Acetic acid.

Special Preservation

- Putrefied body: Muscle (especially the buttock muscle).
- Organochlorine (DDT, Endrin): Body fat.
- Heavy metals (Arsenic, Antimony): Bone, hair, and nail.
- Gaseous poison: Lung.
- Alcohol/Glutathione/Barbiturate/Opium/Nicotine: Gallbladder and bile.
- Strychnine: Spinal cord.
- Organophosphate and Cerebral poisons: Brain.
- Ethanol: Cerebrospinal fluid (CSF).
- Aconite and Cardiac poisons: Heart.

Special Smell

- Fruity/sweet smell: Alcohol.
- Acrid: Paraldehyde.
- Rotten Egg (Sewer gas): Hydrogen sulfide
- Rotten fish: Aniline.
- Kerosene odour: Organophosphate.
- Fishy or musty: Zinc phosphide.
- Bitter Almond: Cyanide.
- Burnt Rope: Cannabis.
- Shoe polish: Nitrobenzene.
- Garlic: Arsenic, Phosphorus, and Thallium.

Poisons Causing Pct Necrosis

- Phenol (Lysol)
- Carbon tetrachloride
- Mercury.

CLINICAL MANAGEMENT

00:07:29

INICET 2025
FMGE 2021, 2024

Gastric Lavage

- AKA: Stomach wash
- Indication: Oral poisoning.
- Tubes:
  - Child: Ryle's tube.
  - Adult: Ewald or Boas tube.
  - Length: 150 cm (marked at 50 cm from the tip).
  - Ideal tube: Lavacuator tube
- Ideal timing: Should be done within 3 hours of poisoning.

Ewald tube

Lavacuator tube

Lavage Fluids

- Most common: Warm water and Normal saline.

- Potassium Permanganate (1:5000): For Opium poisoning.
- STSC:
  - Sodium bicarbonate
  - Tannic acid
  - Sodium/Potassium iodide
  - Calcium lactate.
- Parenteral poisons requiring Gastric Lavage (Mnemonic: Maruti CAB):
  - Morphine
  - Cocaine
  - Amphetamine
  - Barbiturates
- Lavage for Heavy Metals: (Gastric lavage fluids are freshly prepared)
  - Arsenic: Ferric oxide.
  - Mercury: Sodium formaldehyde sulfoxylate.
  - Copper: Penicillamine or Potassium ferrocyanide.

Contraindications For Gastric Lavage

ABSOLUTE	RELATIVE (Mnemonic: CVP-Heart)
• Corrosives (Thin mucosa → risk of perforation) ◦ Exception: Carbolic acid (due to leathery mucosa)	• Convulsions and Coma. • Volatile poisons (Kerosene/Hydrocarbons) → risk of aspiration and esophageal varices. • Pregnancy. • Heart disease, Hypothermia, and Hemorrhagic diathesis.

Antidotes And Antagonists

Universal Antidote

INICET 2024, 2025

- Composition: (Mnemonic: ATM)
  - Activated charcoal (2 parts), Tannic acid (1 part), Magnesium oxide (1 part).
    → Activated charcoal: Physical/Mechanical antidote; dose is 1g/kg; adsorbs poison.
    → Tannic acid: Precipitates alkaloids.
    → Magnesium oxide: Causes oxidation.

Coma Cocktail

- Dextrose (for hypoglycemic coma)
- Naloxone (for Opium coma)
- Vitamin B1/Thiamine (for Ethanol/Alcoholic coma)

Emetics

- Best: Ipecac syrup (30 ml).
- Contraindications: Convulsions, Corrosives, Coma, and Hydrocarbons.

Antagonism Types

- Physical:
  - Adsorption (Charcoal)
  - Coating or dissolving (Milk/Starch).
- Chemical: Neutralization
  - e.g., Acid vs Alkali; Copper sulfate vs Phosphorus
- Physiological: Opposite action at different receptors
  - e.g., Cyanide vs Amyl nitrite
- Pharmacological: Opposite action at the same receptor
  - e.g., Organophosphate vs Atropine

Specific Antidotes

- Paracetamol: N-acetylcysteine.
- Methanol: Ethanol and Fomepizole.
- Carbon monoxide: Oxygen.
- Benzodiazepine: Flumazenil.
- Opiate: Naloxone.
- Organophosphate: Atropine.
- Cyanide: Amyl nitrite, Sodium nitrite, and Sodium thiosulfate (Triple antidote)
  - Best = Vitamin B12.
- Thallium: Prussian blue.
- Methemoglobinemia: Methylene blue.

Chelating Agents For Heavy Metals

INICET 2022

- BAL (British Anti-Lewisite/Dimercaprol):
  - Used in arsenic, lead, copper, mercury, thallium, and antimony poisoning
  - Contraindicated in Cadmium and Iron poisoning.
  - Contraindicated in Liver failure and G6PD deficiency.
- EDTA: Used in Lead; contraindicated in Mercury.
- DMSA: Oral chelator; used in Lead.
- Penicillamine: Used in Copper; contraindicated in Arsenic.
- Desferrioxamine: Used in Iron and radioactive heavy metals.

Contraindication For Hemodialysis

- Kerosene
- Benzodiazepines
- Chloroquine
- Copper sulfate
- Heroin
- Organophosphates
- Digitalis.

Forced Diuresis

- Alkaline Diuresis: Phenobarbitone, Sulfonamide, Methotrexate, Chlorpropamide, and NSAIDs (Aspirin).
- Acidic Diuresis: Morphine, Amphetamine, Cocaine, Quinine, and Strychnine

Stomach Mucosa Appearance

- Slatey color: Mercury.
- Black: Sulfuric acid.
- Yellow (Xanthoproteic reaction): Nitric acid.
- Buffed white: Carbolic acid.
- Blue/Green: Copper sulfate.
- Green: Ferrous sulfate.
- Blue Amber: Amytal.
- Pink: Soneryl.
- Brown: Cresol.
- Grayish-white/Yellow: Phosphorus.

ASPHYXIANT GASES

00:15:16

Carbon Monoxide (Silent Killer)

Properties

- Colourless
- Odourless
- Lighter than oxygen
- Nonirritating

Mechanism

- Affinity for Myoglobin (40x more) and Hemoglobin (210x more).
- Oxygen-Hb dissociation curve shifts → Left.
- Causes anemic hypoxia and High Anion Gap Metabolic Acidosis (HAGMA).

Sources Of Co Poisoning

- May be accidental or suicidal (West)
  - Accidental reasons
    - → Car engine
    - → Chimney
    - → Heater → Gasolene

Clinical Features

- CO Automatism: Erratic movements of dying victim inside the room, disturbing clothings and furniture, which indicate a violent struggle
- Upper safety limit: 0.01% CO in air
- Toxicity Levels:
  - 10-20%: Headache and muscle weakness.
  - 30-40%: Dizziness, disorientation, judgment (emotional) impaired
  - 40-50%: Similar to drunkenness-ataxia, seizures, speech dissociation
  - 50-60%: MI or cardiac arrhythmia.
  - 60-70%: Coma and death.

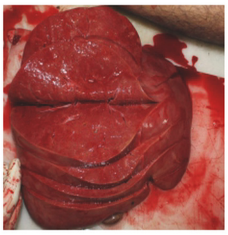
Management

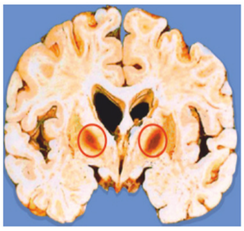
- 100% Oxygen with high flow until COHb <15-20% → Displaces CO

Yourwish

- Hyperbaric oxygen → Risk of barotrauma and rebound toxicity

Diagnostic Test
- Wetzel test
- Hoppe-Seyler test
- Kunkel test
- Spectroscopy.





Post Mortem Findings
- Cherry red post-mortem staining.
- Blisters in dependent or frictional areas
  - Axilla, buttocks, inner thigh, calves, wrists, knees
- Brain: Bilateral symmetrical necrosis and cavitation of Globus Pallidus and Putamen.

Cyanide

00:18:20

Properties
- Produced in seeds of Apple, Apricot, Almond, Peach, Plum, and Linseed.
- Smell: Bitter almond.
  - Perceived in sex-linked recessive trait
- Ideal suicidal poison.

Forms
- Liquid: Hydrocyanic acid (Prussic/Schelle's acid).
- Gas: Cyanogen

Mechanism
- Salt - KCN, NaCN + HCL → HCN (absorbed)
  - Requires gastric HCl for absorption
  - Achlorhydria → no effect
- Binds with Cytochrome Oxidase.
  - Cella cannot utilize O_2
  - Causes histotoxic/cytotoxic anoxia.

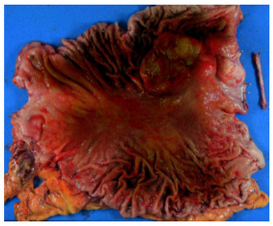
Clinical Features
- Dizziness, vertigo, and constriction of throat following inhalation
- Nausea, headache, loss of muscular power, hypotension, cardiovascular failure, convulsion following ingestion.
- Death occurs from respiratory failure

Uses Of Cyanide- Efgp
- Electroplating, Fumigation, Goldsmith, and Photography.

Treatment
- Best: Vitamin B12 (Hydroxocobalamin → Cyanocobalamin).
- Eli Lilly Antidote (Triple Antidote):
  - Amyl Nitrite (Inhalation).

- Sodium Nitrite (IV).
- Sodium Thiosulfate (50%).
  → Hemoglobin → Methemoglobin → Cyanmethemoglobin
  → Thiosulfate converts Cyanmethemoglobin to Thiocyanate (excreted in urine).
- Others:
  - Sodium bicarbonate for acidosis
  - Methylene blue
  - PAPP (Para-amino-propio-phenol)

Post Mortem Findings


Brick red staining 00:21:32

- Brick red/Bright red staining.
- Bitter almond smell.
- Test: Lee-Jones test.

Hydrogen Sulphide

Properties

- Formed during the decomposition of organic substances
- Smell: Rotten eggs.
- Sudden loss of consciousness → Knockdown gas
- AKA: Sewer gas

Detergent Suicide

- In Japan
- Bath salt (Sulfur) + Toilet bowl cleaner (HCl) → H_2S formation.

Management Of Hydrogen Sulphide Poisoning

- Hyperbaric oxygen and Nitrites.

ORGANIC PLANT IRRITANT POISONS

00:23:04

Ricinus/Castor Plant

- Names: Arandi or Castor plant.
- Fatal Dose: 10 seeds.
- Toxin: Ricin (Tox-albumin).
- Mechanism: Inhibits RNA polymerase; causes RBC agglutination.
- Clinical Features: Burning pain, abdominal pain, and bloody diarrhea.
- Biological Warfare: Category B.

Croton Tiglium

- Names: Jamal Gota or Napala.
- Fatal Dose: 4-5 seeds.
- Active Principle: Crotin.
- The entire plant is poisonous
- Effect: Strong purgative.
- Appearance: Rough and larger seeds compared to Ricinus.

Abrus Pecatorius

- Names: Ratti, Gunja, Liquorice, Jequirity/Rosary
- Fatal Dose: 1-2 seeds.
- Active Principle: Abrin (most potent), Abrine, Abralin
- Mechanism: Acts like Viper venom; causes local necrosis and systemic symptoms
- Ideal Cattle Poison: Used as needles ("Suis") made of crushed seeds (Size: 15 mm)
- Treatment: Gastric lavage, Anti-abrin, and surgical excision of Suis.


Semecarpus Anacardium/Marking Nut

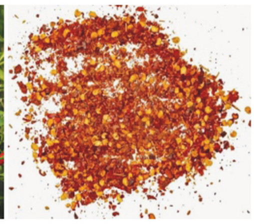
- Names: Bhilawa, Marking nut
- Shape: Heart-shaped seed.
- Active Principles: Semicarpol and Bhilawanol.
- Pericarp- Irritant Juice
- Uses: Cloth marking, creating artificial bruises (juice), and GI irrit
- Fatal Dose: 5-10 grams.


Calotropis

- Types: Gigantea (purple) and Procera (white).
- Names: Rubber bush, Akdo, or Madar.
- Active Principles: Calotropin, Calotoxin, Calactin, Uscharin, Gigantin.
- Clinical Features (ABCD):
  - Artificial bruise, accidental
  - Abortion stick.
  - Conjunctivitis, cattle poison, convulsion
  - Dilated pupil.


Capsicum Annuum

- Active Principle: Capsacin, Capsicin
- Odour and Taste: Pungent
- Seeds Resemble Datura
- Seed-Embryo cut section shows a figure of 6
- Painful Contact Dermatitis → Hunan hand
- Uses: Torture and robbery conjunctivitis

DELIRIANT POISONS

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Datura

- AKA: Devil's Trumpet
  - Datura Alba (white)
  - Datura Niger (black)
  - Datura Stramonium (Jimson weed/Thorn apple).
- All parts are toxic
- Active principle: Hyoscine, Hyoscyamine, Atropine
- Effect: Anti-cholinergic

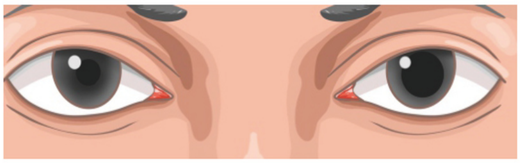
Datura alba

Datura niger

Datura stramonium


- Fatal Dose: 100-125 seeds.
- Uses: Roadside/Railway/ Robbery
- 9D Poison:
  - Dry skin.
  - Dry mouth.
  - Dysphagia.
  - Dilated pupil (early sign).
  - Drunken gait.
  - Dysarthria (difficulty in speech).
  - Delirium.
  - Drowsiness.
  - Death.

Clinical Features



- Blind as a bat
- Hot as Hare
- Dry as Bone
- Red as Beet
- Mad as Hen
- Carphologia: Hallucinations and imaginary threads.
- Pill- Rolling movements
- Corn picker pupil: Unilateral or bilateral mydriasis by dust/pollen

Management

- Stomach wash and activated charcoal.
- Physostigmine is the antidote of choice, used to counteract the anticholinergic action.
- Short-acting barbiturates to control Delirium

Medicolegal Significance

- Stupefying Agent - Roadside poison
- Love - Philter Aphrodisiac
- Accidental poisoning resembles chilli seeds

Cannabis

- Common Names: Marijuana, Hemp, Weed, Reefer
- Street names: Grass, Rope, Joints.
- Species: Cannabis indica and Cannabis sativa.
- Legal Status: Regulated under NDPS Act; illegal and punishable.
- MC illicit drug → Cannabis
- Active Principle: 9-THC (9-Tetrahydrocannabinol).

Characteristics

- Male and female plants are separate.
- Most potent parts: Flowers and leaves.

Cannabis Products

Bhang	• AKA: Siddhi/Sabji • Legal status: Legal. • Prepared from dry leaves. • Concentration: <15%. • Majoon: A sweet product made by mixing Bhang with honey and ghee.
Ganja	• Prepared from the flowering tops of the female plant. • Concentration: 15-25%. • Hookah: Combination of Ganja and Tobacco. • Reefer/Joint: A cigarette containing Ganja.
Charas/Hashish	• Prepared from the resin of the plant. • Concentration: 25-40%.
Hash Oil	• Most potent cannabis product. • Concentration: 70-90%.
Sinsemilla	• USA-based product. • Prepared from unpollinated, seedless dry flowers of the female plant.

Fatal Doses
- Charas: 2g.
- Ganja: 8g.
- Bhang: 10g/kg.

Clinical Features
- Small dose → Euphoria and disorientation.
- High dose → Euphoria and hallucinations.
- Physical effects: Appetite ↑, Sleep ↑, Coitus time ↑, and Gynecomastia.

Chronic Cannabis Use
- Leads to degeneration of the Central Nervous System (CNS).
- Hashish Insanity: Auditory or visual hallucinations.
- Delusion of persecution (delusion of harm).
- Run Amok: Homicide → Depression → Suicide.
- Amotivational syndrome.
- Flashback phenomenon → Re-experience past experience
- Hyperemesis Syndrome: Characterized by intermittent vomiting.
- Koro: Perception of shrinking organ size
  - Penis size ↓ in males; breast size ↓ in females

Treatment
- Smell: Burnt rope.
- Antidote: Diazepam.

Cocaine

- Common Names: Crack, Coke, Coca, She, White Lady, Cadillac, Snow.
- Source: Cocca leaves from Erythroxylum cocca plant
- Properties: Potent vasoconstrictor.
- Crack: Cocaine mixed with baking soda; used for smoking.
- Cocaine Hydrochloride: Salt of cocaine; pure form; taken via IV injection.
- Routes of Administration: Nasal (snorting), smoking, IV, and oral.

Mechanism Of Action

- Inhibits synaptic reuptake of Epinephrine, Norepinephrine, Dopamine, and Serotonin.
- Elevates levels of all neurotransmitters → Sympathomimetic Toxidrome
- Fatal Dose: 1g.

Clinical Features

Small Doses

- HR↑, BP↑, RR↑, Temperature↑, and Sweating↑.
- Vasoconstriction and Pupil Dilation
- Euphoria and excitement.

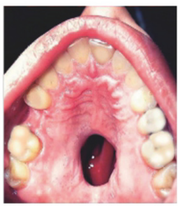
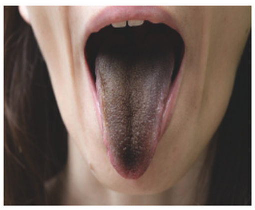
High Doses

- Cardiac Arrhythmia and Myocardial Infarction
- Brain stroke.
- Crack Fever and Delirium.
- Fixed Pupil: Differentiation from small dose dilation.
- Chronic cocaine abuse → Cocainism/Cocainomania/Cocainophagia
  - Development of tolerance to high doses.
  - Rush and Crash": Sequence of intense excitement followed by deep depression.

Triad Of Cocaine Poisoning

- Nasal/palatal septal perforation.
- Blackening of the tongue and teeth.
- Gangrene in the periphery of nasal tip, ear lobules → Due to intense vasoconstriction.

Cocaine Bug (Magnan's Syndrome)

- Formication or tactile hallucinations
- Patient feels like insects are crawling on the skin.

Diagnosis And Management

- Sample: Nasal swab.
- Antidote: Amyl Nitrite.
- Supportive treatment is essential.

Body Packer Syndrome/Mule Syndrome

- Planned drug smuggling by swallowing packets (e.g., cocaine or heroin) encased in condoms or polyethylene.
- High risk if the packets rupture.

Radiological Signs

- Bag of eggs sign.
- Double condom sign.
- Tic-tac sign.
- Halo sign.
- Radiolucent air.

Body Stuffer Syndrome

- Not-planned
- Hurried swallowing of drugs to conceal evidence from authorities.
- Risk of rupture is higher than Body Packer syndrome.

SOMNIFEROUS POISONING

00:36:11

- Opium
- Morphine
- Heroin (Semi Synthetic)

Opium

- Afim/Kasoomba/Madak
- Somniferous poison → Induces sleep.
- Source: Unripe fruit of Papaver somniferum.
  - Unripe fruit color: Greenish-blue.
  - Vertical incision on fruit → Milk (latex) exuded → Dried → Crude Opium (brown color).
- Poppy Seeds (Khas-khas): Non-toxic; used in cooking.
- NDPS ACT 1985

Opium Products

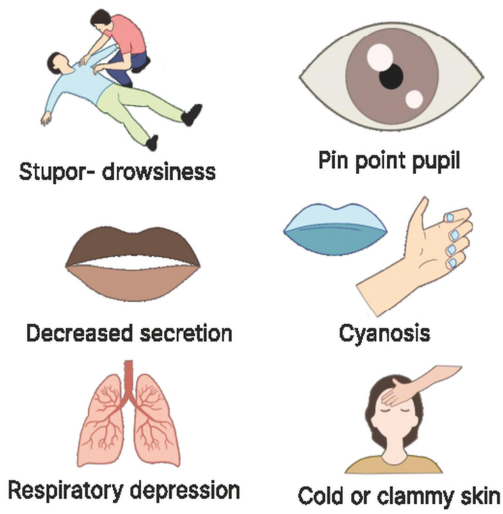
- Natural (MTC): Morphine, Thebaine, Codeine.
- Semi-synthetic: Heroin.
- Synthetic: Methadone.
- Mechanism: ↑ Release of Endorphins.

Systemic Effects

- Depresses all body centers except vomiting and sweating.
- Fatal Dose (Rule of 2):
  - Opium: 2g.
  - Morphine: 0.2g.
  - Codeine: 0.5g (1/2g).
  - Methadone: 100mg.

Stage Of Opium Poisoning

- Stage of Excitement: Excessive happiness (Euphoria).
- Stage of Stupor: Drowsiness, pupil constriction, and cyanosis.
- Stage of Coma
  - Hypothermia
  - Respiratory depression.
  - Pinpoint Pupil.
  - Secretions ↓ (Except sweating).



Classic Triad Of Coma

- Coma.
- Respiratory depression.
- Pinpoint pupil.

Important Information

- M - Miosis
- O - Orthostatic Hypotension
- R - Respiratory Depression
- P - Pain Relief
- H - Histamine Release (Bronchospasm), Hypothermia
- I - Increased ICT, Infrequency Constipation
- N - Nausea, Naloxone
- E - Euphoria
- S - Sedation

Diagnosis And Management

- Laboratory Tests (MDH): Marquis test, Deniges test, Husemann test.
- Gastric lavage with Potassium Permanganate ($KMnO_4$) to oxidize opium.
  - Lavage is performed even if the drug was taken parenterally (due to GIT excretion).
- Antidote - Naloxone (IV)/ Naltrexone (Oral)

Postmortem Findings

- Signs of Asphyxia: Frothing from mouth/nose, cyanosis, petechial hemorrhages.
- Congested organs.
- Post-mortem staining: Black.

Chronic Poisoning (Morphinism; Morphinomania)

- Opium addicts can tolerate 3 to 6 g per day
- Withdrawal effect
  - Yawning, insomnia, dysphoric mood, dehydration
  - Increased BP, heart rate, respiration
  - Secretions ↑ - Rhinorrhoea
  - Piloerection and mydriasis.

Heroin - Diacetylmorphine

- Common Names: Junk, Dope, Smack, Brown Sugar.
- Semi-synthetic product
- Highly potent
  - Fatal Dose: 50mg.
  - Adulteration ("Cutting In"): Heroin mixed with Quinine, Chalk, Mannitol, or Fructose.
- Speedball: Heroin ("He") + Cocaine ("She").
- Hot Shot: Heroin + Strychnine
- Chasing the Dragon: Smoking brown sugar/heroin on aluminum foil over a flame.
- IV → Heroine Hydrochloride
- Popping: Subcutaneous/skin injection.
- Shooting the gallery: A location where Heroin is sold.
- Crack House: A location where Cocaine is sold.

Chasing the dragon

IV

Forms Of Heroin

- Black Tar: Unrefined.
- Brown Sugar: Ill-refined; can cause sclerosis and thrombosis of veins.
- Heroin: Refined form.

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Treatment

- Naloxone

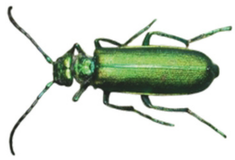
ANIMAL IRRITANT POISONING

Blister Beetle

- AKA: Spanishfly
- Active Principle: Cantharidin.

Effects

- Oral intake → Aphrodisiac (↑ Libido).
- Priapism (painful, persistent erection).
- Toxicity:
  - Fatal dose 15-30mg
  - Highly nephrotoxic.



Scorpion

- Group: Buthidae (Bichhu).
- Classification: Venamatous Arachnid (8 legs).
- Toxicity: Neurotoxic and Hemotoxic.

Mechanism

- Acts via Na^+K^+ channels
- Uncontrolled release of catecholamines → Autonomic Storm
  - ↑ Sympathetic and Parasympathetic activity.

Symptoms

- Local: Pain, swelling, blisters.
- Systemic: Sweating, palpitations, chest pain, mydriasis, and priapism.

Treatment

- Immobilization.
- Pain relief (NSAIDs).
- Anti-scorpion venom (ASV).
- Alpha-blocker: Prazosin

Spider

- Classification: Venamatous Arachnid
- Toxin- Neurotoxin
  - Locally necrotic
  - Excitatory neurotoxin
- Most Poisonous: Black Widow (can cause priapism)

Treatment

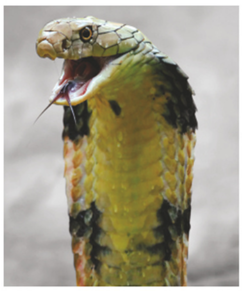
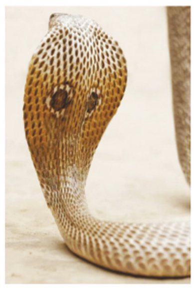
- Dapsone, Antihistamines, Antibiotics, and Anti-spider venom.

OPHIOLOGY (STUDY OF SNAKES)

00:45:53

- Viperidae (Viper): Russell's Viper, Saw-scaled Viper → Vasculotoxic.
- Elapidae: Cobra, Krait, King Cobra → Neurotoxic.
- Hydrophidae: Sea Snakes → Myotoxic.

Snake Identification

• Cobra (Naja naja): Identified by the spectacle mark on the hood.	 
• King Cobra: Ophiophagus	
• Krait (Bungarus Careulus): o Hexagonal scales o Band: Black o Bungarotoxin → Neurotoxin	

• Russell's Viper: Three rows of brown scales; diamond/triangular head. o Name: Daboia russelli o Venom → Vasculotoxic	
• Saw-scaled Viper (Echis): Angulated scales; coils around.	
• Sea Snake: Flat tail used for paddling; o Skeletal muscle → myotoxic	
• Python: Non-poisonous; kills via traumatic asphyxia.	

General Toxicology Of Snakes

- Glands and fangs are modified salivary glands
- Teeth → maxillary
- Bite: By skin puncture
- Ingesting venom is generally harmless unless oral/gastric ulcers are present.
- MC cause of death is "Fright" (Anxiety/Palpitations).
- 70-80% are non-venomous
- 20% of venomous bites are "dry bites" → MC in Cobra
- Envenomation → Local/systemic clinical spectrum
- Study of poison → Ophiotoxemia

Local Symptoms

- Pain, blisters, swelling, bleeding, necrosis, lymphadenopathy (regional).
- Painful, progressive swelling → ASV
- Maximum local symptoms: Vipers.
- No/Minimum local symptoms: Krait.

Systemic Toxicity

Neurotoxic

- Cobra/Krait/King cobra:

 - Ptosis: Bilateral drooping of upper eyelids
 - Diplopia, Dysphagia, Dysphonia, Dysarthria
 - Stridor
 - Descending paralysis
- Death occurs due to respiratory muscle paralysis.
- Single Breath Count Test: In Elapid
  - Count the numbers in a single breath
  - Performed every 15 minutes
  - If decreases → Respiratory muscle paralysis
- Treatment: Mechanical ventilation + ASV
- Neuroparalytic symptom without local finding: Mechanical ventilation + ASV

Vasculotoxic

- DIC (Disseminated Intravascular Coagulation).
- Local pain, swelling, bleeding
- Renal failure.
- If abdominal pain + → Retro-peritoneal bleeding
- Vasculotoxic test: Whole blood clotting test
  - Take whole blood in a test tube → after 20 minutes
  - Clotted → Normal/Elapid
  - Not clotted (DIC) → Viper
  - Repeat after 6 hours
- Treatment requires ASV and Fresh Frozen Plasma (FFP) + Surgical debridement

Myotoxic

- Local pain and swelling
- Muscle necrosis → 1st symptom
- Rhabdomyolysis.
- Myoglobinemia
- Myoglobinuria
- Renal failure.

Management

- RIGHT Strategy
  - Reassurance.
  - Immobilization.
  - Go to the hospital.
  - History taking
  - Tell symptoms and treatment.
- Do NOT use suction, cautery, ligatures, tourniquets, or electric shocks.
- Immobilization of limb by Sutherland wrap/Crepe bandage → To occlude lymphatics.
  - Pressure:
    → Upper limb: 40-70 mmHg.
    → Lower limb: 55-70 mmHg.
  - Pressure immobilization is NOT used for Viper bites → risk of Compartment Syndrome

Yourwish

ASV Administration

- IV route
- Dose: 8-10 vials (1-2 ml/kg)
- Made from: Cobra, Krait, Russell's Viper, Saw-scaled Viper.
- Should be given within 4-6 hours
- Source: Horse hyperimmune serum
  - Risk of allergy; keep Adrenaline ready
- Prepared in Hafkine Institute, Mumbai x
- Discovered by Calmette
- Given when:
  - Severe local symptoms → Pain, swelling, bleeding
  - Severe systemic symptoms → Bleeding, neurotoxic, abnormal WBCT
  - Neuroparalytic- Till clinical improvement
  - Vasculotoxic - Till clotting time is normal

Other Treatment

- Cobra: ASV + Neostigmine (post-synaptic) + Atropine + Mechanical ventilation
- Viper: ASV+ FFP+ Surgical debridement
- Krait: ASV + Mechanical ventilation
  - Neostigmine is ineffective as Krait acts pre-synaptically

CORROSIVE POISONING

00:51:36

Mechanism Of Action

- Acid (C) → Coagulative necrosis.
  - Acid causes eschar/crust formation.
  - Acid causes perforation.
- Alkali (L) → Liquefactive necrosis.
  - Alkali results in more lateral damage
  - Considered more dangerous.
- Only acid that causes Liquefactive and Coagulative necrosis → Hydrofluoric acid

Classification

- Inorganic Acids (Local): Hydrochloric acid, Sulphuric acid, Nitric acid.
- Organic Acids (Systemic): Carbolic, Boric, Oxalic, Acetic acid.
- Alkalis: Sodium hydroxide, Potassium hydroxide, Sodium carbonate.

Management

- Airway: Early intubation; consider cricothyroidotomy
- Gastric lavage: Contraindicated
- Emetics: Contraindicated
- Neutralization (alkali/carbonate): Contraindicated (due to heat production
- Demulcents/Diluents: Use cautiously (may induce vomiting)
- Supportive care:
  - Pain relief

- IV fluids (manage shock)
- Steroids (selected cases)
- Symptomatic treatment

Sulphuric Acid

- AKA: Oil of vitriol
- Strongest acid; colorless, odorless, and hygroscopic.
- Tissue effects → Charred black appearance.
- Skin → Brown/black
- Mouth → Charred black; Tongue → Dry and painful.
- Teeth → Chalky white.
- MC symptom → Odynophagia (painful swallowing).
- Pharynx → Pian
- Stomach → Pain, vomit (acid, acid + blood)
- Larynx → Dyspnea, stridor, edema
- Fatal Dose: 5-10 ml
- Fatal Period: 18-24 hours.
- Complication:
  - Shock
  - Perforation can lead to peritonitis
  - Edema of the larynx
- Vitriolage: Throwing acid → Chemical burn with painless contraction and no vesicles.

Post Mortem Findings

- Choky white teeth and black tongue.
- Blotting paper mucosa of the stomach
- Acid passes through the lesser curvature → Magenstrasse

Management

- Wash with water, topical magnesium oxide or carbonate, and antibiotic
- Antidote: Magnesium oxide.
- If eye burn → Wash with water, olive oil, and bicarbonate

Nitric Acid

- AKA: Aqua fortis
- Causes yellow discoloration of tissues → Xanthoproteic reaction
- Skin, teeth, and stomach mucosa all become yellow.

Oxalic Acid

- AKA: Acid of sugar
- Colorless crystals; present in spinach, cabbage, and tomatoes.
- Use: Ink remover.
- Symptoms
  - Burning pain in the mouth/throat
  - Coffee-ground vomitus.

- Systemic effects
  - Forms calcium oxalate → Hypocalcemia → Tetany.
    → Hypocalcemia in HF & ethylene glycol poisoning
  - Cardiac arrhythmia (due to electrolyte imbalance).
- Cause of death
  - Renal failure (due to oxaluria/tubular failure)
- Antidotes
  - Calcium gluconate/ lactate
  - Chalk powder, or wall scrapings containing calcium.
- Treatment:
  - Gastric lavage with calcium Lactate
  - Hemodialysis for uremia

Carbolic Acid

- Uses: Antiseptic
- AKA: Phenol
- Needle shaped

Clinical Features

- Constriction of pupils
- Ochronosis (cartilage deposition)
- Carboluria (green urine)
- Carbolism → Acute poisoning
- Chronic carbolic acid poisoning → resembles Marasmus
- Pink color
- Products: Pyrocatechol/Hydroquinone
- Resistant to Putrefaction
- Causes PCT necrosis.

Acute Poisoning / Carbolism

- Skin: Painless burn, numbness, white eschar.
- Stomach: Leathery mucosa (Gastric lavage is permissible here).
- Convulsion, hypotension, depressant
- Constricted pupils
- Hemolysis, Methemoglobinemia
- PCT necrosis
- Resist putrefaction

Chronic Poisoning / Phenolic Marasmus

- Anorexia, Weight loss, Dark urine, Pigmentation
- Ochronosis - Cornea, Cartilage, Skin → Black

Management

- Burn - Polyethylene glycol, Water
- Gastric lavage with Olive oil / Castor oil

- Treatment of shock
- Hemodialysis

Boric Acid

- Causes "Boil-off-Strum" or Boil-over syndrome.

Hydrofluoric Acid

- Causes both coagulative and liquefactive necrosis.
- Leads to hypocalcemia and hypomagnesemia.
- Causes decalcification and destruction of bone.
- Deep burning pain in the subungual (under nail) area.
- Causes cardiac arrhythmia
- Treatment:
    - Antidote: Calcium gluconate.
    - Correction of electrolyte imbalance

METALLIC IRRITANTS

00:58:18

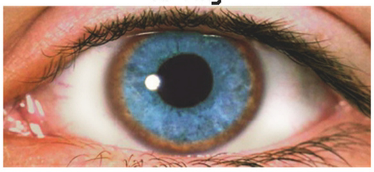
Copper Poisoning

- Pure copper is non-poisonous
- Copper Sulfate is toxic → Blue-vitriol
- Fatal doses → 30gm
- Feature with C:
    - Chalcosis
    - Clapton lines
    - Chelating agent → Penicillamine.
    - Cyanide: Antidote

Clinical Features

- Ptyalism (↑ salivation)
- Blue-green vomitus
- Wilson's disease → KF ring
- Chalcosis (tissue deposition)
- Clapton lines (green lines on gums).
- Hair Green-algaecide
- Vineyard Sprayer's Lung- Due to due to copper vapors
- Interstitial pulmonary fibrosis/ Granuloma

KF ring



Clapton line

Treatment

- Gastric lavage with 1% K+ Ferrocyanide
- Chelating agent of choice Penicillamine

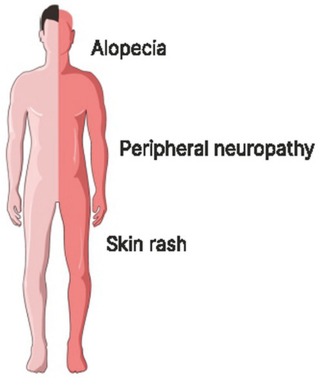
Thallium Poisoning

- Ideal homicidal poison.
- Mnemonic: "Thali mein Aloo Puri Sabji":

Yourwish

- Mees lines on nails.
- Alopecia (after 1-2 weeks).
- Polyneuropathy (resembles GBS).
- Skin rash (Macleo-papular/butterfly rash).

- Signs: Sign de Sourcil (lateral loss of eyebrows).
- Antidote: Prussian Blue.



Cadmium Poisoning

- Sources: Batteries, welding, smoking, water, shell fish, fo
- Causes
  - Hypocalcemia → weak/brittle bones.
  - Waddling gait
  - "Ouch-Ouch" or "Itai-Itai" disease (pain in spine/legs).
- Chelating agent: DMSA (BAL is contraindicated).

Manganese Poisoning

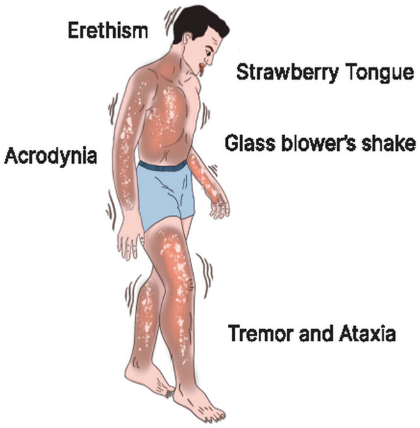
- Manganese toxicity resembles Parkinson disease
- Groote Eylandt syndrome.

Metal Fume Fever/ Smelter Fever

- Caused by inhalation of Zinc, Nickel, Iron, Lead, CO. Copper, Antimony
- Symptoms resembles Malaria.

Mercury Poisoning

- Features:
  - Hunter-Russell syndrome
  - Gray/slaty mucosa, glossitis, gingivitis.
  - Danbury tremor , strawberry tongue
    → Resembles Kawasaki disease
- Elemental Mercury (Thermometer)- Not Absorbed GIT
- It is Liquid metal
- Mercuric>Mercurous
- Acute exposure to elemental mercury vapor in Industry Worker → Inhalation
- Organic mercury (Methyl mercury):
  - Minamata disease (Japan, shellfish poisoning)
- Occupational exposure:
  - Hatters, glass blowers → difficulty in dressing and walkin
- Treatment:
  - Gastric lavage with 5% Na+ Formaldehyde Sulfoxylate, 2 to 5% sodium bicarbonate.
  - BAL is the chelating agent of choice



Chronic Poisoning → Hydrargyrisim

- Key triad: Gingivostomatitis + Erethism + Tremors
- Erethism (Mad Hatter syndrome): Shyness, depression, irritability, anxiety

- Tremors (Danbury tremors):
  - Coarse tremors involving hands, lips, tongue, arms, and legs
- Earliest features: Poor handwriting, slurring of speech, ataxia
- Severe form: Conusssio mercurialis
  - Whole body bedridden state
- Mercuria lentis:
  - Deposition in anterior lens capsule
  - Produces brown "malt" reflex
  - Visual acuity remains normal
  - Bilateral (B/L)
- Acrodynia (Pink Disease)
  - AKA:Swift disease, Calomel disease, Feer's disease
  - Puffy hand, feet
  - Painful toes, fingers
  - Pinkish
  - Pruritus, Perspiration
  - Peeling of Skin, Resemble Kawasaki Disease

METAL POISONS

01:04:16

Arsenic Poisoning

Characteristics

- Fatal dose: 100-200mg
- Fatal period: 1-2 days
- Arsenic is good homicidal poison
- Acute poisoning:
  - Direct action on heart
  - Cause of death: Shock
- Nail changes: Aldrich-Mees lines (Reynolds lines)
- Mucosal changes: Red, velvety mucosa ("flea-bitten" appearance)
- Hair: Alopecia
- Skin changes:
  - Raindrop pigmentation
  - Rashes resembling fading measles rash
  - Hyperpigmentation of palms and soles
- Subendocardial hemorrhage, Sheehan-type hemorrhage
- Neuritis (sensory > motor)
- Acute poisoning resembles: Cholera
- Antidote: Iron oxide
- WHO Limit permissible arsenic in drinking water: 0.01 mg/L
- Metallic arsenic is Non-poisonous
- Poisonous compounds: Arsenic Trioxide
  - Aka- White Arsenic, Sankhya, Somalkar
  - Colorless, odorless, tasteless
  - Ideal homicidal poison.


Aldrich-Mees line


Raindrop pigmentation


Subendocardial hemorrhage

- Arsine gas: Garlicky odor

Mechanism

- Combines with SH groups → inhibits mitochondrial enzymes → inhibits respiratory chain.

Important Information

- A: Aldrich Mees lines (nails).
- P: Red velvet mucosa / Raindrop pigmentation.
- S: Subendocardial hemorrhage / Sheehan's hemorrhage.
- E: Excess hyperkeratosis of palms/soles.
- N: Neuropathy (sensory > motor).
- I: Iron antidote (Ferric Oxide).
- C: Cholera mimic (Rice water stools).

Differential With Cholera

- Arsenic: Sequence is Throat pain → Vomiting → Purging (TVP). Tenesmus is present.
- Cholera: Sequence is Purging → Vomiting → Throat pain (PVT). Tenesmus is absent.

Diagnosis Of Arsenic Exposure

- Urinary arsenic > 50 µg/24 hours indicates significant exposure
- Arsenic deposits in keratin-rich tissues Hair and nails
- Test for metallic arsenic:
    - NAA (Neutron Activation Analysis)
    - AAS (Atomic Absorption Spectroscopy)

Treatment

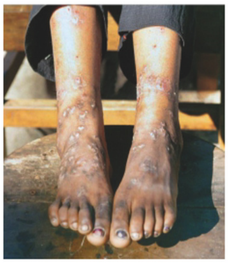
- Gastric lavage with warm saline
- Antidote: Iron (Hydrated Ferric Oxide)
- DMSA is superior to Dimercaprol.

Arsenophagist

- Take it as Aphrodisiac
- Can Tolerate up to 300mg

Sign And Symptoms Of Chronic Arsenic Poisoning

- Leucomelanosis (MALAR): earliest sign of chronic poisoning, presented as Depigmentation
- Raindrop pigmentation
- Hyperkeratosis of palm and soles (B/L)
- Rash (Measles, Addison Disease)
- Neuropathy:
    - Mainly Sensory>Motor
    - Resembles GBS



- Blood Vessels- Occlusion and Sclerosis, Peripheral Gangerene → Due to Peripheral Ischemia
- Aka: Black Foot Disease

Lead Poisoning

Routes

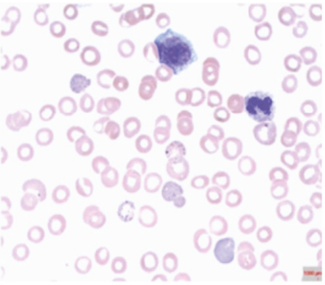
- Inhalation (most common in paint, pipe industry/plumbing).
- Ingestion of lead paint (most common in children).
- Skin → Chemical factories
- Contaminated water → Lead cistern leakage

"A-B-C-D-E-F-G" Mnemonic

- A: Anemia (Microcytic Hypochromic).
- B: Basophilic stippling (punctate basophilia) and Burtonian lines (blue lines on gums).
- C: Colic (dry belly ache), Constipation, Calcium osteopathy
- D: Drop (Wrist drop and Foot drop).
- E: Encephalopathy (more common in children).
- F: Facial Pallor (earliest and most consistent sign).
- G: Gout (Saturnine gout due to ↓ uric acid excretion).

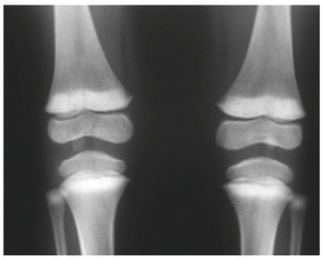
Chronic Poisoning Aka Plumbism Saturnism

- Facial pallor (lead pallor):
  - Circumoral pallor due to vasospasm
  - Earliest, most consistent, and most specific sign
- Microcytic, hypochromic anemia
- Inhibits enzymes: Ferrochelatase, ALA-dehydratase, Coproporphyrinogen oxidase.
- Basophilic Stippling/Punctate basophilia:
  - Blue dots in RBCs - ribosomes
  - Due to inhibition of 5-pyrimidine nucleotidase



- Lead line (Burtonian line - blue): Seen in 50-70% of cases
  - Dental caries → teeth bacteria → H_2S + Pb → formation of PbS

- Lead Osteopathy/bone line:
  - Radio-opaque bands (Lead lines) seen in X-ray
  - Deposition of calcium in growing end of bones presented as a radiopaque bands in growing end of bones.
  - It takes minimum 4 weeks of exposure to lead.



- Colic and Constipation → Dry Belly Ache
  - Late presentation seen in 85% of cases
  - Colic occurs at night
  - Type of spasmodic pain which is lasting for few minutes and relieved by pressure
  - Also called Painter's colic or Devonshire colic/Saturnine Colic
- Lead Palsy - Motor Nerves
  - It is a late manifestation, seen in less than 10% of cases, more common in adults than children.
  - Men are particularly affected.

Yourwish

- Patient is presented as wrist drop and foot drop as extensor group of muscles affected
- Encephalopathy
  - Present in almost every case of plumbism
  - Common with lead often associated with tetraethyl lead
  - It is seen more commonly among children
  - 85% have permanent brain damage and death occurs in about 25% cases
- Reproductive system:
  - Amenorrhea
  - Dysmenorrhea
  - Sterility

Lab Investigation - Blood Sample

- Lead (> 5µ/100ml)
- ALA >40 µ
- Zinc Protoporphyrin: 35-50µ/100ml

Treatment Of Lead Encephalopathy

- BAL + EDTA
  - If in adult - >70µ/dl
  - In children → >50µ/dl
- EDTA causes excretion of lead in urine - not given in Renal-Failure
  - In Renal failure → BAL
- Children - without encephalopathy - DMSA (ORAL)
- Removal of exposure:
  - CaNa2-EDTA if lead level is 45µ/dl.
  - Succimer if lead level is 45-69µ/dl
  - BAL-Dimercaprol if Lead Level > 70 mcg/dl

INORGANIC IRRITANT NON METALLIC POISON

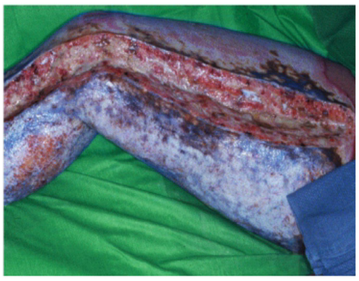
01:12:29

Phosphorous

Property	White	Red
Toxic	Yes	Non
Odour	Garlic	No
Luminous	Yes	Non
Morphology	Crystalline	No
Inflammable	Yes	Non
Kept Under Water	Yes	Not

- White + red → Yellow phosphorus
- Red phosphorous is used in matchbox sides.
  - Match stick: Sulphur+$KClO_3$
- White phosphorus is used in:
  - Chemical Warfare
  - Insecticide
  - Rodenticide
  - Crackers → Diwali poison
- It is an irritant poison which leads to gastro-enteritis
- Accidental poisoning in children
- Fatal dose: 60-120mg
- Fatal period: 2-8 days

"CRACKER" Mnemonic



- C: Copper Sulfate antidote.
- A: Asterixis (flapping tremor).
- K: Vitamin K used for treatment.
- S: Smoking Stool syndrome (luminous feces/vomit).

Clinical Stages

1st Stage	Initial (1-2 Days)	• Gastrointestinal: Burning pain, nausea, vomiting, and diarrhea. • Liver involvement leading to Jaundice and yellow atrophy. • Skin contact causes painful penetrating 2nd or 3 rd degree burns. • Breath and excreta have a Garlicy smell. • Luminous vomit/feces • Smoking Stool Syndrome (faint fumes from stools).
2nd Stage		Asymptomatic
3rd Stage	Systemic Phase	• Multi-Organ Failure • Jaundice and bleeding (RBC destruction). • Encephalopathy affecting the Brain, tremors, and Flapping Asterixis. • Kidney damage/failure.

Treatment

- Gastric lavage with $KMNO_4$
- Antidote $CuSO_4$→ Antidote and Poison
- Vitamin K
- FFP
- Burn-Should be washed with 1% $CuSO_4$

Pm Findings

- Odour Garlicy
- Jaundice

- PM-Staining: Chocolate-brown
- Yellow liver atrophy
- Multiple hemorrhages in mucosa/organ

Chronic Poisoning

- Olden Days, White phosphorous was used in match box
- Chronic poisoning seen in: Match box industry
  - Vapours → Exposure
- Phossy jaw aka → Glass Jaw/Lucifer Jaw
  - Osteomyelitis of jaw bone → Multiple Sinus
  - Pain, Swelling, Multiple discharging sinuses of tooth and mandible
  - By John Syer Bristowe

INSECTICIDES (AGRICULTURAL POISON)

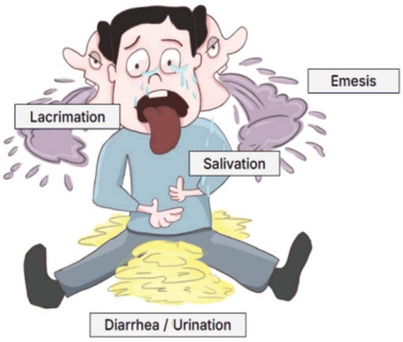
01:16:20

Organophosphates

- Mostly suicidal
- Cholinergic
- Irreversibly inhibits Acetylcholinesterase found in N-M junction of skeletal muscle, synapses of the ganglions of nervous tissue and RBC

Clinical Features

- "B-S-C" Symptoms:
  - B: Bradycardia.
  - S: Secretions increased (salivation, lacrimation/red tears, sweating, diarrhea).
  - C: Constriction of pupils (pinpoint).
- Dumb Bels
  - Diarrhea
  - Urination
  - Miosis/muscle weakness
  - Bronchorrea/spasm
  - Bradycardia(M2)
  - Emesis
  - Lacrimation Red-Tear,Porphyrin
  - Chromodacryorrhea
  - Lethargy
  - Salivation



- Nicotinic symptoms:
  - Muscle weakness, fasciculation, areflexia, muscle paralysis
  - Death due to Respiratory Muscle Paralysis
  - CNS – Headache, tremor, confusion, slurred speech, coma, convulsion

Syndrome

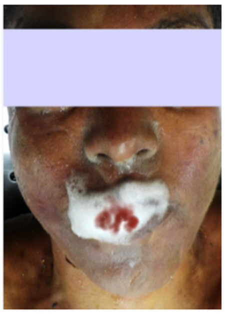
- Acute:Increased secretions
- Intermediate syndrome: Seen in 1-4 days after acute poisoning
  - Due to prolonged cholinesterase inhibition and muscle necrosis

- Proximal limb weakness occurs
- Does not respond to oximes or atropine
- Delayed syndrome:Seen in 1-4 weeks
  - Organophosphorus-induced delayed neuropathy
  - Polyneuropathy with distal limb muscle weakness

Investigation And Treatment

- RBC cholinesterase (true cholinesterase) → More specific
- Plasma cholinesterase (pseudo) → More common, more sensitive, easy, inexpensive fall rapidly
- Confirmatory test: P-nitro phenol test
- Treatment:
  - Resuscitative measures-A-B-C
  - Gastric lavage with 1:5000 Potassium Permanganate
  - Activated charcoal
  - Atropine sulphate arrests the muscarinic receptors but no effect on nicotinic action
    → It should be continued until the tracheo Bronchial Secretion becomes clear (Lungs-Dry)
  - Oximes (Pralido, OBIDO):
    → Acts mainly at nicotinic receptors, along with decreasing muscarinic and CNS symptoms
    → Mechanism of action: Removes phosphate group
    → Effect:Decreases the dose requirement of atropine and potentiates its action

Post Mortem Findings



- Signs of asphyxia and congestion of all organs.
- Pulmonary edema
- Blood stained froth is seen at the mouth and nose.
- Kerosene smell due to Aromax → Solvent
- Organophosphorus can be detected in putrefied body.

Carbamates

- Aldicarb, D-carb, Ficam, Baygon, Propoxure
- Reversibly inhibit carboxylic esterase (AChE) enzymes by carbamylation
- Spontaneously hydrolyzed from enzymatic site within 48 hrs
- Do not penetrate CNS
- Atropine is specific antidote.
- Oximes are contraindicated

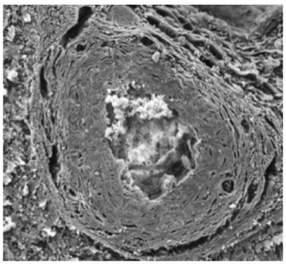
Organochlorides

- Endrin, DDT, Aldrin
- Plant Penicillin"; deposits in subcutaneous fat.
- CNS stimulant → inhibits GABA
  - Myoclonus, tremors and seizure due to CNS stimulation
  - Hyperthermia, mydriasis, respiratory failure
- "Kepone Shake" (tremors of hand/head).
  - Due to Chlordecone (Chronic Organo-chlorine Poison)
- ENDRIN inhibit Gaba Mediated Cl^- Influx in CNS

Yourwish

- Managment:
  - Resuscitative measures along with gastric lavage
  - Activated charcoal.
  - Antidote - NO
  - Symptomatic treatment

Aluminium Phosphide



- Aka Celphos
- Used as Grain preservative.
- Garlic-like smell.

Mechanism Of Action

- Releases Phosphine gas in the body.
- Inhibits Cytochrome Oxidase (Electron Transport Chain Complex IV).
- HCl presence in the stomach → ↑ chemical reaction.

Clinical Features

- Fatal dose: 1-3 tablets.
- Liver findings: Centrizonal hemorrhagic necrosis.
- Cardiovascular: Cardiogenic shock due to hypomagnesemia.
- Mortality rate: 35% - 100%.

Management

- Antidote: None.
- Magnesium Sulfate: Administered to correct hypomagnesemia and relieve cardiac arrhythmia.
- Activated charcoal and liquid paraffin (↓ absorption and ↑ excretion).
- Gastric lavage is performed.

Zinc Phosphide

- Rodenticide.
- Releases Phosphine gas.
- Slow onset of action.
- Garlicky smell.

MISCELLANEOUS POISONS

01:22:48

Hallucinogens

Lysergic Acid Diethylamide (Lsd)

- AKA: Acid, Blotter, Paper, Stamp.
- Mechanism: ↑ Serotonin levels in the brain.
- Dependency: Causes psychological dependence only.
- Effects:
  - "Good trip" or "Bad trip" experiences.
  - Erotic hallucinations
  - Perceptual changes: altered changes in the visual hallucination and illusions
  - Flashback phenomenon: Re-experiencing past events.

MDMA

- Methylene-dioxy-methamphetamine
- AKA: Ecstasy, Rave drug, Club drug, Party drug, Molly. Hug
- Effects
  - Euphoria and amnesia.
  - Love Boat: A combination of a cigarette (tobacco/marijuana) + Phencyclidine or Formaldehyde.
    → Phencyclidine: Also known as "Angel Dust."

Other Hallucinogens

- Amphetamine: Associated with "Golden urine."
- Cocaine: Classified as a hallucinogen.

Chloral Hydrate

- Street names: Dry wine, Mickey Finn, Knockout drops.
- Usage
  - Usually taken in combination with alcohol.
  - Feature: Acrid smell.

Conium Maculatum

- AKA: Hemlok
- Nerve poison.
- Historical significance: Used to kill Socrates.

Characteristics

- Smell: Mousey.
- Active principle: Coninine.

Clinical Features

- Progressive motor paralysis extending upwards.
- No specific antidote.
- Cause of death: Respiratory muscle paralysis.

Suicide Types

- Complex → Attempt more than one method
- Complicated → Died by unintentional trauma
- Para-Suicide: Intention to die is absent → Attempt +

CNS DEPRESSANTS

01:25:17

Ethanol

General Properties

- Toxicity hierarchy: Isopropyl Alcohol > Methanol > Ethanol.
- Alcohol concentrations:
  - Absolute Alcohol: 99.95% Ethanol.
  - Rectified Spirit: 95% Ethanol.

- Denatured/Methylated Spirit: 90% Ethanol + 5-10% Methanol.
- 100% Proof Ethanol: 50% Ethanol.

Pharmacokinetics

- Absorption: Maximum absorption (80%) occurs in the small intestine.
- Factors ↑ absorption:
  - Empty stomach.
  - Carbonated drinks.
  - Warm drinks.
  - Gastrectomy.
- Factors ↓ absorption:
  - Protein-rich food.
  - Ice-cold drinks.
  - Achlorhydria.
  - Atropine and Pyloric spasm.

Concentration And Legal Limits

- Relative Concentration:
  - Whole Blood: 1.00
  - Urine: 1.3.
  - Vitreous Humor: 1.2.
  - Alveolar Air: 0.0021.
- Driving Limit: 30 mg%.
  - MVA-185 act

Test

- Samples:Blood (NaF, K-oxalate), vitreous humor, CSF
- Tests used:
  - Kozelka test
  - Breath analyzer (Drunkometer): Infrared principle (Henry's law)
  - Chromatography (Cavett test):
    → Gas chromatography → quantitative and qualitative; most specific
- Screening test: Hines test

Symptoms

- Stage of excitement:
  - 30 mg%: Impairment of cognitive function.
  - 50 mg%: Impaired reaction time.
  - 80 mg%: Lateral gaze nystagmus.
- Stage of incoordination: 150 mg%:
- Stage of coma: Motor, sensory, and speech deeply affected
  - Mcwan Sign (seen in coma): Pupils are constricted but dilate when the patient is pinched → > 300 mg%
- Sober: < 10 mg%.
- Drinking: 10-70 mg%.
- Under the Influence: 80-100 mg%.

- Intoxicated: 150-300 mg%.
- Coma and Death: 300-400 mg%

Widmark Formula

- Blood → 1, Urine → 1.3
- Formula: A = pcr.
    - A: Weight of alcohol.
    - p: Body weight.
    - c: Concentration of alcohol.
    - r: Constant (Male = 0.68, Female = 0.55).

Alcohol Withdrawal

- 6-8 hours: Tremors.
- 12 hours: Auditory hallucinations (Most common).
- 12-24 hours: Seizures (Generalized Tonic-Clonic).
- 48-72 hours: Delirium Tremens.
    - Crimes committed during Delirium Tremens may lack liability due to disorientation.

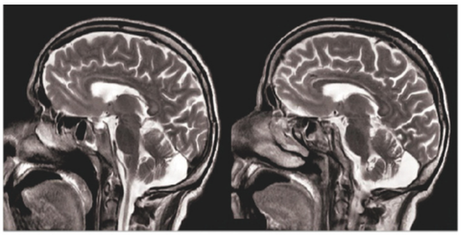
Delirium Tremens

- D: Delirium and Disorientation.
- A: Autonomic activity ↑ (BP, Heart rate, and sweating).
- T: Coarse Tremors and Fever.
- H: Visual Hallucinations (Most common in Dts).

Chronic Alcoholism

- Nutritional: Vitamin B1 (Thiamine) deficiency.
- Wernicke's Encephalopathy (GOA triad):
    - G: Global confusion.
    - O: Ophthalmoplegia.
    - A: Ataxia.
- Korsakoff Psychosis (CAP triad): Late neurological manifestation due to Vitamin B1 deficiency:
    - C: Confabulation (filling memory gaps with false stories).
    - A: Amnesia.
    - P: Polyneuropathy.

Machiafava Syndrome



- Typically males.
- Pathology
    - Atrophy/involvement of the Corpus Callosum.
- Symptoms
    - Ataxia
    - Dementia
    - Coma
    - Death.

Methanol Poisoning

- Nature: Illicit liquor (Hooch tragedy).
- Fatal dose: 80-120 ml.

Mechanism

- Forms Formic Acid → attacks the retina → Snowfield vision

Clinical Presentation

- Earliest feature: Severe abdominal cramps.
- Muscle weakness and Hypothermia.
- Snowfield vision (Optic neuritis) → can lead to blindness.
- Fixed and dilated pupils.
- CNS and cardiac depression.

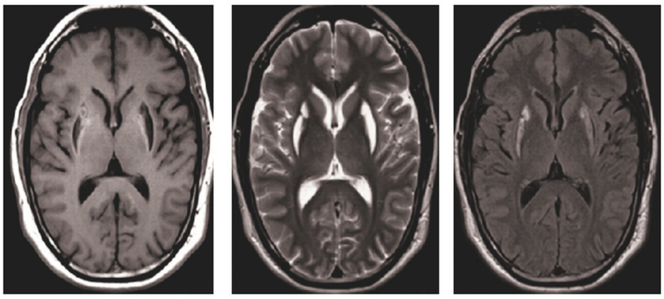
Management

- Stabilization
- Treatment of choice: Hemodialysis.
- Antidotes:
  - Ethanol (competitive inhibitor)
  - Fomepizole (Alcohol Dehydrogenase inhibitor).
- Folinic acid: Helps in excretion.
- Sodium Bicarbonate: Corrects acidosis.

Post Mortem Findings

- Absence of Post-mortem clotting.
- Hemorrhagic necrosis of the Putamen

Hemorrhagic necrosis of Putamen



Error Files

- Heroin: Known as Junk, Dope, Brown Sugar, or Smack.
  - It is Diacetylmorphine (semi-synthetic).
  - Fatal dose: 50mg
  - Antidote: Naloxone.
- Aldridge Mees Lines (Transverse nail lines): Found in Arsenic, Thallium, Chronic Renal Failure, and Chemotherapy.
- Lead Osteopathy: Lead lines in bones are due to Calcium deposition, not lead deposition.
- Cobra vs. Krait Bite:

- Neostigmine + Atropine is used for Cobra bites (post-synaptic action) but not for Krait bites.

PYQ

01:33:40

Q. A patient is brought to the emergency department with acute onset of severe abdominal pain, throat irritation followed by vomiting that contains blood and bile, and diarrhea that initially appears bloody but later becomes colorless, odorless, and rice-water-like. On examination, a distinct garlicky odor is noted in the breath. Which of the following is the most likely agent responsible for the poisoning?

a. Arsenic
b. Phosphorus
c. Aluminium phosphide
d. Croton seeds

Ans: a

Q. Aldrich mees lines and raindrop pigmentation in hand is seen in which poisoning?

a. Arsenic
b. Thallium
c. Cadmium
d. Lead

Ans: a

Q. A person dies suddenly, and his family is abroad. During the autopsy, his Dr.Vraman preserved for toxicological analysis. Which of the following substances can still be detected in the visceral organs even if it was not recently ingested before death?

a. Morphine
b. Aconite
c. Arsenic
d. Alcohol

Ans: d

Q. Black foot disease with peripheral neuropathy is seen in which metal poisoning?

a.Arsenic
b. Lead
c. Mercury
d. Cadmium

Ans: a

Q. What is the treatment of choice for acute arsenic poisoning? INICET May 2022

a. Ipecac
b. Penicillamine
c. Activated charcoal

d. Dimercaprol

Ans: d

Q. Which of the following are seen in patients with chronic arsenic poisoning?
1. Raindrop pigmentation
2. Peripheral neuritis
3. Mees line
4. Luminous vomit

a. 1, 2, 3 are correct
b. 2, 3 are correct
c. 1, 4 are correct
d. Only 1 is correc

Ans: a

Q. A patient presents with hair loss, behavioral changes, lateral eyebrow loss, and nail changes. What is the type of poisoning in this case?
a. Thallium
b. Arsenic
c. Mercury
d. Lead

Ans: a

Q. Match the following types of poisons with their corresponding examples:

EFFECT	POISONS
a. Metallic Irittant	1. Opioid
b. Organic Irritant	2. Lead
c. CNS Depressant	3. Cannabis
d. Deliriant	4. Croton Oil

a. a-2, b-4, c-1, d-3
b. a-1, b-4, c-2, d-3
c. a-4, b-2, c-1, d-3
d. a-2, b-1, c-4, d-3

Ans: a

Q. A 56-year-old man presents with fatigue, pallor, abdominal pain, memory loss, and foot drop. He works at a battery recycling plant and has elevated blood lead levels. Which enzyme is affected in the given scenario?
a. Aminolevulinic acid (ALA) dehydratase
b. Uroporphyrinogen III Synthase
c. Uroporphyrinage Synthase
d. Pyruvate dehydrogenase

Ans: a

Q. Match the following:

I. Heroin	1. Ganja
ii. MDMA	2. Acid
iii. Joint	3. Brown Sugar
iii. LSD	4. Amphetamine

a. i-2, ii-1, iIi-4, iv-3.
b. i-3, ii-2, iii-1,iv-4
c. i-4, ii-2, iii-1, iv-3
d. i-3, ii-4, iii-1, iv-2

Ans: d

Q. Which of the following substances is used in a tube for collecting blood samples specifically for measuring alcohol concentration?
a. Heparin + EDTA
b. Sodium fluoride + Potassium chlorate
c. Heparin
d. Sodium citrate

Ans: b

Q. Hooch tragedy is related to:
a. Phosphorus
b. Mercury
c. Ethanol
d.Methanol

Ans: d

Q. A 50-year-old factory worker was brought to the emergency room with complaints of headache, vomiting and blurring of vision after he consumed local spirit. Which of the following is used for the treatment of his condition?

a. Fomepizole
b. Flumazenil
c. N-acetylcysteine
d. Naloxone

Ans: a

Q. Match the following substances with their appropriate antidotes: INICET Nov 2025

SUBSTANCE	ANTIDOTE
1. Benzodiazepines	I. BAL
2. Alcohol	ii. Naloxone
3. Opioid	iii. Flumazenil
4. Arsenic	iv. Fomepizole

a. 1-iii, 2-iv, 3-ii, 4-I
b. 1-ii, 2-iii, 3-iv, 4-iv
c. 1-iii, 2-I, 3=ii, 4-iv
d. 1-iv, 2-iii, 3-ii, 4-I

Ans: a

Q. A female was given morphine sulfate during labor for pain, following which she developed respiratory distress. Which of the following will be the correct antidote?
a. Naloxone
b. Atropine
c. Pralidoxime
d. Epinephrine

Ans: a

Q. A 28-year-old male is brought to the emergency room. On examination, his PR is 50 bpm, BP is 80/60 mmHg, RR is 7 breaths/min and his temperature is 95° F. He has a pinpoint pupil and is disoriented. What is the most probable diagnosis?
a. Benzodiazepine overdose
b. Cocaine intoxication
c. Opioid withdrawal
d. Opioid intoxication

Ans: d

Q. Which of the following features is characteristic of chronic mercury poisoning?
a. Hyperkeratosis and Mees' lines
b. Lead lines are visible on X-ray
c. Mad hatter's (intentional) tremor
d. Basophilic stippling of red blood cells

Ans: c

Q. A 72-year-old farmer was presented in the hospital with pinpoint pupil & increased secretions. The diagnosis is:
a. Alcohol poisoning
b. Opioid poisoning
c. Organophosphorus poisoning
d. Datura poisoning

Ans: c

Q. Which mechanism is responsible for the inhibition of the acetylcholinesterase enzyme by organophosphorus compounds?
a. Non-competitive inhibition
b. Reversible competitive inhibition
c. Irreversible inhibition
d. Suicidal inhibition

Ans: c

Q. Which of the following is used for the treatment of Datura poisoning?
a. Physostigmine
b. Atropine
c. Sodium nitrite
d. Neostigmine

Ans: a

Q. Which of the following substances are antidotes for cyanide poisoning?
1. Amyl nitrate
2. Sodium nitrate
3. Sodium thiosulphate
4. Benzyl thiocyanate

a. 1, 2, and 3 only
b. 1, 2, 3, and 4
c. 1, and 2 only
d. 1, 3, and 4 only

Ans: a

Q. In which poisoning is cherry red hypostasis seen on post-mortem examination?
a. CO Poisoning
b. Hydrogen sulphide
c. Yellow phosphorus
d. Hydrogen cyanide

Ans: a

Q. A patient was brought to casualty with seizures. He had multiple episodes and was taking herbal medicines for the same. He was conscious in between the episodes. During the episodes, he had an arching of his back. What is the likely cause?
a. Strychnine
b. Ricinus
c. Nerium odorum
d. Datura

Ans: a

Q. Among the listed options, which substance is not utilized as a chelating agent in cases of heavy metal poisoning? INICET Nov 2023
a. Deferiprone
b. EDTA
c. Penicllamine
d. Oximes

Ans: d

Q. Gastric lavage is contraindicated in which of the following poisonings? FMGE Jan 2024
a. Strychnine
b. Paraldehyde
c. Hydrocarbons
d. Iron tablets

Ans: c

Q. A 23 year old farm worker from a remote village is brought to the hospital 8 hours later, following a snake bite at 5 in the morning. The patient complained of headache, blurred vision, tingling sensation around the mouth, dizziness, and vertigo and had multiple episodes of vomiting since the bite. He has signs of respiratory depression and bradycardia (HR<50). The local wound showed mild swelling and blistering. There are no apparent bleeding manifestations. He was administered 10 vials of antivenom. Which of the following is the subsequent step of management?
a. Check the blood coagulation profile
b. Neostigmine with atropine
C. Epinephrine injection
d. I.V hydrocortisone

Ans: b