

Perpendicular pressure abrasions

1. Pressure Abrasion

- Crushing of epithelium seen
- Eg. Ligature mark

2. Patterned abrasion (imprint abrasion)

- Crushing of epithelium + pattern of abrasion is seen
- Eg. Radiator mark, Tyre mark

Examination of abrasion

→ **Direction of force:** - Epithelial tag helps in it.

→ **Time since injury (Ageing of Abrasion)**

- **Color of scab** (dried lymph) helps in it.

R³B³

R - Raw → < 12 hours

R - Reddish Scab → > 12 hours

RB - Reddish Brown → 2-3 days

B - Brown → 4-5 days

B - Black → 6-7 days

→ **Site:**

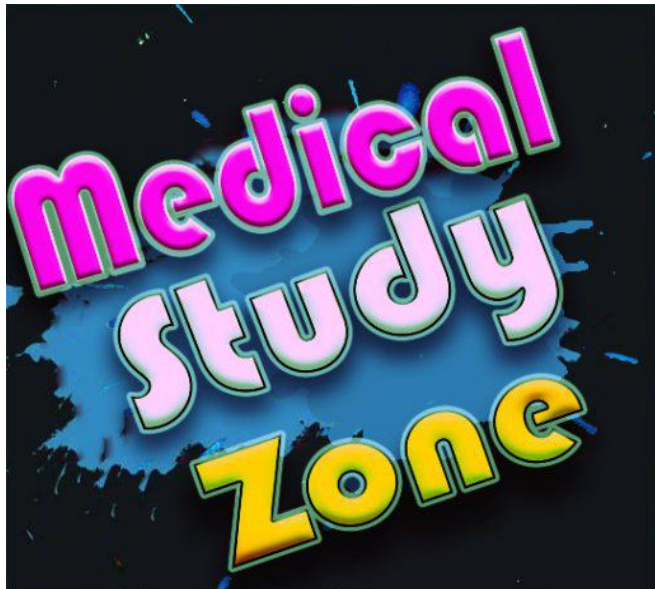
- Genitalia → sexual assault
- Abrasion in Perioral Region → smothering

Medico legal Importance: - (Abrasion)

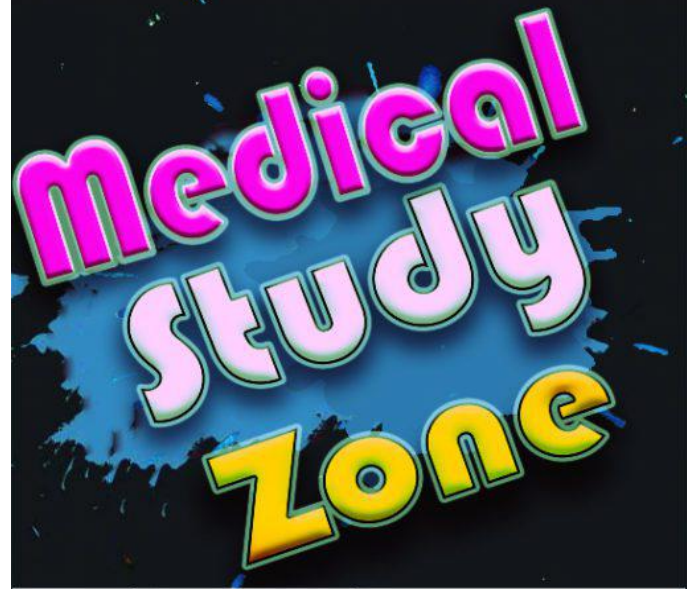
- Pattern of weapon
- Case
- Direction of force
- Time since injury
- All Abrasions - Simple hurt (except corneal abrasion)

→ **Medicolegally Most significant wound is Abrasion.**





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MECHANICAL INJURIES

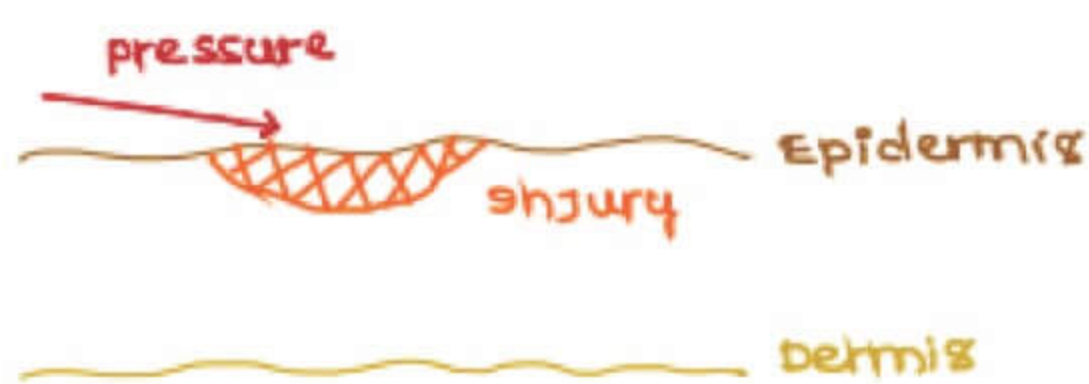
Classification

BLUNT FORCE TRAUMA	SHARP FORCE TRAUMA
Abrasion Contusion Laceration Fracture	Using Light cutting weapon → Incised wound Using Heavy cutting weapon → chop injury Weapon with pointed end → stab injury

Abrasion

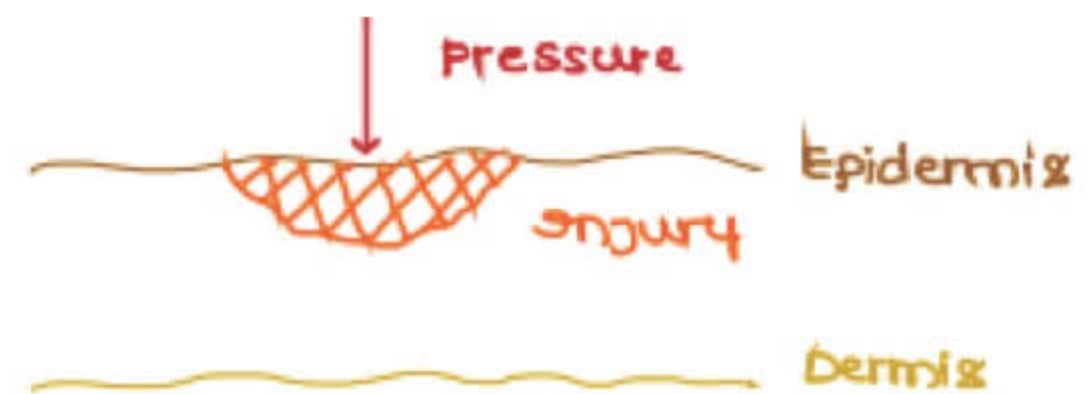
- (Abrade – Scrape)
- Only epidermis is affected
- Superficial abrasions will not bleed

Types of Abrasions:



→ due to Tangential Pressure

1. Scratch
2. Graze



→ due to Perpendicular pressure

1. Pressure
2. Pattern

Tangential pressure abrasions

i) Scratch (Linear abrasion)

- By Pin, Thorn, Nail
- Tangential Force

ii) Grazed abrasion

- aka sliding abrasion / scrapping abrasion / Brush abrasions
- Multiple lines of scratches over wide area due to skin is rubbed against rough surface (road)
- This rash is also called as **Gravel rash**
- **Most common type of abrasion**
- Tangential force.

Perpendicular pressure abrasions

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Examination of abrasion

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→ **Time since injury (Ageing of Abrasion)**

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→ **Site:**

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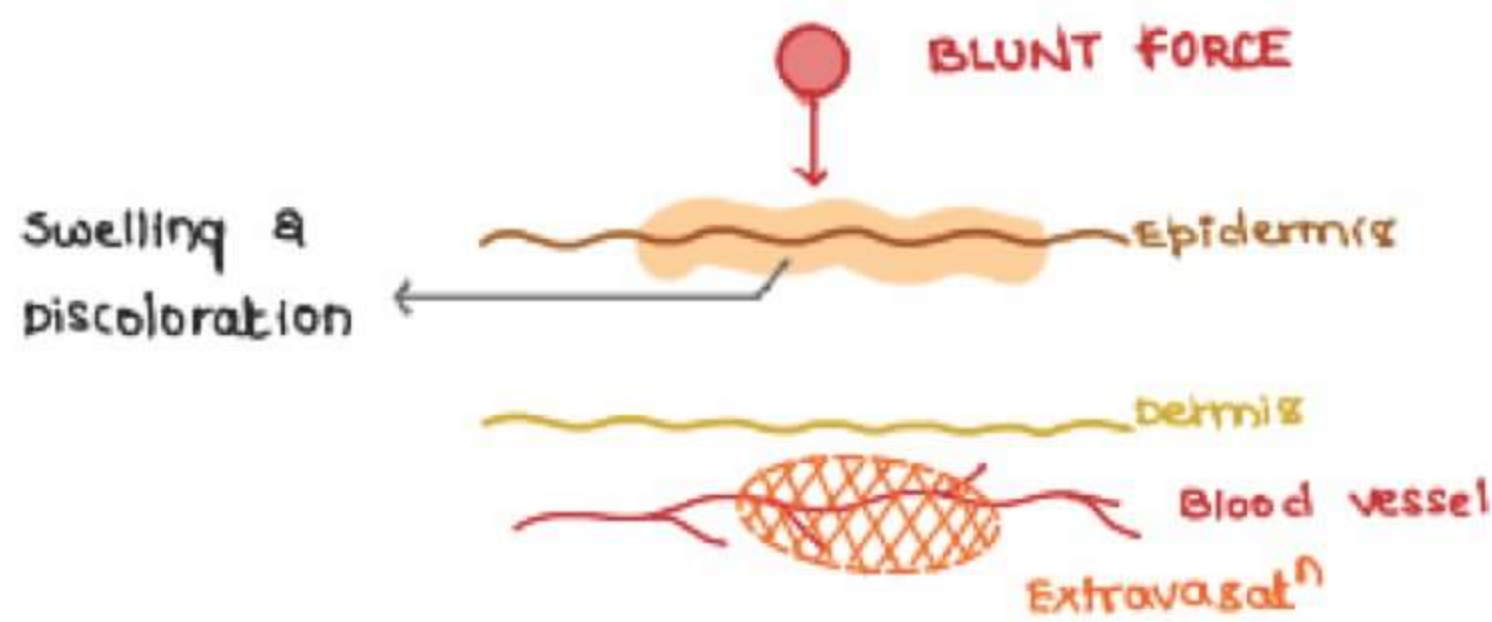
Medico legal Importance: - (Abrasion)

- Pattern of weapon
- Case
- Direction of force
- Time since injury
- All Abrasions - Simple hurt (except corneal abrasion)

→ **Medicolegally Most significant wound is Abrasion.**



CONTUSION (BRUISE)



Blunt Force



Dermal Vessel ruptures



Collection of Blood (Extravasation)



Swelling & discoloration of skin (Contusion) → Margins are Irregular

Factors that influence Appearance of contusion:

1. Site

Bony Prominence →	↑
Loose skin →	↑
Thick skin →	↓

2. Age

For both child & elderly, (two extremes of age)
Contusion → More (↑) for both Child & Elderly

3. Complexion

Fair → more visible (↑)

4. Sex

Females → ↑ Bruise



BLACK EYE



BATTLE SIGN

- dit MCF #
- Ectopic bruise
in mastoid region
[MCF - middle
cranial fossa]

Types: (contusion)

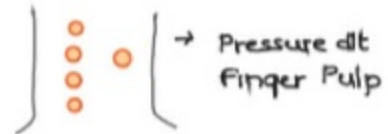
1. Ectopic bruise / Migratory bruise

- Bruise away from site of impact
- Eg. 1. In Anterior cranial Fossa fracture, blood collects in Periorbital region leading to, Raccoon's eye (or) Black eye (or) Periorbital hematoma.
 - 2. In Middle cranial Fossa Fracture, blood collects in Post auricular / Mastoid region known as Battle's sign.

Pattern bruise

- **Six Penny bruise**

- Six Penny bruise is seen in Manual Strangulation (Throttling) i.e. compression of neck by hand.
- It is produced by Finger tips
- This sign is also seen in shaken Baby syndrome



- **Tram line Bruise** (aka Railway line bruise)

- When a person is hit with a stick tram line bruise is produced.

Medico Legal Importance of contusion

Healing → color change



Ageing of contusion

- Color of contusion depends on the pigment inside

Color of contusion & pigments responsible

Oxyhemoglobin →	Red →	Few hours
Deoxyhemoglobin →	Blue →	Few hours to 3 days
Hemosiderin →	Brown →	4-5 days



BLuish
- Hrs - 3D

Biliverdin →	Green →	6-7 days
Bilirubin →	Yellow →	7-12 days

- In subconjunctival hemorrhage, No color change is observed.

BRUISE

Can appear due to,

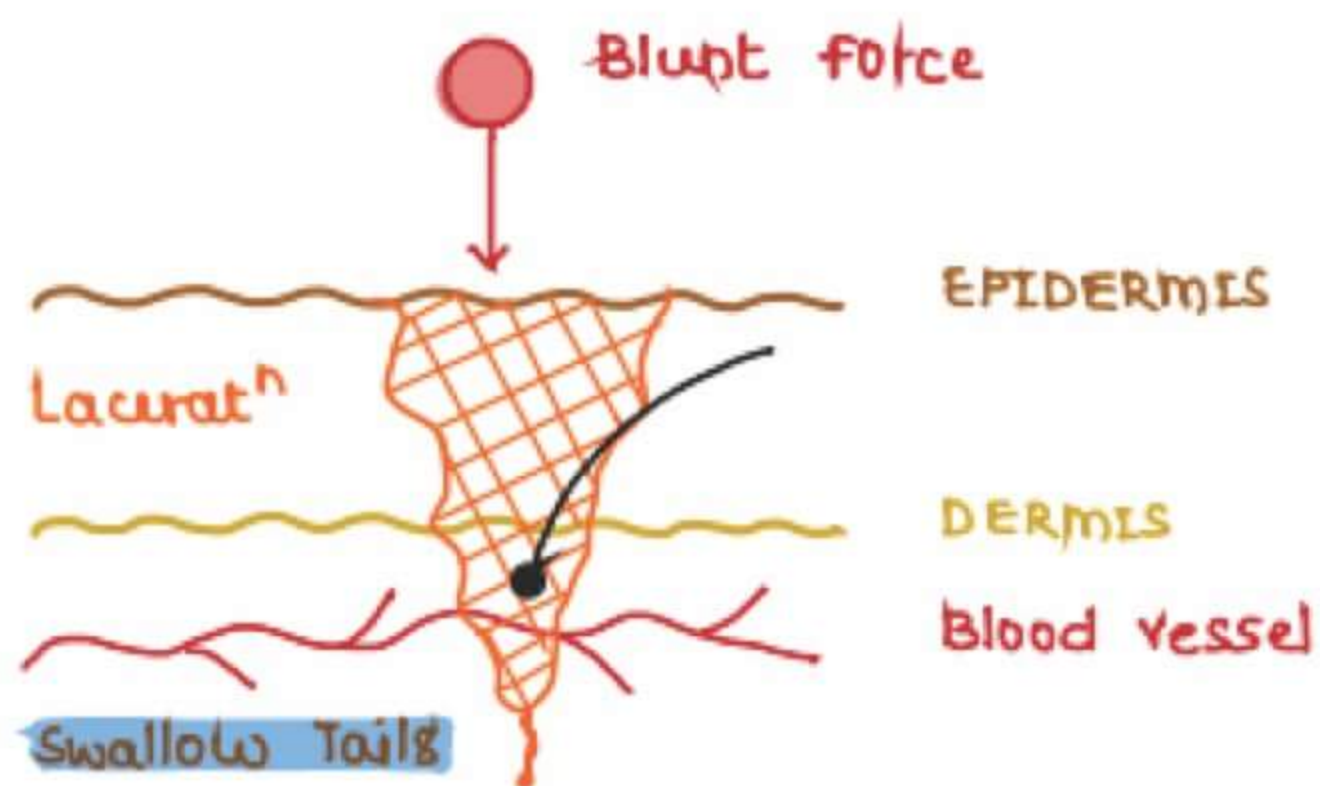
- Hypostasis (Postmortem Lividity)
- Artificial bruise

	HYPOSTASIS	BRUISE
Site	Dependent parts	Anywhere
Blanching	Present	Absent
Color change	Absent	Present
Margins	Regular	Irregular
Extravasation	Absent	Present
Incise & pour Water (H ₂ O)	Washed away	Persists

	TRUE BRUISE	ARTIFICIAL BRUISE
Etiology	Trauma	Irritant plant
Site	Anywhere	Accessible sites
Color	All colors	Brown
Blisters	Absent	Present
Incise	Blood	Acrid serum
Itching	Absent	Present
Margins	Irregular	Regular

Laceration

→ Lacere - Tear



1. Irregular margin
2. Floor: Vessels / Hair bulb → Crushed
3. Tissue bridges
4. Swallow tail – small split from edge of laceration seen

Types of Laceration

1. Split Laceration

- Seen in Bony Prominences. (Elbow, Zygoma, Forehead)
- In Naked Eye Examination: Margins appear regular
- Floor: crushing of tissue → laceration
- Incised looking laceration
- Seen in

Scalp
Forehead
Zygoma
Elbow
Iliac crest
Shin

2. Stretch Laceration

- Seen in overstretching of skin:
 - Run over injury
 - Compound fracture

3. Avulsion Laceration

- Seen with run over injury (Rotational Force)
- Direction of Flap is apposite to direction of force
- Degloving injury

4. Cut Laceration (Chop injury)

- Heavy weapon (Axe) with sharp surface.
- Fracture of underlying bone is seen



Incised looking laceration



STRETCH LACERATⁿ



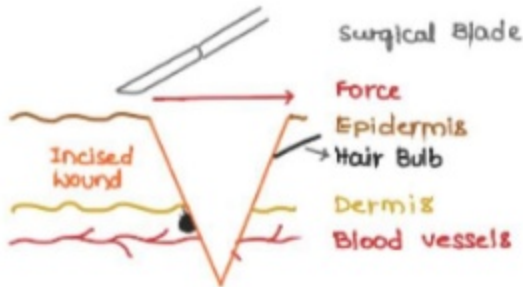
FLAPPING



DEGLOVING

Light cutting weapon

- Incised / cut/ slash / slice injury
- Eg. surgical blade.



1. Length is more
2. Clear cut margins
3. Floor: vessels cut & Hair bulb cut

Tailing

- seen in incised wound
- It helps in determining direction of force.



Ageing of Incised wound

- Fresh → Neutrophils Margination
- 12 h → Monocytes
- 24 h → Endothelial layer appear
- 2-3 days → Granulation tissue present
- 4-5 days → Fibrills present
- >7 days → Scar

Suicidal injury / Hesitatal cut / Intentional cuts

- i) Multiple cuts
- ii) Superficial linear cuts
- iii) Seen in accessible parts of body
- iv) Diagnostic of suicidal tendency



Stab injury

- Pointed end → Stab injury

Types of stab injury

1. Penetrating:
 - Only Entry wound is present
2. Perforating:
 - Both Entry & Exit wounds are present.



	ENTRY WOUND	EXIT WOUND
Margins	Inverted	Everted
Site	Large	Small

Shape

→ Gives the information about the Type of weapon

- i) **Single edge Knife** Produces wedge, Triangle shaped wound (One end is acute, another end is blunt)
- ii) **Double edge Knife** Produces oval/ spindle shaped injury (Both ends are acute)

Lines of Langer/ cleavage lines

- Imaginary lines
- made of Collagen fibers
- If the stab injury is perpendicular to the line, Gaping is more.
- If the stab injury is parallel to the line, Gaping is less



CLEAVAGE LINES



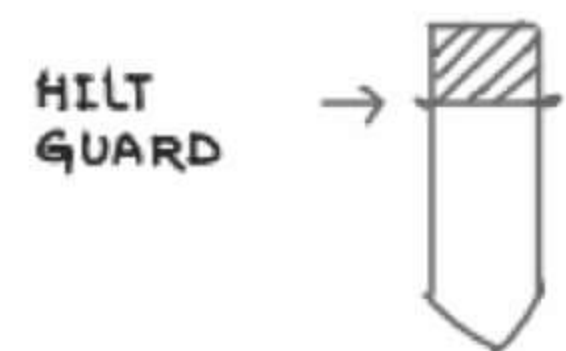
FISH TAILING

Fish tailing

→ produced by Single edge weapon from blunt end.

Hilt guard

- In complete penetration of the knife, Hilt guard Procedures **Patterned abrasion/ patterned contusion** of the skin
- Injuries produced by hilt guard is called as **Hilt mark**
- Hilt mark indicates the complete penetration



Hara-kiri: / SEPPUKU

- It is usually done by Japanese soldiers
- Stab injury – Abdomen
- Self-inflicted
- Evisceration → Circulatory collapse/ Hypotension

↓
Death



HARAKIRI

Defense wounds

- Active defense injuries → 1st webspace, Palmar surface
- Passive defense injuries → Medial Margin of Forearm

→ Presence of defence injury indicates that it may be homicidal but it is not Mandatory when,

- i) Attacked from behind
- ii) Unconscious

} Defence injuries will be absent



DEFENCE WOUNDS

Fabricated/ Fictitious injuries

→ Either, Self-inflicted → done by himself

Self-suffered → done with the help of another person

Features of self-inflicted injuries

TYPE → Incised wounds (MC)

Burns

SITE → Accessible points

CLOTHES → Not cut/not affected

DEFENCE INJURY → Absent

REGIONAL INJURIES

Skull fractures

1. #of Skull vault
2. #of skull base

M/C bone fractured in skull is temporal bone

• Skull vault fractures

i) Fissure fracture / linear fracture

- M/C # of skull vault
- Single thin line #



fissure #

ii) Depressed # / Signature # / fracture alae signature

- # With heavy weapon but small striking surface. Eg. Hammer
- 2nd M/C # of skull vault.



depressed #

iii) Comminuted fracture / spider web fracture

- Multiple # lines intersecting each other

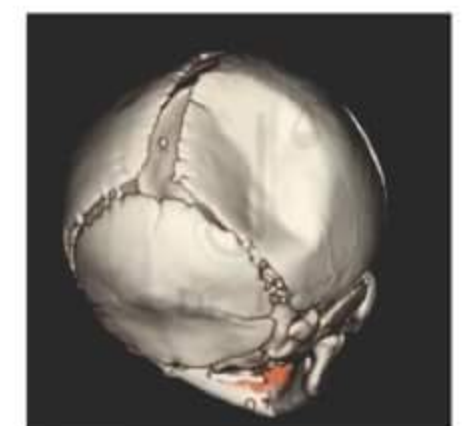
iv) Indented # / Pond's

- # of elastic skull
- Seen in infants

Eg. During forceps delivery

v) sutural # Diastatic

- # lines runs along the sutural line
- Commonly associated with sagittal suture
- Seen in young adults



pond's #

vi) Gutter fracture

- Associated with glancing / oblique bullet



sutural #

- **Skull base fracture**

- vii) **Ring fracture**

- Associated with fall from height
- # lines run around foramen magnum like a ring
- # of posterior cranial fossa

- viii) **Hing # / motor cyclist #**

- # line bisects the skull base into 2 halves
- Commonly seen in motorcyclist
- # of middle cranial fossa

- **Coup injury / contre coupe injury**

- A blow from side of skull
- Injury at the point of contact → coup injury
- injury opposite to the point of contact → Contre-coup injury
- Commonly associated with mobile head
- Widely accepted theory is struck hoop theory (Vacuum due to impact)

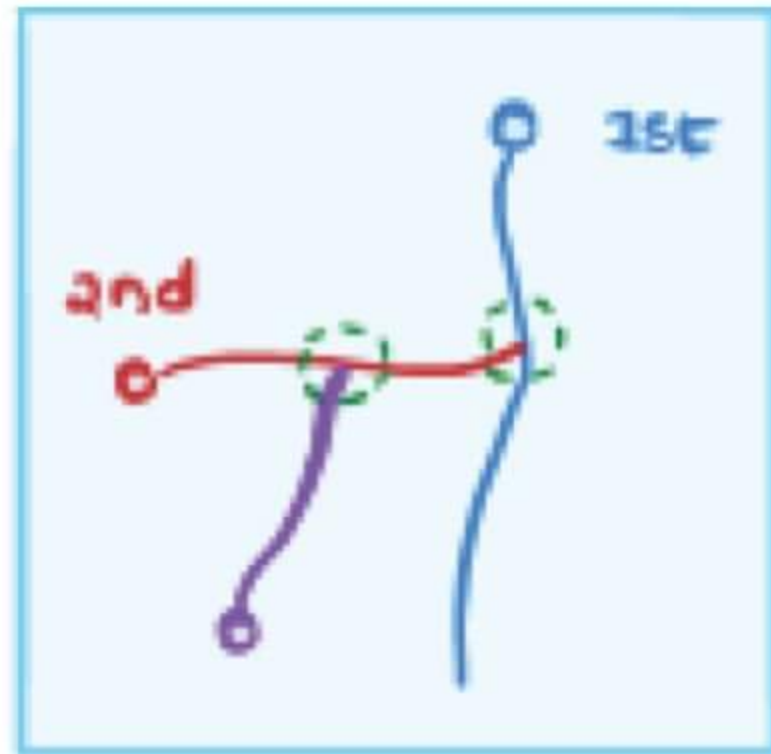
- **Imp. Points**

- (1) **Associated with fall injuries**

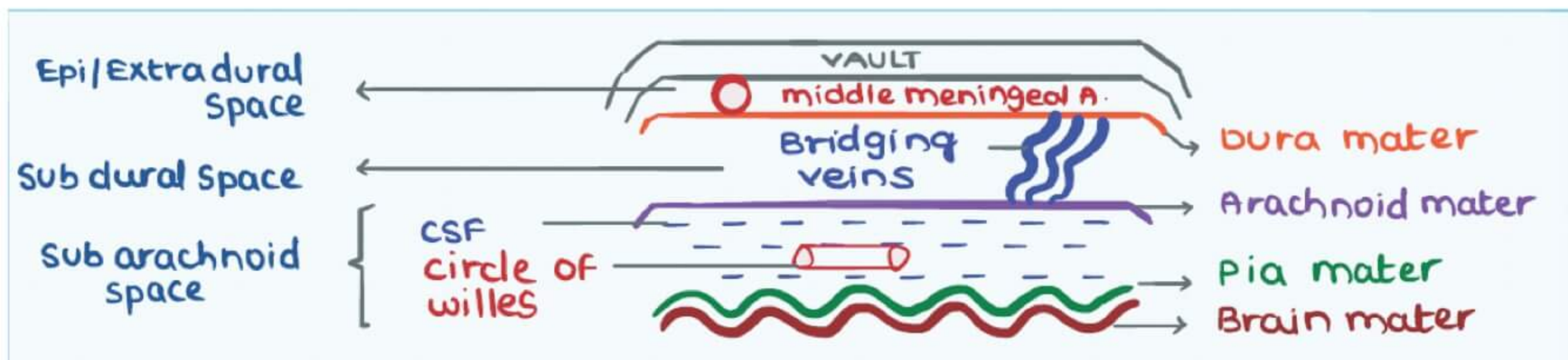
Coup	Contre coup
- Mild	- May be Severe
- No injury	- Injury may be present
- Occipital impact	- Frontal lobes confusion (M/C contre coup injury)
- temporal side	- Temporal lobe of opposite side
- Frontal lobe impact	- X no injury
- Temporal lobe impact	- Contre coup opp. Temporal region - [Contra lateral surface of ipsilateral lobe injured]

Puppe's rule

- Given by **George puppe**
- He demonstrated sequencing of skull #
- It states that: Whenever 2 fracture lines meet, the 2nd fracture line will never cross the 1st # line.



INTRA CRANIAL HEMORRHAGES



- Source of EDH → Middle meningeal Artery
- Content of Sub Dural Space → Bridging veins (source of SDH)
- Content of SAS (Sub Arachnoid Space) → CSF
- Circle of Willes (Source of Sub arachnoid Hemorrhage)

EDH [Extra Dural Hemorrhage]

Blow trauma to the side of head (Pterion)
 ↓
 Fracture of Temporal bone
 ↓
 Rupture of MMA
 ↓

Extra Dural Hemorrhage

- Injury at the point of contact → Coup Injury
- Injury Opposite to the point of contact → Contre Coup Injury
- EDH is usually a COUP INJURY

Lucid Interval

- Unconscious → Conscious → Unconscious → Death
Lucid Interval
- Period of consciousness between 2 Unconsciousness → Lucid Interval
- Medico Legal Relevance

Patient	DOCTOR
1. valid evidence in court	Death of a patient dlt
2. valid will	medical negligence
3. Crime → criminally liable	→ (P) 304 (A) IPC

SDH (Sub Dural Hemorrhage)

Types

- Acute SDH → within hr
- Sub-acute SDH → hr - Days
- Chronic SDH → > Months

Reason → Intense shaking → Rupture of bridging veins

Predisposing Factors

1. AGE

Common in extremes of age

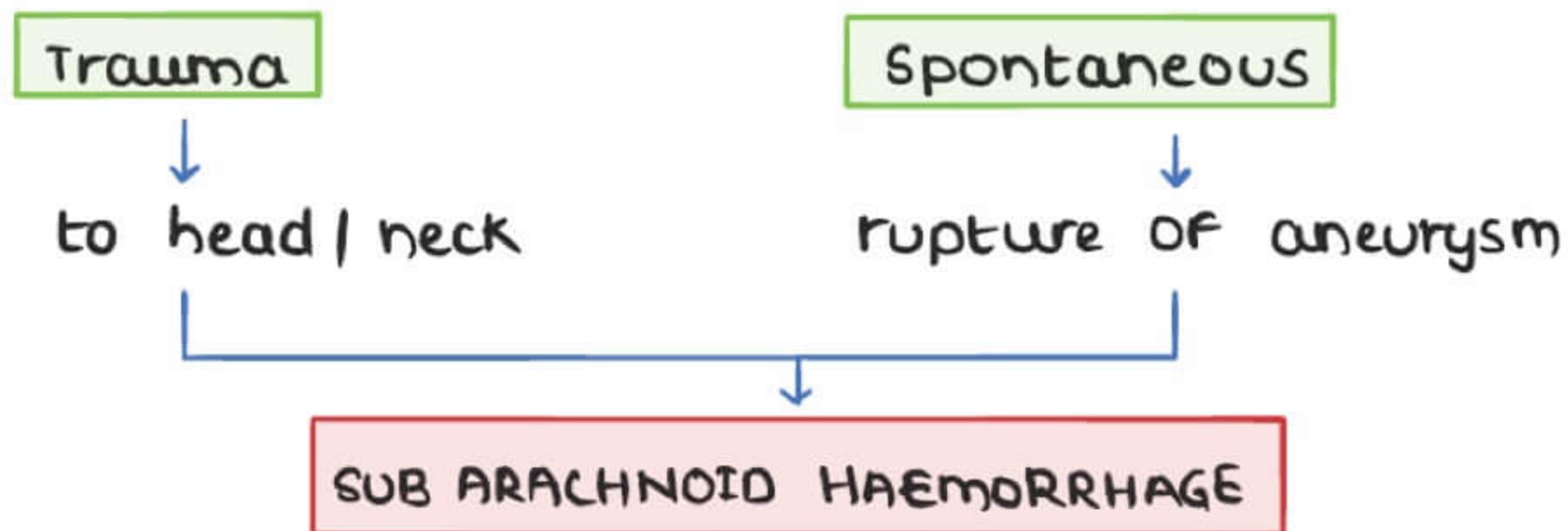


Children	Elderly
Shaken Baby Syndrome / Infantile whiplash Syndrome (most consistent Feature)	Follows a minor trauma

2. Alcoholics

SAH (Sub Arachnoid Hemorrhage)

- D/t rupture of willis



- CSF + Blood
→ Lumbar Puncture + Xanthochromia [Blood Stained CSF]
 - Characteristic Finding of SAH

EDH

- CT Scan → Biconvex / Lens Shaped opacity
- R_x → Emergency craniotomy & Removal of clot

SDH

- CT Scan → Concavo convex Opacity

Punch Drunk Syndrome

- Seen in Boxers (Boxing profession)

Repeated blows to head

↓

Minor hemorrhage in Brain (Boxer's Hemorrhage)

↓

Punch Drunk Syndrome/

Dementia Pugilistica /

Chronic Traumatic Encephalopathy

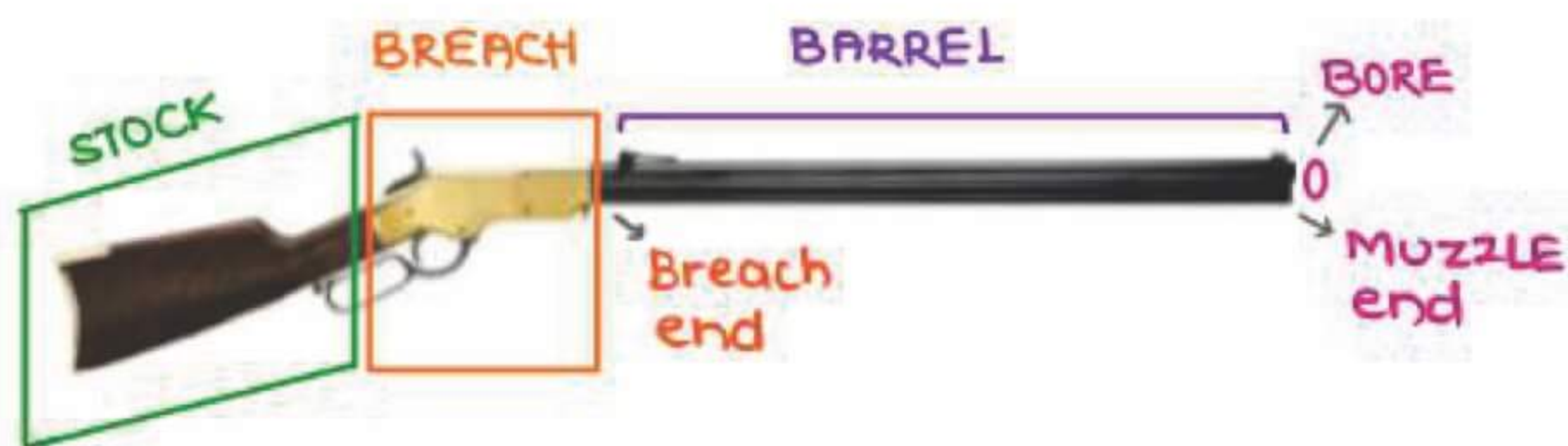
- Parkinsonism → Rigidity
- Dementia
- Drunken Appearance

FORENSIC BALLISTICS

- Ballistics – study of firearms and projectiles and its effects
- Proximal ballistics – study of fire arm and its ammunition → Internal ballistics
- Intermediate ballistics – study of motion of bullet → External ballistics
- Terminal ballistics – study of effects of bullet on target → Wound ballistics

- CALVIN GODDARD – father of forensic ballistics

FIRE ARM



- Barrel – long metal tube connected to the breach
- Bore – inner diameter of barrel
- Outer end of barrel – Muzzle end
- Inner end of barrel – Breach end

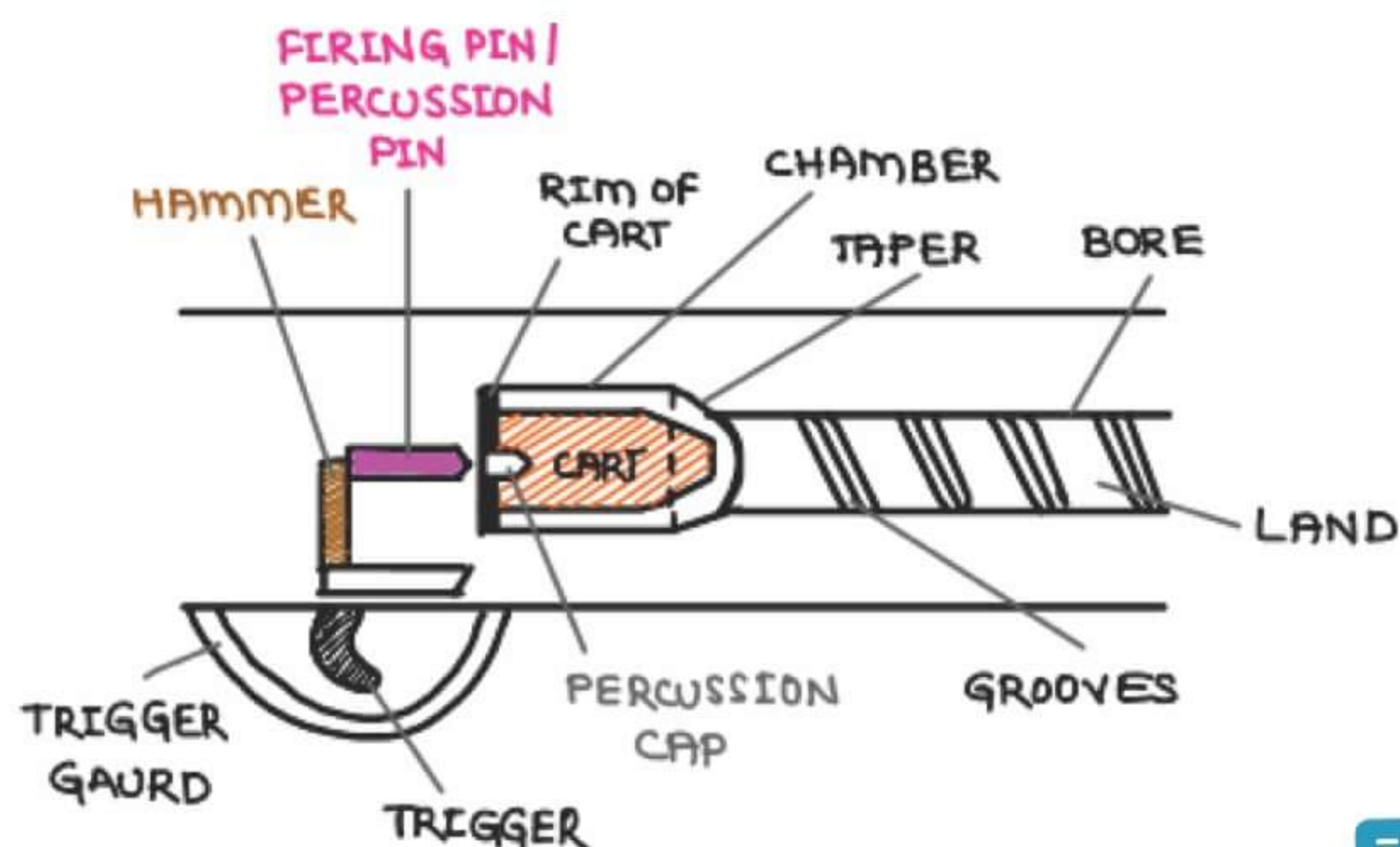
→ Bullet comes from breach – through the barrel



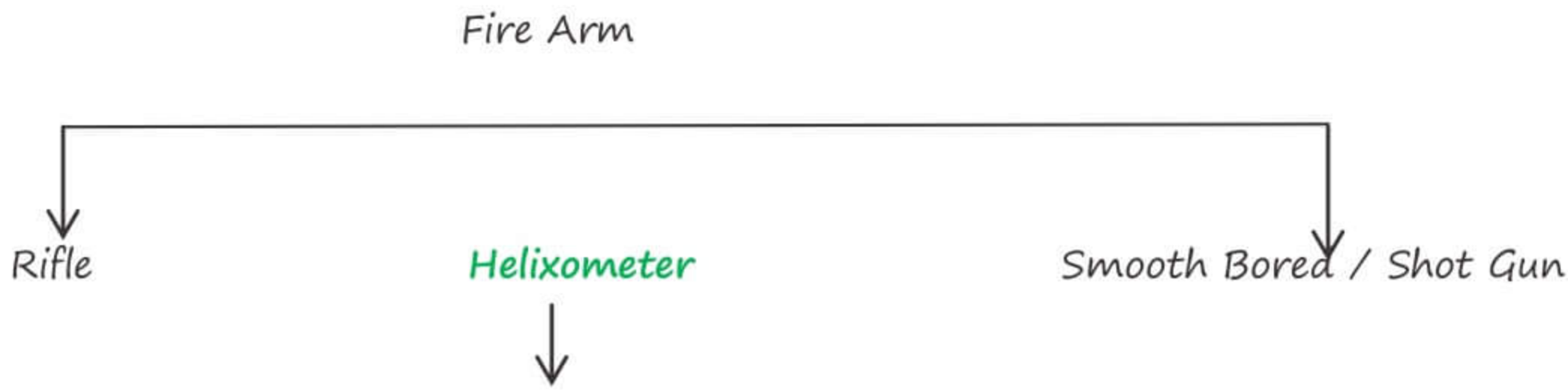
Comes out

Components of a firearm

- Cut section of a breach



Classification



instrument to examine the inner surface Of Barrel



- Spiral grooving



- completely smooth

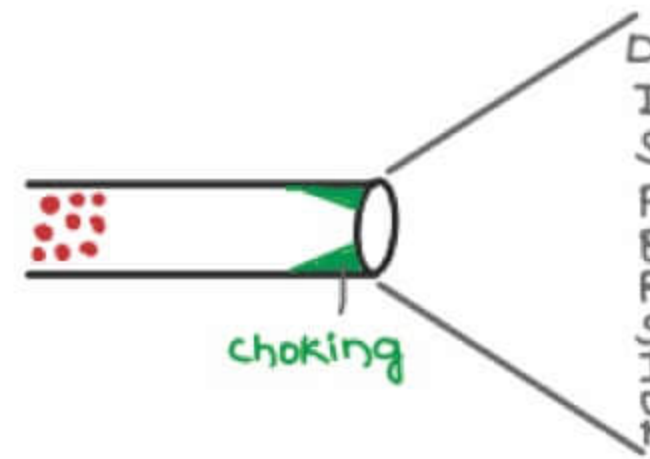
Starts from breach end

Till the muzzle end

- Called as RIFLINGS
- Bullets are used made from lead

- lead shots / pellets are used

- When bullets come through This grooving it will spin the bullet



Narrowing of barrel

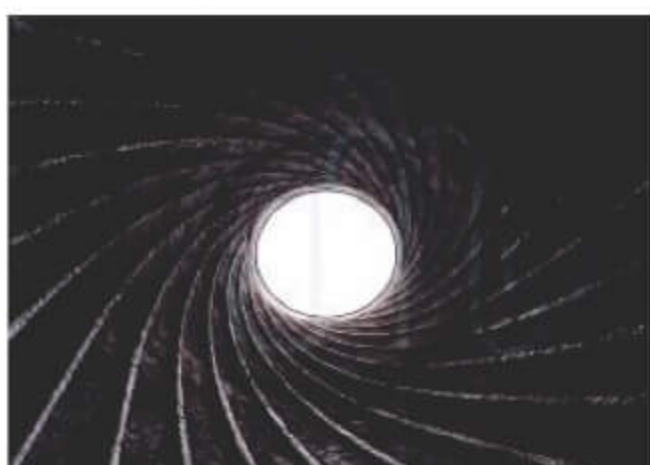


It will

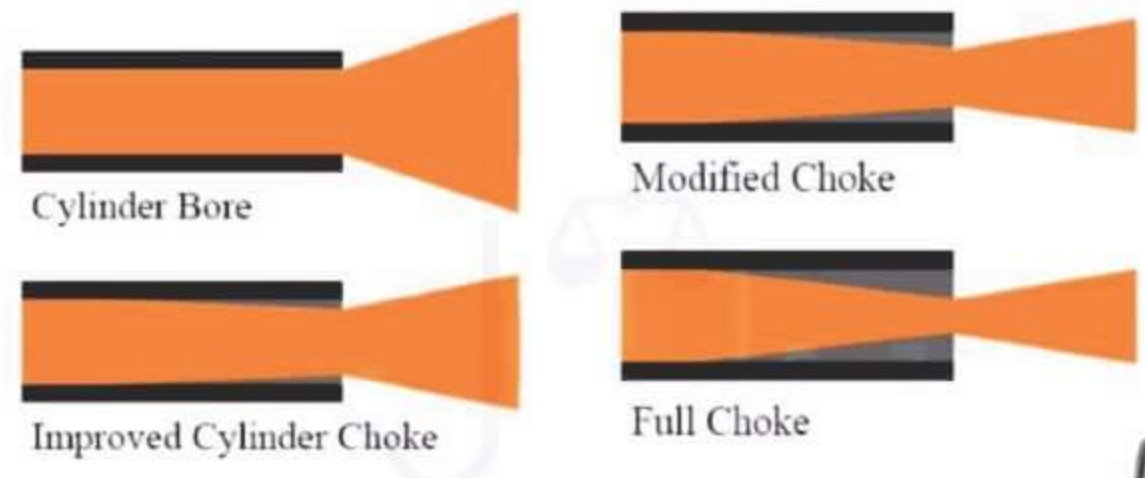
choking

- ↑ Range
- ↑ Stability

- to decrease dispersion
- and will increase range



1. Unchoked gun (cylinder)
2. Improved cylinder
3. Modified cylinder
4. Fully choked



Eg of rifled gun



1. Revolver – 200 yards
2. Pistol – 400 yards
3. Military rifle – 2000 yards

R
P
M ↓ Range increases

Eg: of Shot gun

1. Single bore
 2. Double bore
- 50-60 yards



Rifled Gun Calibre	Shot Gun Gauge / bore
 <p>Distance b/w 2 opposite lands – caliber</p>	 <p>No. of balls If 10 -10 bore gun 18-18 bore gun etc No. of balls made from 1 pound of Pb – gauge</p> <ul style="list-style-type: none"> • Bore \propto 1/size

Ammunition

Shot gun cartridge

Primer – is highly inflammable

- It will burn into flame when hit.



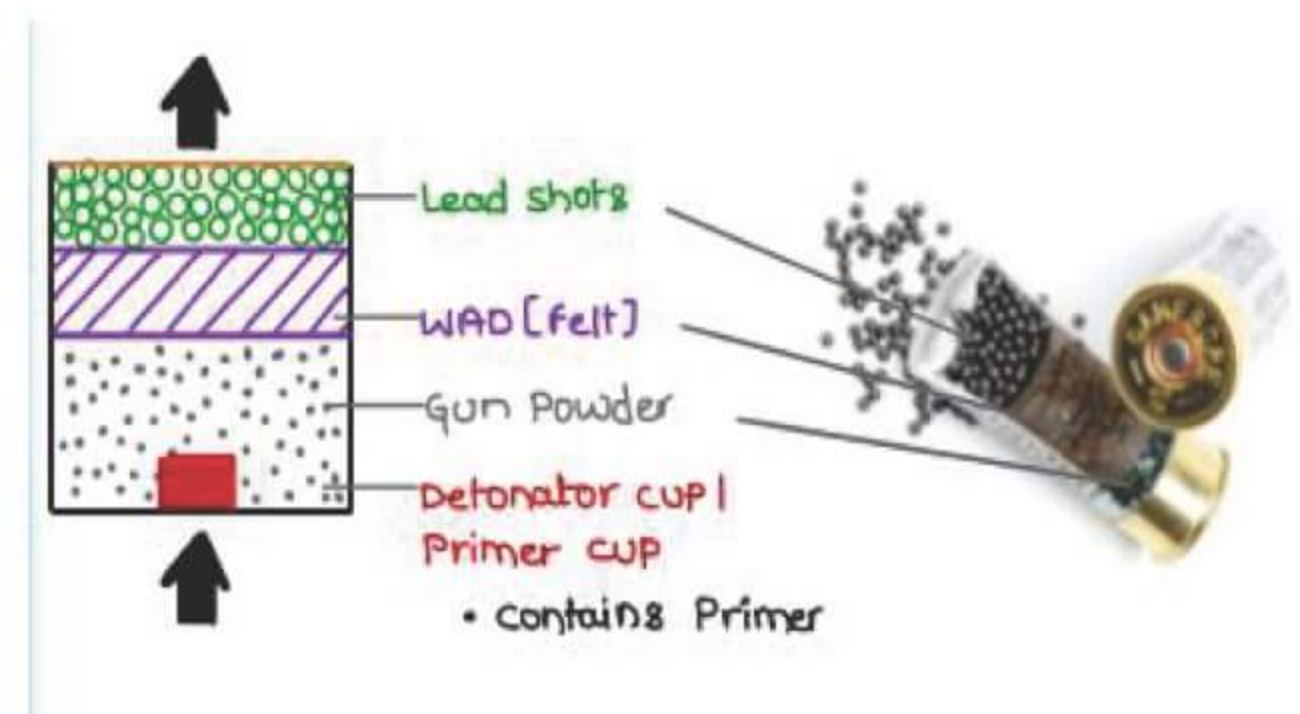
it will explode the gun powder



Lead shots will move away

Wad (fort) – acts as a lubricant

- Functions like a piston – pushing the lead shots out



- Does not cause any fatal injury only minor bruise

Rifled Gun – Bullet

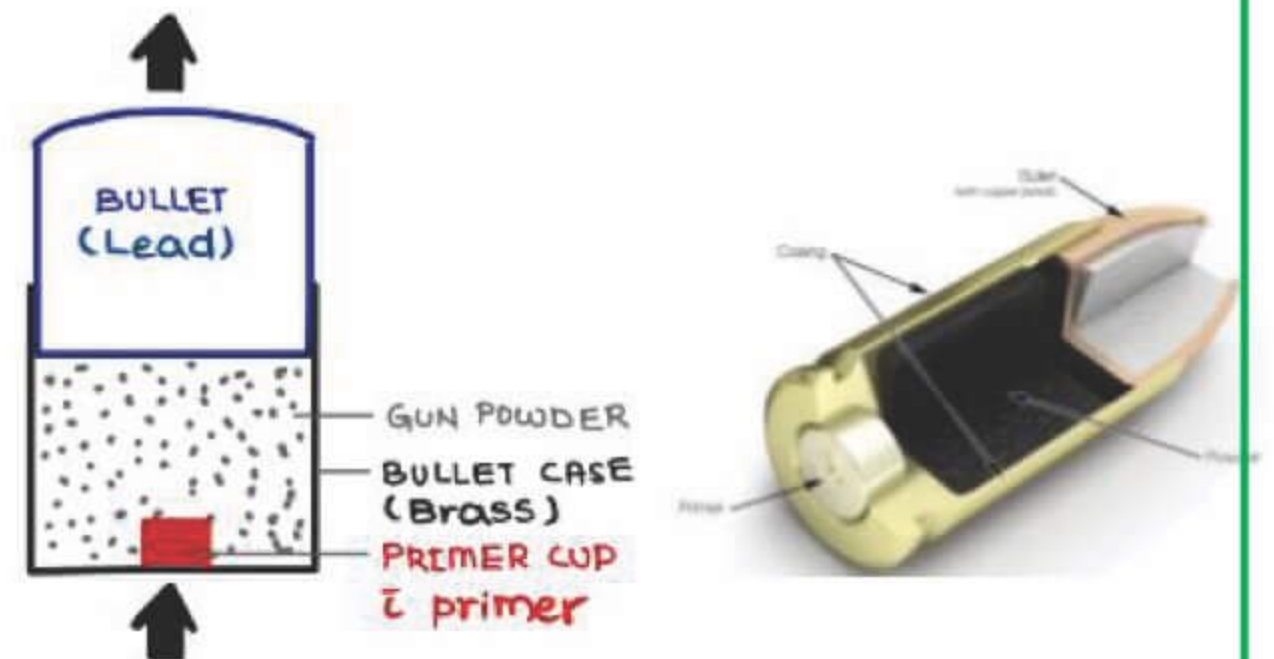
- When primer is hit it burns in flamer

↓

Gun powder explodes

↓

Pushing the bullet forward



Fatality

Kinetic energy (Ke) – $\frac{1}{2} mv^2$

M= mass

V= velocity

- Energy depends mostly on velocity
- Object with same mass with higher velocity creates more injury
- Velocity \propto Ke – injury

Gun powder

- 3 different types of gun powder

1. Black gun powder

K – potassium nitrate – 75%

C – Charcoal – 15%

S – Sulphur – 10%

- Produce ↑ smoke, ↓ power
- 1 gm. of black gun powder – 3000 – 4000 cc / gas

2. Smokeless gun powder

Nitrocellulose – single base

Nitroglycerine – double base

Nitroguanidine – triple base

Single base: N.C

Double base: N.C + NGL

Triple base: N.C + NGL + NGU

- ↓ smoke
- 1 gm. – 12,000 – 13000 cc/gas
-

3. Semi smokeless gun powder

- Black (80%) + smokeless (20%)

Gun powder can be termed by

- FG
 - FFG
 - FFFG
 - FFFFG
- } F – indicates fineness
- more fine – power ↑

Constituents of primer

B – Barium nitrate

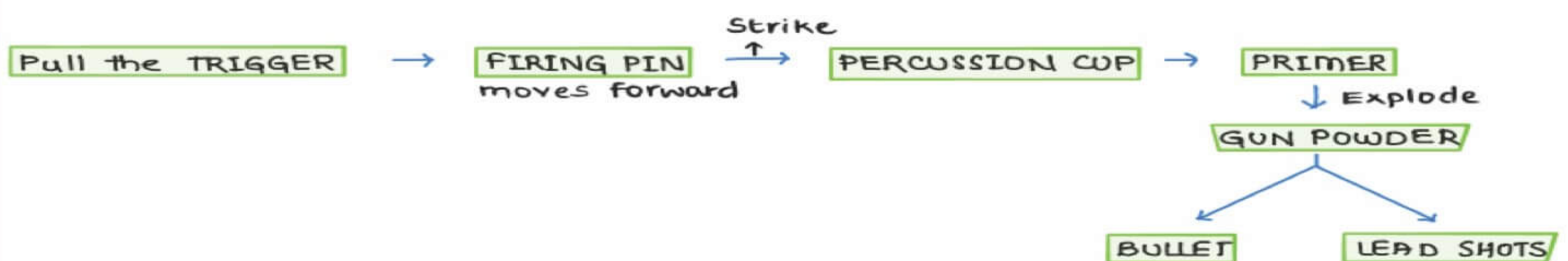
L – Lead peroxide

A – Antimony

S – styphnate (lead styphnate)

T – Tetrazine

Sequence of firing event



1. Flame → burns / charring / *singeing of hair*
2. Smoke → *blackening*
3. Unburnt gun powder → *Tattooing* / peppering
4. Bullet → *punctured wound*

Collars produced by bullet

Grease collar / dirt collar (inside)

Abrasion collar (outside) [GA]

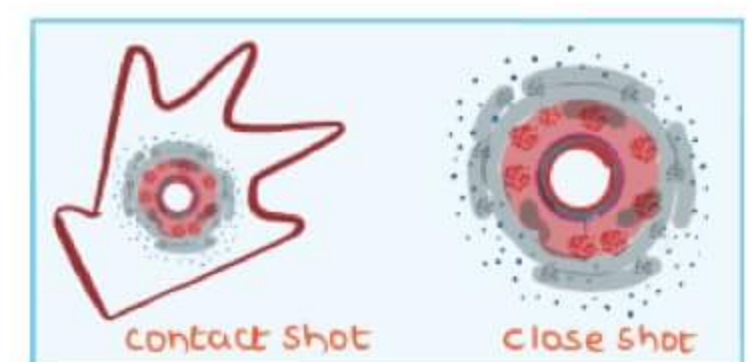
Effects

	Rifle	Shotgun
Flame	8 cm	15 cm
Smoke	30 cm	45 cm
Gun powder	60-90 cm	60-90 cm
Wad	-	2 m



Ranges

- *Contacts – tight contact*
 - Held tight towards skin
 - Skin splits due to energy and due to expanding gas – stellate margin / stellate shaped wound
 - Burns, blackening and tattooing is seen inside the wound
- *Close shot*
 - Punctured wound is seen
 - 2 collars are seen
 - Burns, blackening and tattooing all are seen outside the wound
- *Near shot*
 - Bullet hole with 2 collars
 - Tattooing is observed

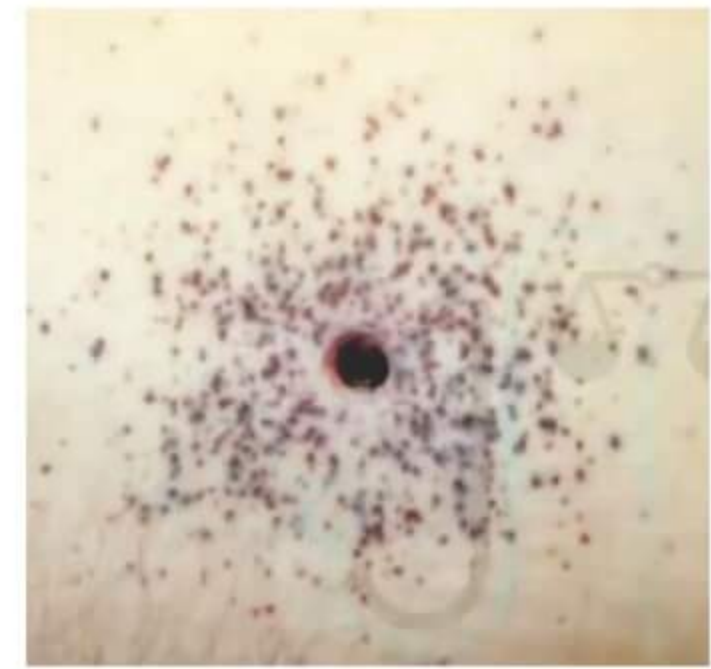


- Blackening ±

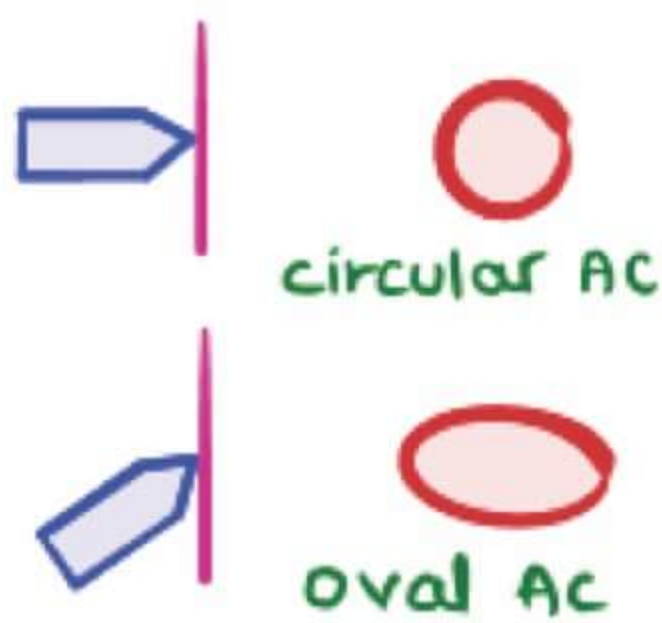
• **Distant shot**

- Bullet hole with 2 collars

- Bullet piercing the skin perpendicularly give circular abrasion collar
- Oblique shot gives oval abrasion collar



→ bullet direction can be found by the shape of abrasion collar



Shot gun

Ranges

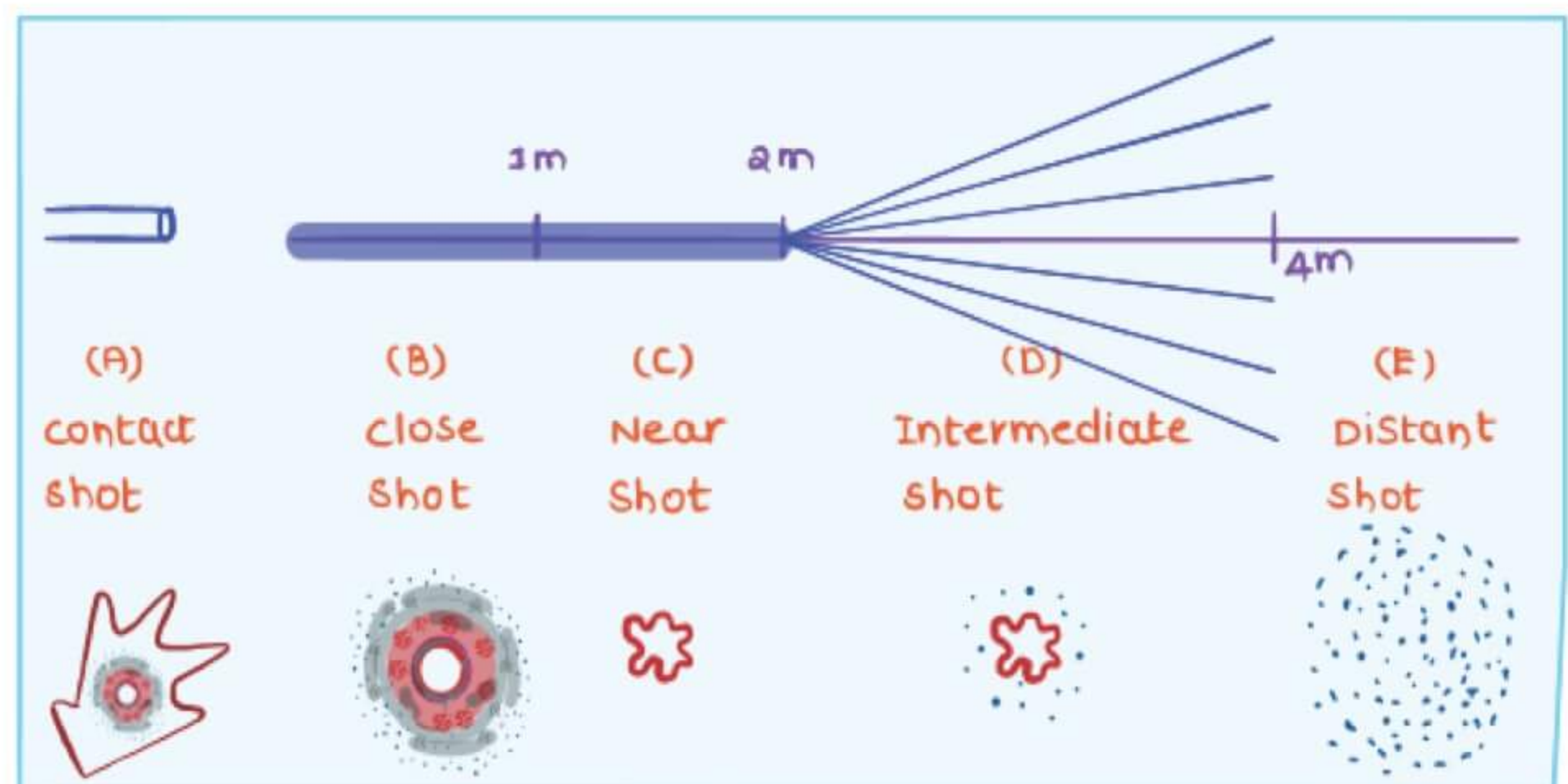
Contact – tightly on the skin

Close - <1 m

Near – 1-2 m

Intermediate – 2-4 m

Distant - >4 m



Till, 1 m – flame, smoke, GP is seen

From 2 m – dispersion starts (satellite holes)

4 m – complete spread / dispersion

- a) Contact shot – stellate wound, cruciate margin
- b) Close shot – burns, blackening and tattooing is observed
- c) Near shot – only the palate hole is observed
 - Dispersion has not started yet
 - Single hole, irregular margin
- d) Intermediate – dispersion starts
 - Central hole with satellite palate hole is observed
 - No cruciate margin
 - No burns / blackening / tattooing
 - Not a single
 - Incomplete dispersion is observed
- e) Distant – lead shots entering into skin as separate holes.
 - Complete dispersion

→ distant shot > 4 m



contact shot



Intermediate range



Entry & exit wounds from bullet

Entry

Margins: Inverted

Size: smaller

Exit

margins: Everted

larger

In contact shot entry will be larger because it is stellate

Flame – burns

Smoke – blackening

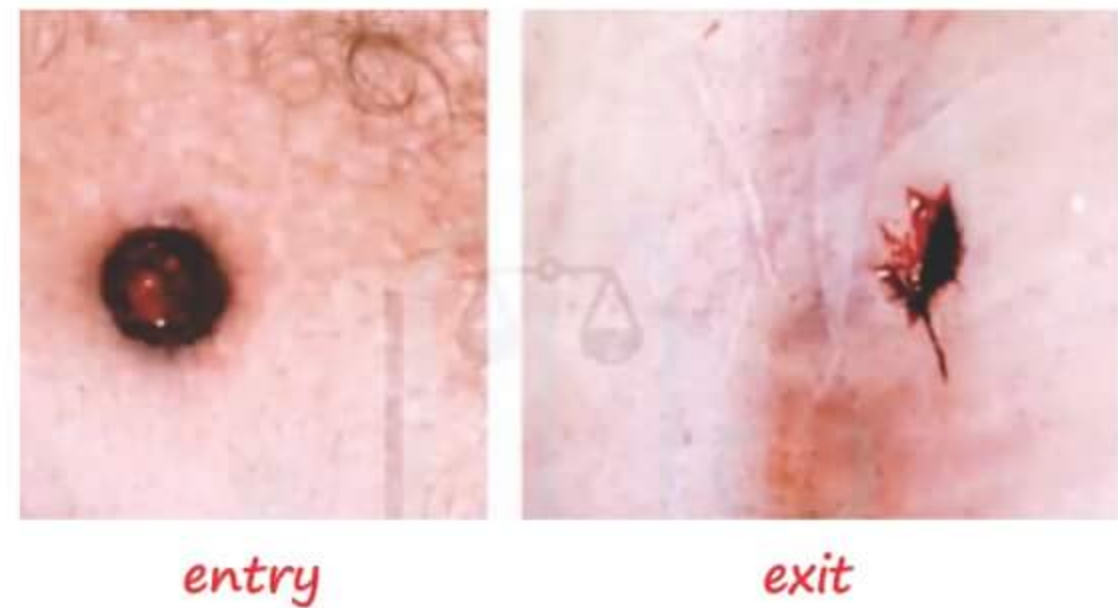
Gun powder – tattooing



is only seen at entry

Abrasions collar
 Grease collar
 ↑ bleeding

Only found at entry



- Bleeding is more with exit wound

Bullet finger printing

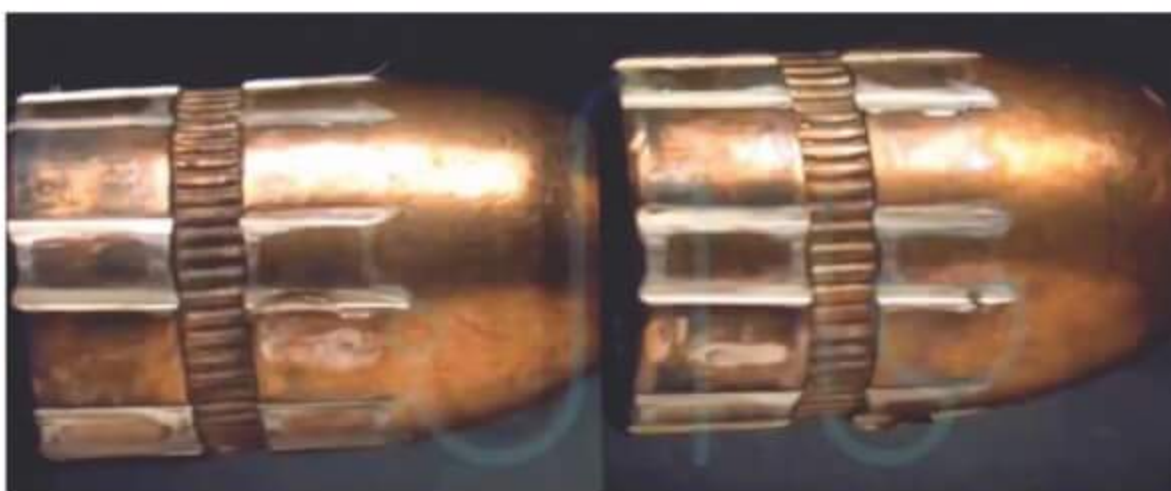
Primary marking – d/t rifling

Secondary marking – d/t irregularities in the barrel



- Can be due to metallic fouling
- Or irregularities due to manufacturing process.

- A test bullet from a suspected gun and the crime bullet are observed under a comparison microscopic and checked for the similarities in the markings.
- If the markings are matching the bullet had come from the same gun.
- Primary marking are also called class characteristics
- Secondary marking are also called as individual characteristics



- Rifling of 1000 guns from a same brand will be having same primary markings
- Every gun will differ in the individual irregularities



- GSR test [gunshot residue]

"Firing HANDS"

F- Flameless atomic absorption spectrometry (FAAS)

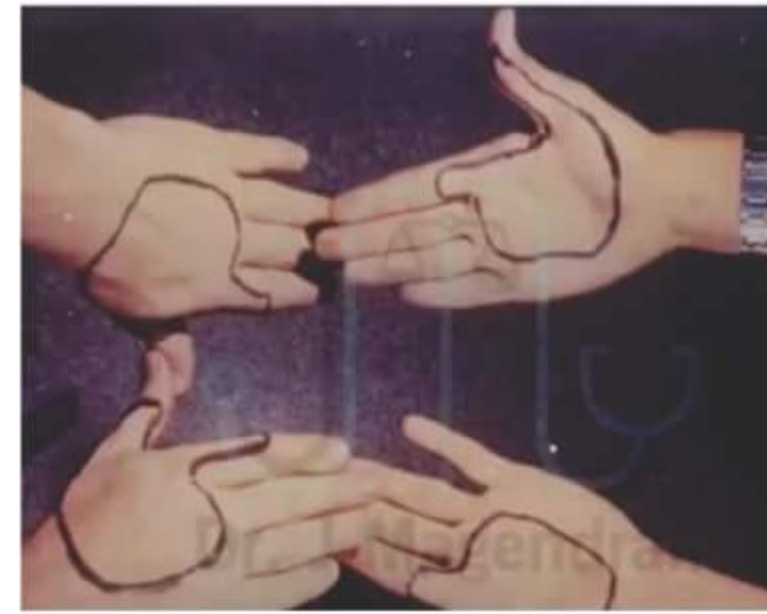
H- Harrison and Gilroy

A- Atomic absorption spectrometry (AAS)

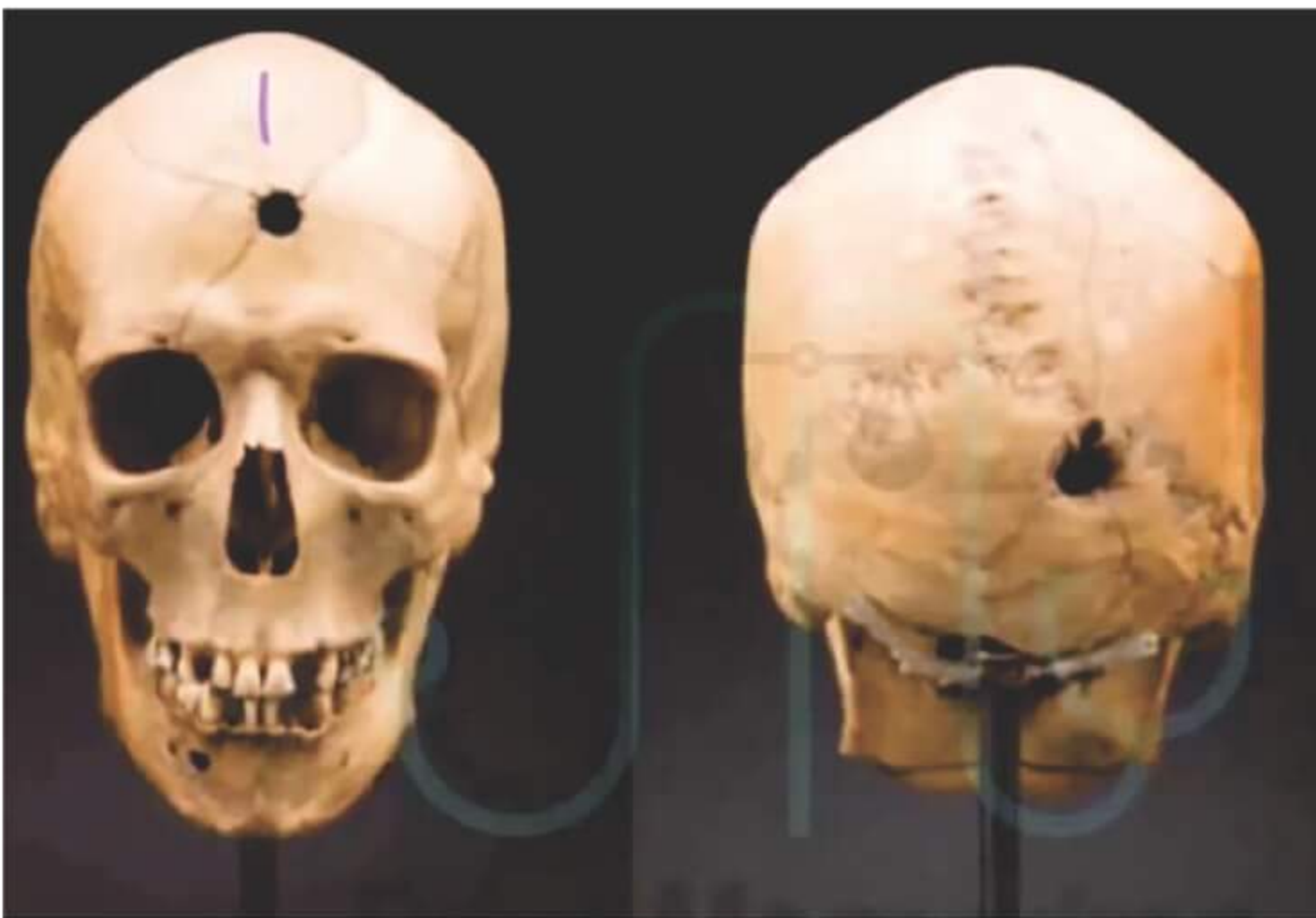
N- Neutron activation analysis

D- Dermal nitrate test

S-SEM-EDXA (most specific)

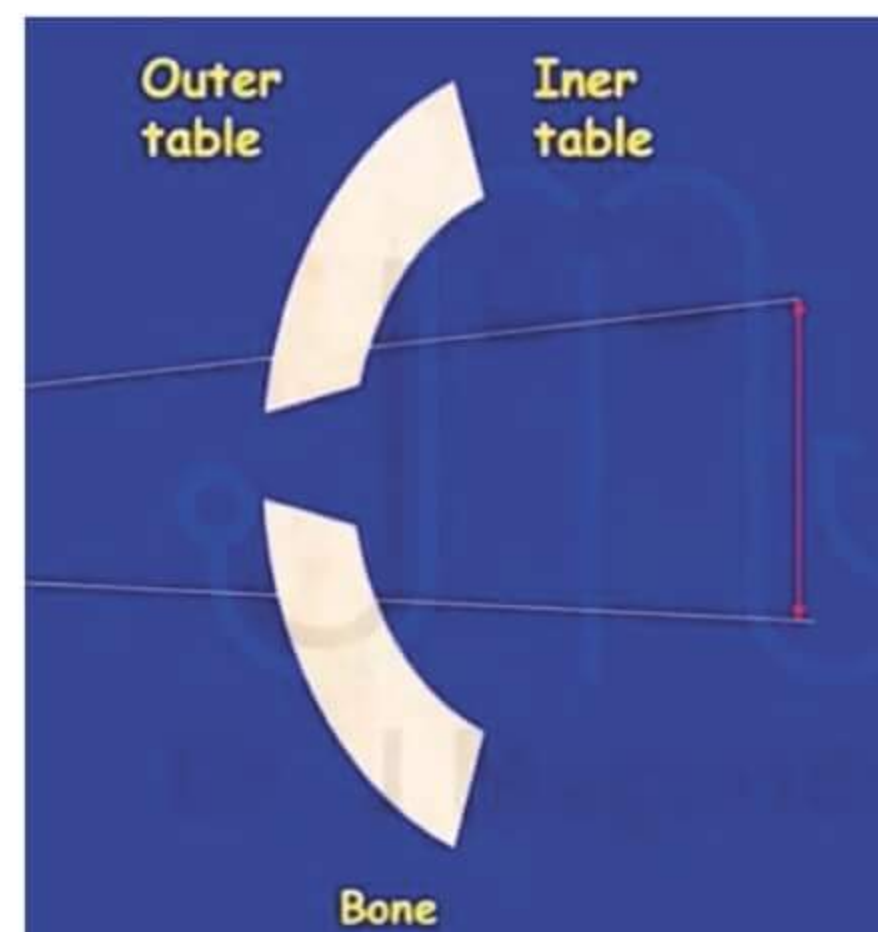


Entry & exit wounds in skull



beveling

- Entry wound – inner table shows beveling
- Exit wound – outer table shows beveling
- Bullet enters the skull tangentially
- Key hole appearance



- Bullet strikes the skull tangentially
- Gutter fracture
- High velocity with close range
- Evisceration of brain through exit wounds

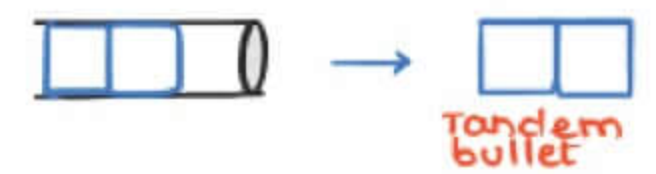
→ KRON LEIN Shot

FORENSIC BALLISTIC – PART II

Types of Bullets

1. Tandem Bullet / PiggyBack Bullet

- Seen with old unused gun
- One bullet follows the other bullet



2. Tracer Bullet

- Bullet glows in the air when it is fired
 - Tracing the path of bullet is possible
- Used in Military warfare



3. Dum Dum Bullet / Mushrooming Bullet

- Semi Jacketed bullet
- When it enters the skin, it expands like a mushroom → Mushrooming

4. Frangible / Fragmented Bullet

- Bullet get fragmented on impact
- Made up of zinc/copper

5. Ricochet / Deflected Bullet

- Bullet that gets deflected from a intermediate Surface
- Internal ricocheting occurs in skull
- Creates irregular entry wound

6. Incendiary Bullet

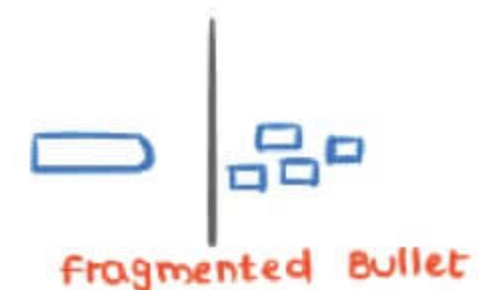
- Bullet which explodes on impact

7. Tumbling Bullet

- Bullet which rotates & hit the target

8. Yawning Bullet

- Bullet which moves in irregular fashion



Kennedy Phenomenon

- Gunshot Victim with multiple wounds

↓
RX - dressing iatrogenic
Suturing Intervention

↓
Appearance altered

↓
Range determination is difficult [Kennedy's Phenomenon]

Bullet Graze

- Bullet do not enter the skin
- Produce an abrasion & incised wound

9. Souvenir Bullet / Retaine Bullet

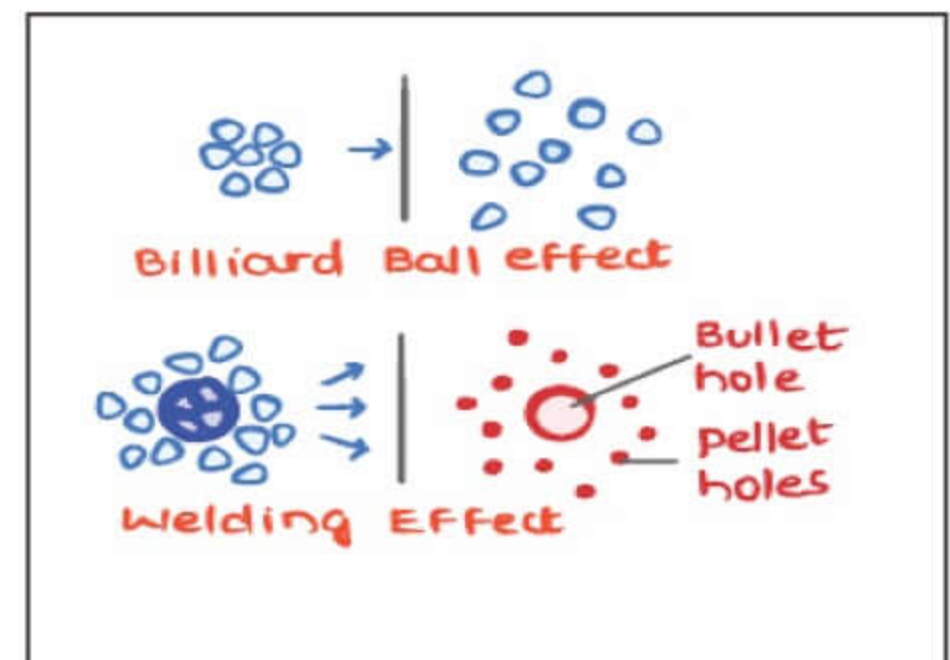
- Retained bullet in the body
- Fibrosis present around bullet
- Can produce chronic lead poisoning (Plumbism), Otherwise it is harmless

Billiard Ball Effect

- Seen in shot gun injury
- On entering the skin, Lead shot collide with each other & all lead shots disperse widely in a close range
- Resembles like a distant shot because of billiard ball effect

Balling or Welding Effect

- Seen in shot gun injury
- Few lead shots will combine together & enter the skin along with other lead shot creating a central hole with pellet holes
- Resembles like a rifle gun & shot gun shot



Types of Guns [Other than Rifles & Shot gun]

1. Paradox Gun → Smooth bored gun
→ In terminal part has rifling
2. Carbine → Rifle gun
3. Musket → Smooth bore gun

BLAST INJURIES

Bomb Blast Injuries

Products Released From Blast

1. Blast Wave
2. Flying Objects / Projectiles / Missiles
3. Wind → Causes Victim displacement
4. Miscellaneous

1. Blast Wave

- Pass through body of persons
- Organs + air are affected
 - Ear → Tympanic membrane rupture (MC)
 - Lung → Blast Lung (Fatal)
 - GIT → Colonic Perforation
- Injuries called as **Primary Blast Injuries**

2. Flying Objects / Projectiles / Missiles

- Produce
 - Abrasions
 - Contusions
 - Lacerations
 - Injuries called as **Secondary Blast Injuries**
- Marshal's Triad**
→ At same site

3. Victim Displacement

- Causes Skeletal #
- Injuries known as **Tertiary Blast Injuries**

4. Miscellaneous

- Building Collapse → Traumatic Asphyxia
- Injuries known as **Quaternary Blast Injuries**

Under Water Blast

- Injury Depends on the level of head
 - Head below the water level → Tympanic membrane Rupture
 - Head above the water level → GIT Injury

Molotou's Cock Tail → Petrol Bomb

Solid Blast

- Explosion occurs on other side of solid Surface, energy transfer into the person
- Causes Skeletal #

THERMAL INJURIES I

Injuries due to,

HEAT → General heat – Produces heat cramp, heat syncope, heat stroke

Local heat – Produces flame burns, scalds

COLD → General cold – produces Hypothermia

Local cold – Produces frost bite, Trench foot.

General increase in heat

→ Hypothalamus is the temperature regulator center which controls body temperature.

Mechanism of heat dissipation by hypothalamus

↑ Environmental temperature



Hypothalamus



↑ sweating → loss of electrolytes → **HEAT CRAMPS (or) MINERS**



↑ sweating

CRAMPS (or) FIREMANS CRAMPS.

(+) → loss of blood pressure → **HEAT SYNCOPE**

Vasodilation



↑ Body core temperature → CNS symptoms → **HEAT STROKE (fatal)**

(due to failure of temperature regulation)

Heat stroke / thermic fever/sun stroke/heat hyperpyrexia

→ ↑ BCT

→ Rectal temperature > 41° C

→ CNS symptoms

→ Dry skin / absence of sweating

→ Miosis

**TRIAD OF
HEAT STROKE**

- **PM finding** - Post mortem calorcity (PMC) - Body remains warm classical feature of heat stroke - PMC
- Necrosis / edema in Purkinje layers of cerebellum - classical lesion of heat stroke

THERMAL INJURIES- II

Local increase in heat

- Burns - due to dry heat
- Scalds - due to moist heat

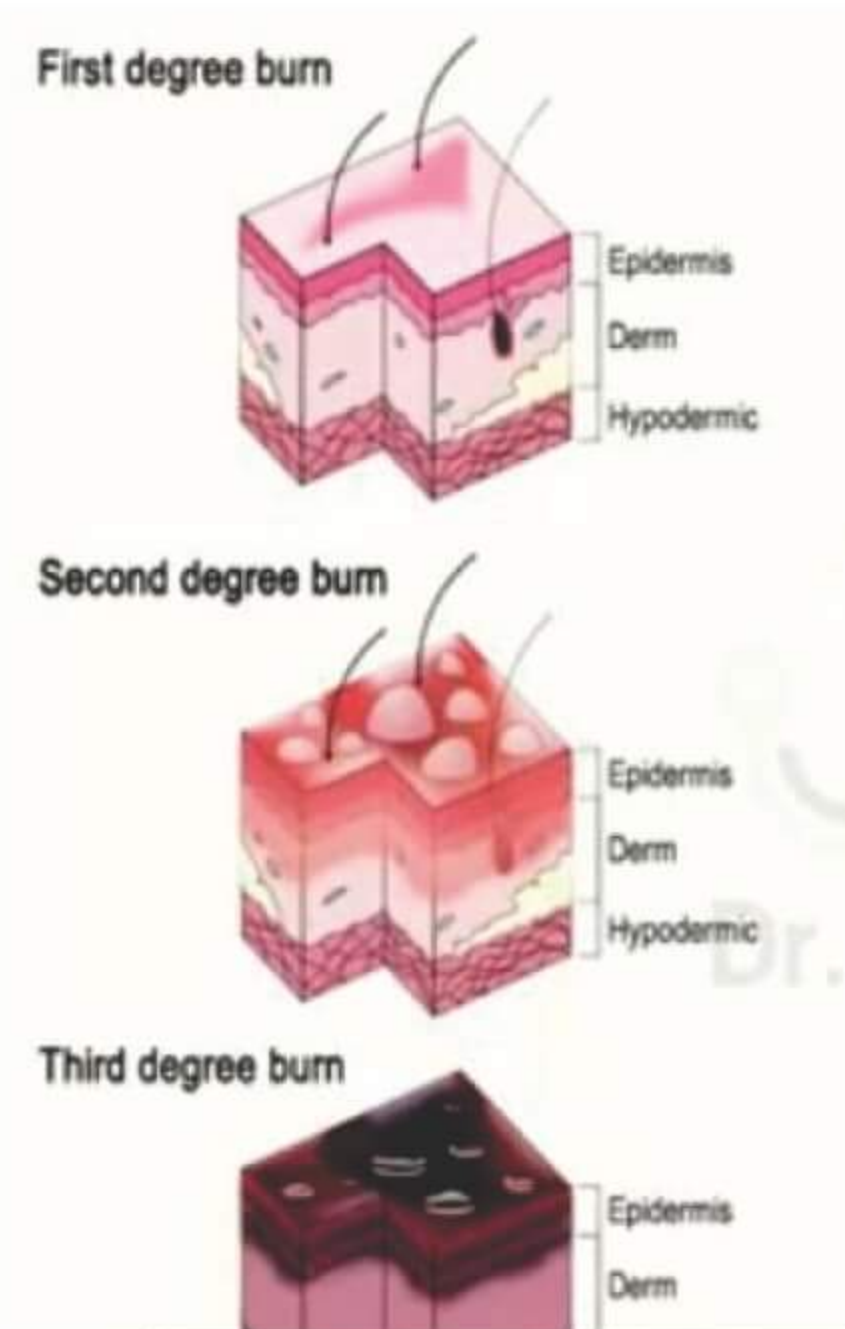
Burns

Commonly used classifications are,

1. Dupuytren's classification - 6 degrees
2. Wilson's classification - 3 degrees

Wilson's classification

- 1° Burns → Epidermal burns
- 2° Burns → Dermo epidermal burns
- 3° Burns → Deep burns



1 ° Burns	2 ° Burns	3 ° Burns
Erythema (+)	Blisters (+)	Scar (+)
Pain (+)	Pain (±)	Painless
Blisters (±)	Scar (+)	

Estimation of surface area in burns

- Done mainly to calculate amount of IV fluid resuscitation

Methods for estimation

1. Rule of nine / Rule of Wallace

Adults - 11 '9's + 1 = 100%

- 9% - for face and head
- 9% - for front of chest
- 9% - for back of chest

→ 9% - for front of abdomen

→ 9% - for back of abdomen

→ 9% - for Right upper limb

→ 9% - for Left upper limb

→ 9% - for front of leg

→ 9% - for back of leg

→ 1% for Genitalia

Child

→ 18% - for face and head

→ 14% for each lower limb

2. Lund & Browder's chart

→ Used for IV fluid estimation in children of 1-5 years of age

3. Rule of palm

→ Burnt area size - size of palm = 1%

→ Used in case of patchy burns

Cause of death

1. Immediately - Neurogenic shock, CO intoxication
2. 1st day - hypovolemic shock
3. 2nd day - Acute Renal Failure
4. 3 - 4th day - septicemic shock

FM findings in burns

1. Smell of Petrol / kerosene
 2. Charred body
 3. Livor mortis
Rigor mortis
- } cannot be assessed in burn victim

Specific signs

Ante mortem burns

1. Face (+)

→ Froth - as hot smoke inhalation irritates pulmonary edema

→ Crowfeet's sign - sparing of skin around eye



CROWFEET'S SIGN

Examination of burns

F – Fluid in blisters (↑ proteins & chloride)

I – Inflammatory reaction (granulation tissue), infection

R – Redness

E – Elevated enzymes

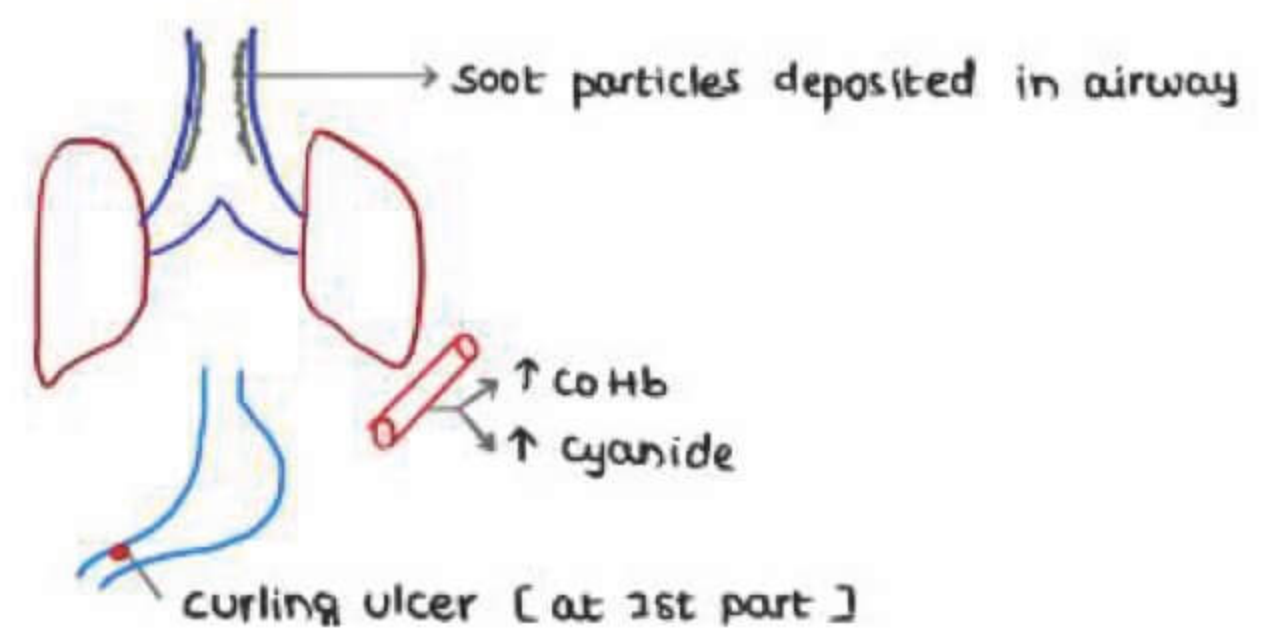
2. **Blisters** – d/t burns or decomposition

	Ante mortem blisters	Postmortem putrefaction blisters
Content	Inflammatory fluid (+)	Gas bubble (+)
Edges	Line of redness (+)	Line of redness (-)
Base	Erythemic base	Pale

Internal findings

→ Suggests that person was alive at time of fire.

1. Carbon particle / smoke
2. Co gas
3. Cyanide gas



3 'c' are seen,

1. Carbon deposition in airway
2. ↑ Co Hb
3. ↑ serum Cyanide levels

Non – specific signs

1. Heat stiffening / pugilistic attitude

Muscle (Burns) → Protein (coagulation) → stiffening

2. Heat rupture

Skin (Heat) → coagulation & drying of skin → splitting of skin & subcutaneous tissue

→ Resembles incised wound / laceration

3. Heat hematoma

Head (skull) on intense heat → charring → Rupture of venous sinus



Hematoma in extradural space (B/L)

4. Heat fracture

Bone (Heat) – Drying of bone (long bone and skull)



Fracture

Internal organs (in burns)

Prolonged exposure } → cooked / firm / hard internal organs
to high temperature }



Puppet organs

Age of burns:

- Immediate – Redness
- 1 hour – Blistering
- 1 day – Dry exudate
- 2 days – Pus information
- 4 days – Superficial slough separated
- 2 weeks – Separation of deep slough along with granulation tissue

SCALDS

MOIST HEAT INJURIES

1. Scalds

When a person is exposed to hot liquid or steam, the person can have scalds



Differences between scalds and burns

Burns	Scalds
→ Dry heat	→ Moist heat
→ Below upwards	→ Above downwards/ line of blisters (Not in steam)
→ Vesicles at the edges	→ Vesicles all over affected areas
→ Charring/ singeing ⊕ of hairs	→ No charring/ Singeing of hairs
→ Clothes burns	→ clothes wet
→ Soot / Co in blood	→ No soot in airway/ No Co in blood
→ Thick scar	→ Thin scar

ELECTRICAL INJURIES

→ AC & DC two forms of current.

→ AC is more dangerous than DC (4-5 times dangerous)

Terminology

1. Ampere – determines fatality in electrocution causes tetanoid convulsions at 10 – 20mA
2. Voltage
3. Resistance

Causes of death in electrocution: (depends on flow of current)

1. Cardiac arrhythmia (most common cause)
2. Respiratory failure

Dangerous circuit

→ From Right arm to Left foot

PM findings

MNEMONIC: SMB

1. **S**kin findings
2. **M**uscle findings
3. **B**one findings

→ Individual Tissue with Maximum Resistance to electricity – **Bone**

→ But in the body, maximum Resistance to Electrocution is seen most with – **Dry skin > Bone > Moist skin**

Skin findings

1. Joule burn (endogenous burn)

→ central crater with peripherally raised margin

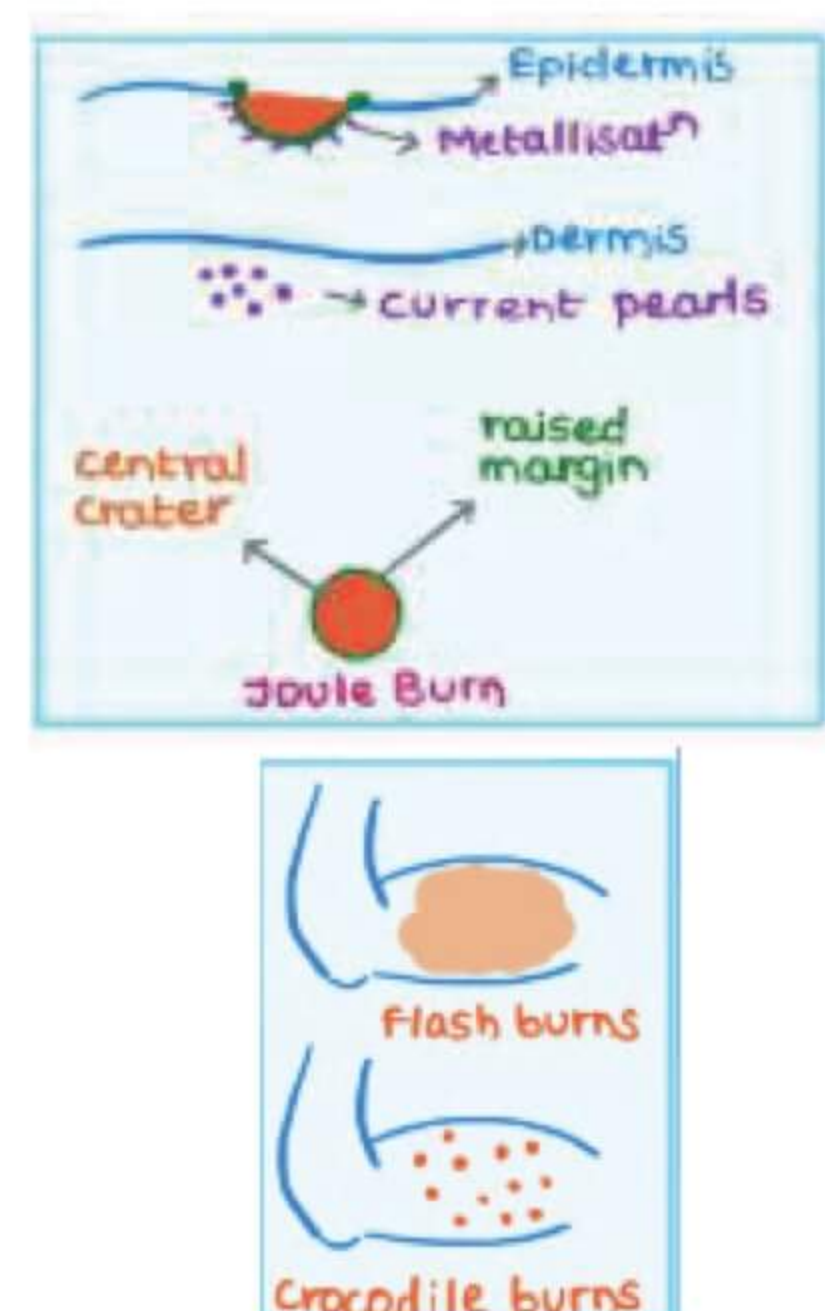
→ due to low voltage with tight contact

Microscopic features of Joule burn

→ Epidermal separation (Micro blisters/Vacuolation)

→ Nuclear streaming/ Palisade appearance

→ Coagulation necrosis in epidermis



2. Metallization

→ Deposition of metallic ions from the conductor into skin

→ Acro reaction test – detects metallization

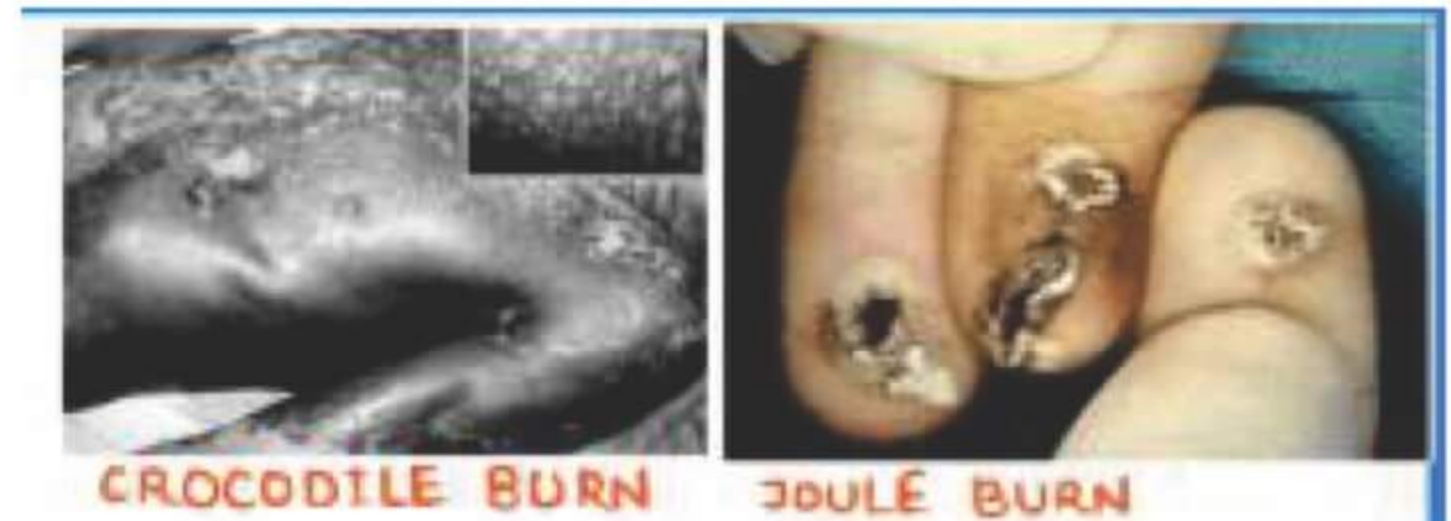
3. Current pearls

→ Deposition of metallic ions into the tissues

4. High voltage/ loose contact with skin

→ FLASH BURNS – Diffuse patchy burns

→ CROCODILE BURNS – Multiple pitted lesions



MUSCLE FINDINGS

ZENKER'S DEGENERATION – caused by the passage of electricity through muscle which leads to Myolysis and Myoglobinuria.

BONE FINDINGS

Bone pearl/ wax drippings – High voltage electricity produce Radio opaque densities on X-rays.

JUDICIAL ELECTROCUTION → practiced in US (United States)

Filigree burns

→ always seen with lightning

→ aka **ARBORESCCENT MARKINGS** (looks like branch of a leaf)

→ aka **LICHENBERG FLOWERS**

→ aka **FERNING**

→ aka **KERANOGRAPHIC MARKINGS**

→ seen in 4 hours to 48 hours

→ Clear mechanism is unknown

→ THEORIES

1. STATIC ELECTRIC DISCHARGE
2. HEMOGLOBIN STAINING
3. ELECTRON SHOWERS



Filigree burns

COLD INJURIES

Types

- Dry Cold Injuries
- Moist Cold Injuries → More dangerous (d/t more rate of heat loss)

General Effects of Cold

- Hypothermia

Local Effects

- Frost Bite (d/t dry cold)
- Trench Foot (d/t moist cold)

General Effects

Hypothermia

- Body Core temperature → $< 35^{\circ}\text{C}$
- **More Seen in**
 - Extremes of age
 - Alcoholics
 - Preexisting diseases

Effects

Temperature → b/w 32°C – 24°C

- Disorientation
- Clouding of Consciousness
- Loss of reflex
- ↓ RR, ↓ HR, ↓ BP

PM Findings

- PM Hypostasis → Pink
- Skin → Pale (Hypothermic death → White deaths)
- Internal Organs → Congested
- Stomach → **Wischniewski Spots** (Multiple Mucosal Hemorrhages)

PHENOMENA

1. Paradoxical Undressing

- Seen with hypothermic death
- Naked / Semi naked in Cold climates
- Hypothermia → Disorientation → Confusion → Undressing
- May resemble sexual offence

2. Hide & Die Syndrome

- Seen in Hypothermic death

- Dead bodies found
Under the bench (or)
Under the bed (or)
Under the wardrobe
- Resembles a case of robbery or assault

LOCAL EFFECTS

1. Chill Blain (PERNIO) → red, itchy skin lesions over the extreme
2. Local Cold Injury

Frost nip → Superficial frost bite → Deep frost bite

Frost Nip

- Superficial
- Non-Freezing
- D/t vasoconstriction
- Seen over extremities
- Not a permanent damage
- C/F
- Pallor
- Numbness
- Burning sensation
- Rx → Rewarming



Superficial Frost Bite

- Permanent damage
- d/t freezing temperature
- 2.5°C → Freezing of skin → ice crystal formation → ischemia → gangrene



Superficial Frost Bite	Deep Frost Bite
<ul style="list-style-type: none"> • Affects skin & Sub cutaneous tissues • Numbness, itching, burning sensation, painless blisters with clear fluids 	<ul style="list-style-type: none"> • Effects deeper structures • Firm skin, tenderness, burns haemorrhagic blisters, gangrene

Frost Bite Injuries Are Always Ante Mortem

Treatment of Frost Bite

- Rewarming
- Protection of body parts
- Anti-Infective measure

3. Trench foot / Immersion Foot

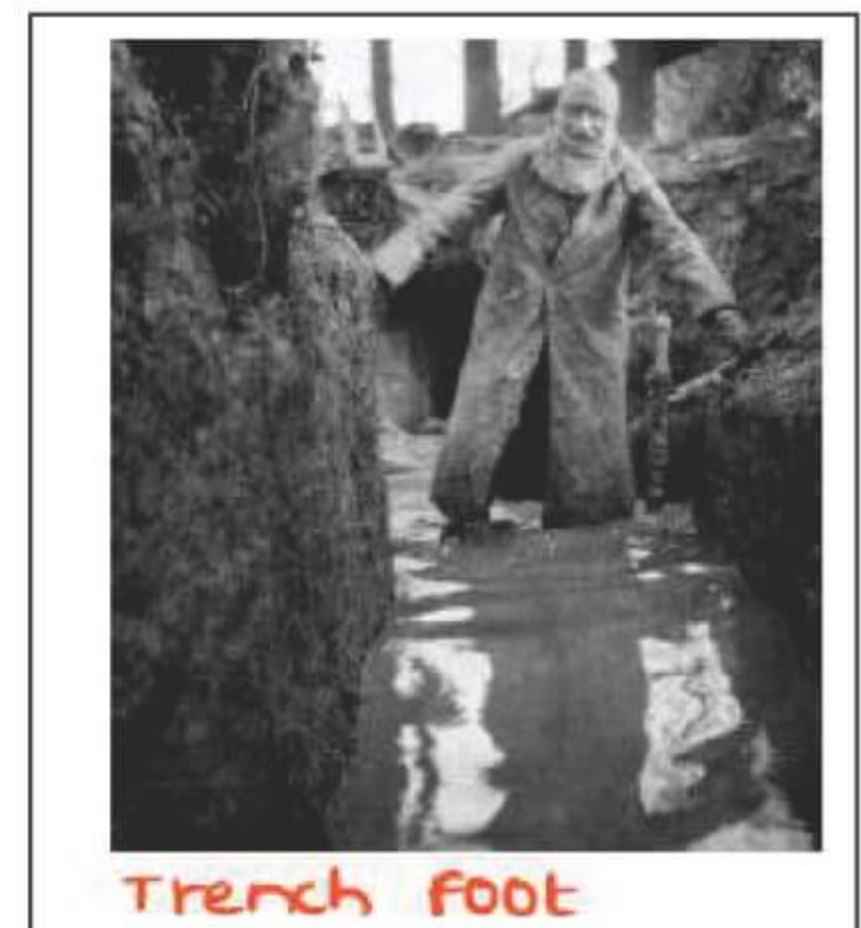
- d/t moist cold
- d/t prolonged immersion
- Seen in Soldiers during warfare times, Sailors
- Can develop necrosis & gangrene
- Seen around 5-8°C
- Also involves hand → Trench Hand



TRENCH FOOT - Necrosis



TRENCH FOOT - Gangrene



Trench foot

THERMAL INJURIES -2 (OPTIONAL VIDEO)

HEAT ARTEFACTS

1. Heat stiffening
 2. Heat rupture
 3. Heat hematoma
 4. Heat fracture
- all are nonspecific

Heat stiffening

→ Whenever, the skeletal muscle is exposed to heat



Muscle Proteins go for coagulation.



Therefore, Muscles become stiff

↓
Pugilistic attitude
 or
Boxer's attitude
 or
Flexion attitude
 or
Fencer's attitude
 or
Defence attitude

Heat rupture

→ Due to heat there is intense drying of skin

↓
 Leads to skin split
 ↓
 Resembles like rupture

→ Heat ruptures resembles like incised wound

→ Difference between heat rupture & Incised wound

Heat Rupture	Incised wound
→ Size is large	→ Size is small
→ Margins are irregular	→ Margins are regular
→ In the floor the nerves and the vessels will be intact	→ In the floor the nerves and the vessels are cut
→ Bleeding absent	→ Bleeding present
→ Inflammatory Rxn absent	→ Inflammatory Rxn present

Heat hematoma

→ Heat hematoma resembles extradural hematoma

→ Heat leads to boiling of blood inside the vessels

↓
 Leads to rupture of vessel inside the cranium

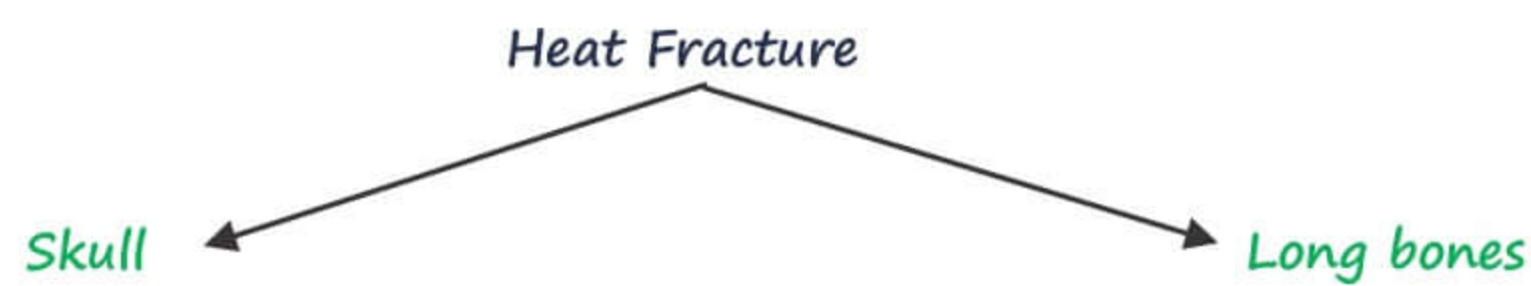
↓
 Result in heat hematoma

→ Difference between heat hematoma & EDH

Heat Hematoma	EDH
→ Seen diffusely	→ Seen only at the side of head (Temporal region)
→ Bilateral	→ Unilateral
→ Chocolate brown color	→ Reddish
→ Honeycomb appearance	→ X
→ ↑ CoHb	→ X

Heat Fracture

→ It is due to intense drying of bone



Skull heat Fractures

Mechanism

1. Due to ↑ intracranial steam pressure, it will separate the sutures
2. Due to rapid drying & contraction of the bone

↓

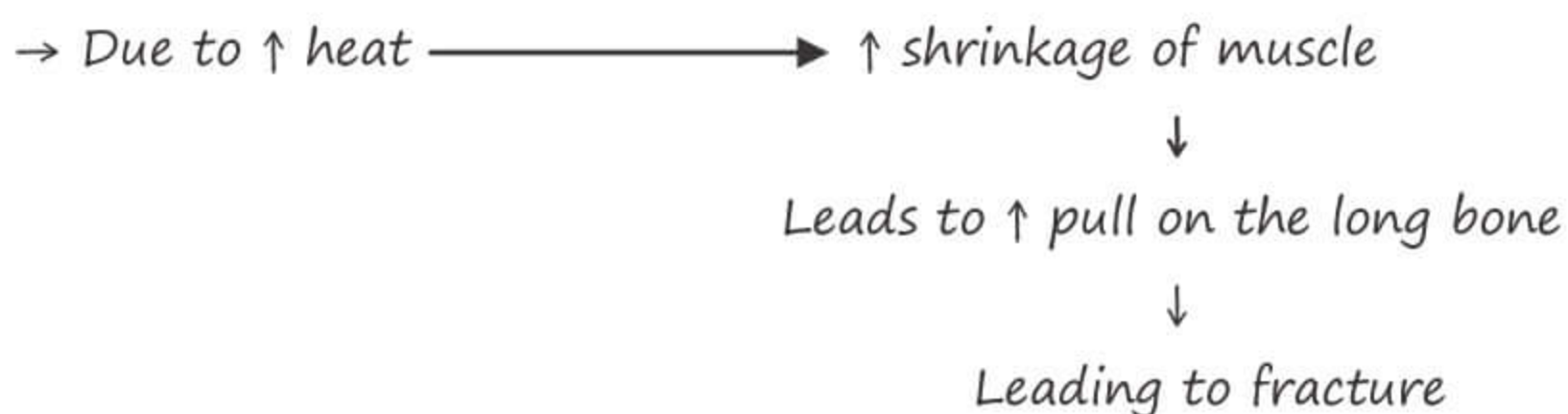
Leads to fracture over the outer table

- Multiple fracture lines from a point
- Stellate fracture
- No displacement seen in temporal bone

Long bones fractures

Mechanism

it results in



- Street & Avenue fracture
- Network of fractures seen over the cortex of the burnt bones.
- Present in Antemortem as well as postmortem

TRANSPORTATION INJURES

-

Classification of RTA

Pedestrian injures

1st impact / primary impact injury

- Usually at the level of legs
- Due to bumper impact
- Bumper fracture → affects tibia
- Bumper impact helps you to find the direction of the vehicle.



2nd impact / Secondary impact injury

- Due to bonnet / wind shield impact
- Leads to head injury, skeletal # or cervical injury



3rd impact / ground impact / Tertiary impact

- Leads to head injury, abrasions & lacerations.



(1) Injuries to occupants

- Head impact → Head is hitting the windscreen.
 - On face sparrow foot marks / sparrow injuries foot are seen and it is due to broken wind screen.
 - Neck level - Neck mores Hyperflexion
- Hyperextension } Spinal cord will injure
- This is known as whiplash injury
- For whiplash injury more important cause is **hyperextension**.
- **Steering impact**
 - Steering wheel hitting the person
 - Leads to patterned contusion, sternal #, ladder tears are seen with aorta
- **Seat belt impact / Seat belt syndrome**
 - On skin person has bruse
 - Seat belt leads to abdominal organ injury (rupture of mesentry is M/C)
 - Lumbar vertebra #



- Chance #



Seat Belt Injury



Skin Bruise



Chance fracture



Seat Belt Injury

TORTURE METHODS

Legal Provision against torture

1. Declaration of Tokyo

Defines torture

- It prohibits the physician from taking part in any torture
- It tells the physician about the guidelines to handle a case of torture

330 IPC

- Punishment of causing hurt due to torture

331 IPC

- Punishment for causing grievous hurt due to torture.

Method of Torture

1. Telefono

- Repeated slapping over ears

2. Falanga (Bastinado)

- Beating over the soles

3. Parrot's perch

- Tying the limbs along horizontal pole

4. Saw horse

- Forced straddling

5. Dry submarine

- Plastic bag asphyxiation



telefono



Falanga



saw horse



Parrots perch

6. Wet submarine

→ Forced immersion of head under H_2O .



wet submarine



dry submarine

7. Dunking

→ Immersion of whole body under H_2O

8. EL Planton

→ Prolonged standing



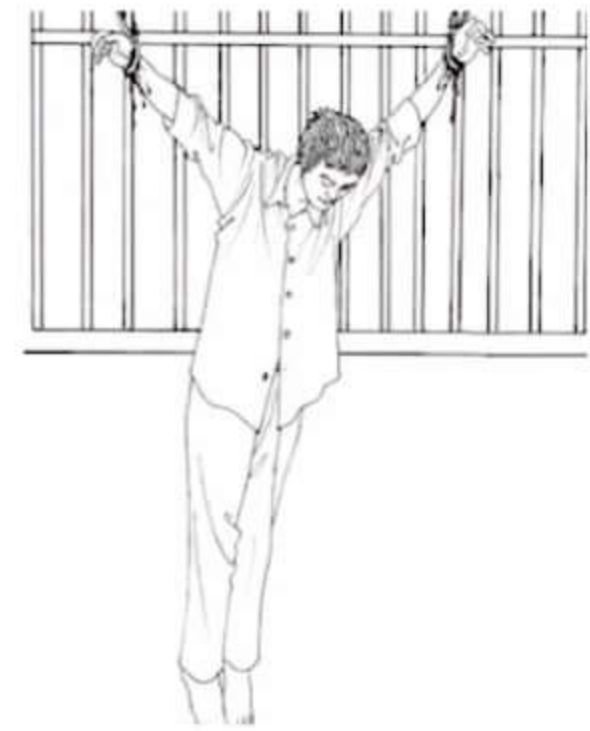
dunking

9. Picana

→ Giving electric shock

10. Cattle's prod

→ Giving electric shock to genitalia



El planton

11. Black Slave

→ Hot metal rod is inserted into anus of the victim

INDIAN LEGAL SYSTEM & COURT PROCEDURE

3 Quotes of Indian Legal System

1. Indian Penal Code
2. Criminal Procedure Code
3. Indian Evidence Act

Indian Penal Code: (IPC)

- Enacted in 1860
- Contains both offences and its punishment
- IPC contains 511 sections
- Definition & Punishment

Criminal Procedure Code: (CPC)

- Crime → Enquiry → Arrest → Trial

↓

Execution of Punishment ← Verdict

- Enacted in 1973
- It contains 484 sections

Indian Evidence Act:

- Enacted in 1872
- It tells about different types of evidences & recording of evidence

<i>Civil case</i>	<i>Criminal case</i>
i) Plaintiff vs Accused ii) Dispute b/w 2 parties iii) Plaintiff is a person who files a case	State vs Accused

Types of criminal courts in India: (Hierarchy)

		Imprisonment	Fine
Court of appeal	Supreme court	Any sentence	Unlimited
	High court	Any sentence	Unlimited
Court of trial	Sessions court	Any sentence	Unlimited
	Assistant sessions	10 years	Unlimited
	Chief Judicial Magistrate (MM)	7 years	Unlimited
	1 st class Judicial Magistrate (MM)	3 years	Rs. 10,000
	2 nd class Judicial Magistrate (MM)	1 years	Rs. 5,000

MM → Metropolitan Magistrate

Apex court of the country → Supreme court

Apex court of the state → High court

Apex court of the district → Sessions court

→ Fast track courts = Sessions court

→ All cases can be tried in sessions court

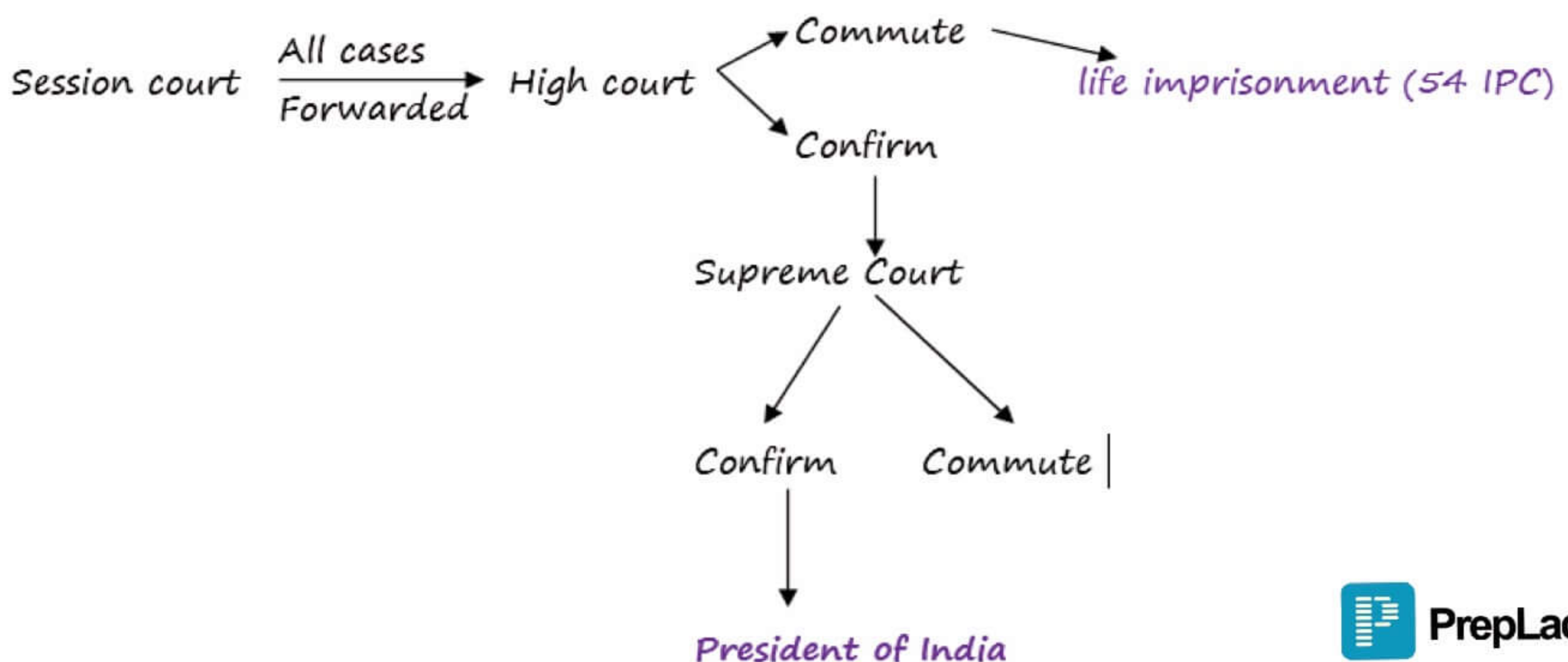
→ Sessions court is the lowest court which can give death sentence

→ Any punishment given by lower courts can be increased or reduced (commute) by Higher courts

→ Lowest court that can commute death sentence is high court

Death Sentence

- In India it is executed by Judicial hanging.
- All the cases of death sentence given by sessions court will be forwarded to high court
- All Punishments are discussed in 53 IPC



Death sentence in Pregnant Female:

- High court will commute death sentence into Life imprisonment as per section 416 CrPC.

Compoundable offence	Non- compoundable offence
i) Offences where 2 parties can compromise ii) Less serious offences Eg. Defamation, Adultery, Simple hurt	Parties cannot compromise More serious offences Eg. Murder, Rape

Summons cases

Cases related to offences of Punishment <2 years

Warrant cases

Cases related to the offences of Punishment >2 years

Offences:

i) Cognizable offence: (2(c) CrPC)

- Arrest without warrant
 - M - Murder
 - D - Dacoity
 - R - Rape, Robbery, Ragging
 - D - Dowry Death

ii) Non - cognizable offence: (2(l) CrPC)

- Arrest only with warrant

Witnesses

Common witness (118IEA) (Lay witness)	Expert witness (45 IEA)
Person perceived the fact by his own senses.	Person who is skilled/ trained in a particular field
Eyewitness/ Hearsay witness	Finger print expert, bomb blast expert
Can give evidence only about the facts perceived by them	Can express opinions / conclusions based on the findings
1 st hand knowledge rule is applicable	Not applicable
Anybody can be the common witness provided if he can understand the questions	Expert in a particular field who is skilled/ trained

Volunteering of statement cannot be done	Volunteering of statement can be done
--	---------------------------------------

- Doctor can serve as both common witness & expert witness
- Firsthand knowledge lies with common witness.

Inquest

Inquiry → cause of death in unnatural death

Types of inquest

i) Police inquest (174 CrPC)

- Most common type of inquest in India
- Minimum cadre of police for conducting Inquest is station officer (senior Head Constable)
- Panchanama – Enquiry report

ii) Magistrate Inquest (Best inquest system In India)

Types of Magistrates:

1. Judicial Magistrate (by High Court) – Conducting trial
2. Executive Magistrate (by Govt.) – Maintain Law & order in society: 176 (1) CrPC

Different cadres of executive magistrate

1. District Magistrate
2. Sub Divisional Magistrate
3. Other Executive Magistrate
 - Collector
 - Deputy Collector
 - RDO, Tahsildar

Executive Magistrate can conduct trial in circumstances like,

- i) Suspected Dowry Death
 - Death of Married Female within 7 years of Marriage under
 - o Suspicious circumstances
 - o Suicide
- ii) Exhumation (Disinterment)

Judicial Magistrate can conduct trial in circumstances like

i) Custodial Deaths

- Death in Police custody
- Death in Psychiatric hospitals

- Death in Borstal
- Death in Juvenile home

ii) Custodial Rape

→ These are the only two inquests being practiced in India

Coroner Inquest

- Introduced by the British and was Practiced in Mumbai and Calcutta
- It was last Practiced and abolished in Mumbai (1999)

Medical Examiner System

- Best inquest system all over the world

Dying declaration - 32(1) IEA

- Written/ oral statement made by a dying person due to unlawful act (Document used as evidence)
- Type of hearsay witness

Preliminaries

1. Doctor has to certify "COMPOS MENTIS" i.e. person is in composed mind before the start & throughout the recording → Composed Mind
2. Anyone of the following can record Dying declaration

- | | | |
|---|---|---|
| <ol style="list-style-type: none"> i. Victim (if possible) ii. Magistrate iii. Doctor iv. Police v. Public | } | <p>Recording is done
in the presence
of 2 witnesses</p> |
|---|---|---|

Procedure for recording dying declaration

1. No oath
2. No leading questions
3. Verbatim (recorded word by word)
4. Signed by recorder & 2 witnesses
5. Forwarded to magistrate

→ Incomplete Dying declaration is also admissible in the court of law

- If the patient survives after giving dying declaration, the document is used as Corroborative evidence in court of law.

Dying deposition

1. Judge / Magistrate → Only can record
2. Accused / Defence Lawyer
3. Cross examination
4. Leading Question permitted
5. Oath is taken

- Dying Deposition is superior than Dying declaration
- Dying deposition is practiced in developed countries

Summons

- aka subpoena meaning under penalty
- Summon is a written document issued by the court compelling the attendance of the witness at particular date & time for the purpose of giving evidence.

Two types of summon:

- i) Ad testificandum
- ii) Ducus tecum

Inability to attend - inform the court

- Willful disobedience to summon is Punishable
 - Civil cases - Warrant/ fine
 - Criminal Cases - Warrant / Fine / Imprisonment

Priority of summon received on same date

1. Criminal court summon > civil Court
2. Higher Courts > Lower Court
3. Equal Status
 - Attend the 1st one received
 - Inform the other court
 -

Conduct money (Diet Money)

- Money paid to the witness towards the expenses in attending the court

	When	Who	Fixed by
Civil case	While serving summon	Party calling the witness	Court
Criminal case	After giving the evidence	Govt; institution Private: court	Court (312 CrPC)

Summary

Civil case – Paid by party, Fixed by court

Criminal case – paid by court/ Govt. Fixed by court

In court of law, witness is of two types

Victim	Accused/ Defendant
Prosecution witness Public prosecutor (Lawyer)	Defense witness Defense Lawyer

Procedure for giving evidence

1. OATH – (Compulsory) – 51 IPC

“I do swear in the name of God”

- Truth
- Whole truth
- Nothing but the truth

After taking oath,

False evidence → PERJURY

Definition (D) – 191 IPC

Punishment (P) – 193 IPC

- Aethists should also take the oath but may not be in the name of God,
- “I do solemnly affirm that”

Refusal of oath → 178 IPC

Exemption → child <12 years old

People in the court of Law,

- Judge
- Public prosecutor
- Defence lawyer

After oath,

2. Examination in chief – done by same side lawyer
3. Cross examination – done by opposite side lawyer
4. Re – examination – done by same side lawyer

Scenarios

In case of Prosecution witness – Oath → PP → DL → PP

In case of Defence witness – Oath → DL → PP → DL

Leading questions – (Yes/NO)

- Leading questions (LQ) not permitted by same side lawyer
- LQ are permitted by opposite lawyer
- LQ are not permitted in chief & Re – examination
- It is permitted only in cross examination

SECTIONS UNDER INDIAN EVIDENCE ACT

137 IEA → Examination

138 IEA → Order of Trial

141 IEA → Leading Questions Definition

142 IEA → Leading Questions not Permitted

143 IEA → LQ Permitted

165 IEA → Questions by the judge

154 IEA → Hostile witness

Hostile witness

- aka *Adverse/ Unfavorable witness*
- Any witness who gives evidence against the same side party (or) *contradicts his own statement*
- Judge will declare the hostile witness, & if any witness is declared as hostile witness, then the same side lawyer can ask leading question (154 IEA)

Exemptions on oral Evidence

1. Dying declaration
 2. Textbook authors
 3. Chemical examiner
 4. Bomb blast expert
 5. Mint officer
 6. Doctor who has given evidence in lower court proceedings.
- There is no minimum age to give evidence.

LEGAL SECTIONS

I.P.C → Indian penal code → Enacted in the year → 1860

* It defines an offence

* Also gives punishment for offence

→ **44 I.P.C** → (D) Injury [D= Definition]

* Any harm, illegally done to person's body, (physical harm) mind, reputation & property is injury.

→ **45 I.P.C** → (D) Life

→ **46 I.P.C** → (D) Death

Sections related criminal responsibility of a person

Criminal responsibility

- If a person commits a crime, whether he is liable to punishment / not is criminal responsibility
- It depends on age, mental soundness of person (sane/insane)

-

***Age**

→ **82 I.P.C** → Defines criminal responsibility of person < 7yrs of age → Not liable for any crime

→ **83 I.P.C** → Defines criminal responsibility of person b/w (7-12 yrs)

- Depends on mental maturity of the person
- Determined by the court of law.

*** Insanity**

→ **84 I.P.C** → criminal responsibility of a insane person → Not liable to be punished

Due to unsoundness of mind



Unable to know nature & quality of act/ unable to know nature what he was doing was wrong
 Unable to know what he was doing was wrong contrary to law / illegal



Then that person is not punishable

*** Intoxication**

→ **85 I.P.C** → Involuntary drunkenness

- When a person is suffering from intoxication due to any substance which was administered to him without his knowledge
- Under this intoxication, if a person commits a crime, then he is not punishable (not liable)

→ **86 I.P.C.** → Voluntary drunkenness

- Person. Himself is taking the substance voluntarily (with his knowledge) & got intoxicated & commits a crime then he is liable for punishment

Consent

→ **88 I.P.C**

1. Any act done in a good faith
 2. Any act not intended to cause death
- } Should be done with consent of the person

- Any medical / surgical procedure can be done with consent of pt.

→ **89 I.P.C** → When act is done in good faith for a child < 12 yrs./ insane person

↓

Can be done with the consent of guardian

→ **90 I.P.C** → Consent given out of fear of injury/ intoxication/ insanity- invalid

→ **92 I.P.C** → In emergency situations → No need to get consent (law given consent)

-

→ **191 I.P.C** → **(D)** Perjury → Giving false evidence after taking oath

→ **193 I.P.C** → **(P)** Perjury

→ **197 I.P.C** → **(P)** for issuing false certificates → Maximum punishment → 7 yrs imprisonment

→ **201 I.P.C.** → **(P)** Intentionally causing disappearance of evidence

Eg. Failure to preserve gastric lavage material of a homicidal poisoning case → disappearance of evidence →

Liable to punishment evidence under this

→ Embalming of a poisoning case prior to autopsy

→ **272 I.P.C** → **(P)** Adulteration of food

→ **273 I.P.C** → **(P)** Sale of noxious food (Contaminated / spoiled food) knowingly

→ **274 I.P.C** → **(P)** Adulteration of Drug

→ **275 I.P.C** → **(P)** Sale of adulterated drug

→ **284 I.P.C** → **(P)** Negligent conduct with poison

→ If a person carelessly handles a poison & bcoz of that anyone is hurt / injured then that person is punishable under this section.

→ **299 I.P.C** → **(D)** Culpable (punishable) homicide

* Situations where culpable homicide is amounting to murder → **300 I.P.C**

- When a person does some act in the intension of causing death

- When a person does some act with the intension of causing injury knowing that it is likely cause death /

sufficient to cause death / imminently dangerous to life.

→ **302 I.P.C** → (P) to culpable homicide amounting to murder.

Culpable homicides not amounting to murder

- When homicide is done out of

- i. Sudden provocation
- ii. Self defense
- iii. Public Servant while executing the law (Judicial hanging)
- iv. Without any premeditation (without any motive)

→ **304 I.P.C** → (P) Culpable – homicide not amounting to murder

→ **304 A** → (P) Causing death due to rash / negligent act.

E.g. Death of pt. due to medical negligence

↓

Punishment is 2 yrs. imprisonment

→ **304 B** → (P) Dowry death → Death of a married women within 7 yrs of marriage under suspicious conditions.

→ Attempt murder → punishable under **I.P.C 307**

→ Attempt for culpable homicide not amounting to murder **I.P.C. 308**

→ **I.P.C 306** → **Abetment for suicide** (Compelling / forcing as person to commit suicide)

Hurt & Grievous Hurt

Hurt: Any person who is causing bodily pain (Physical component only), disease, infirmity then the person is said to cause Hurt.

→ All Hurts are 'Injuries'

→ All injuries are not 'Hurt'

Injury → Damage to body mind, reputation, property

Hurt → Damage to body

→ **320 I.P.C** → (D) Grievous Hurt

*** Have 8 Clauses

- i. Emasculation (Loss of potency of a person → injury to genitalia /spinal cord)
- ii. (P) Privation / loss of vision in any one of the eyes
- iii. (P) Privation / loss of Hearing
- iv. (P) Loss of member / Joint (e.g. Amputation of U.L etc.) (any part of body which have a specific function)
- v. (P) Loss of power of member / Joint
- vi. (P) Disfiguration of face / head
- vii. Fracture / dislocation of any bone / tooth
- viii. Any hurt which endangers life / if the person is in severe bodily pain / if the person is unable to do routine activities (like taking bath, eating food, changing dress etc.) for a period of 20 days

Simple Hurt	Grievous Hurt
→ Definition → 319 I.P.C	→ 320 I.P.C (D)
→ Punishment 323 I.P.C	→ 325 I.P.C
→ Dangerous weapon: 324 I.P.C	→ 326 I.P.C

- Voluntarily causing hurt → 323 I.P.C → 1-year punishment
- Voluntarily causing hurt with dangerous weapon, → 324 I.P.C → 3 yrs (P) (any weapon used for cutting, stabbing, shooting, firing, bomb (explode) weapon of offence / likely to cause death → considered as dangerous weapon)
- Voluntarily causing grievous hurt → 325 I.P.C → 7 yrs (P)
- Voluntarily causing grievous hurt with dangerous weapon → 326 I.P.C → 10 yrs (P)

→ I.P.C. 334 → (P) Hurt on provocation

→ I.P.C. 335 → (P) Grievous hurt on provocation

→ I.P.C. 336 → (P) Endangering injury
 → I.P.C. 337 → (P) Hurt
 → I.P.C. 338 → (P) Grievous Hurt

} Due to rash & negligent act

→ 326 (A) → (P) Vitriol age (acid attack)
 → 326 (B) → (P) attempt of acid attack

} enacted in 2013

→ 328 I.P.C → (P) Administering the poison to cause hurt / to facilitate commission of an offence.

Assault

→ 351 I.P.C.

Gesture / Word causing fear (criminal force on a person) → Assault

→ I.P.C. 354 → Indecent assault → Use of criminal force to outrage modesty of a women

- 354 A → (P) Sexual harassment
- 354 B → (D) Usage of criminal force to disrobe a woman
- 354 C → (P) Voyeurism → watching / capturing image / Private acts
- 354 D → (P) Punishment for stalking

Stalking (D): Any man who follows as women / contacts / attempt to contacts repeatedly, / monitoring the women in spite of her disinterest then it is called as stalking.

- For 354 C & 354 D
 - 1st offence is cognizable & bailable → 3 yrs. imprisonment (police can arrest that person without arrest warrant)
 - 2nd / repeat offence → Cognizable & non bailable → 7 yrs. imprisonment

Kidnapping & abduction

Kidnapping → 2 types	From India → [360 I.P.C] (D)
	From lawful guardianship → [361 I.P.C] (D)

Boy < 16 yrs. of age Girl < 18 yrs. Insane person	} Are moved from their lawful → kidnapping guardian ship
---	--

→ Kidnapping from lawful guardian ship is punishable under → 363 I.P.C. upto 7 yrs. Imprisonment

Abduction

- Forcing / compelling / deceit a person to move from one place to another place is abduction (no age limit)
- Given by I.P.C 362

Sexual offence

- **375 I.P.C** → (D) rape
 - **376 I.P.C** → (P) rape
 - i. Minimum punishment → 10 yrs. life imprisonment
 - ii. (P) custodial rape
 - iii. (P) rape of women < 16 yrs. of age
 - **376 (A)** → (P) rape victim dies / if the victim goes into persistent vegetative state.
 - **376 (AB) I.P.C** → (P) rape of women < 12 yrs. of age
 - **376 (B) I.P.C** → (P) forceful sexual intercourse by husband on his wife during separation
 - **376 (C) I.P.C** → (P) sexual intercourse by a person in authority
 - **376 (D) I.P.C** → (P) Gang rape
 - **376 (DA) I.P.C** → (P) Gang rape on a woman < 16 yrs. of age
 - **376 (DB) I.P.C** → (P) Gang rape on a woman < 12 yrs. of age
 - **376 (E) I.P.C.** → (P) Rape by a repeated offender
 - **377 I.P.C** → (P) Unnatural sexual offences.
 - Forceful anal intercourse / minor
 - Bestiality
- } Punishable
- **498 (A) I.P.C** → (P) Cruelty to a woman by husband / relatives
 - **509 I.P.C** → (P) for using any word / gesture / action causing insult to the modesty of a women.
 - **510 I.P.C** → (P) for misconduct in a public place under the influence of alcohol

Poisons

- **272 I.P.C** → (P) Adulteration of food
- **273 I.P.C** → (P) Sale of noxious food
- **274 I.P.C** → (P) Adulteration of drug
- **275 I.P.C** → (P) Sale of adulterated drug
- **284 I.P.C** → (P) Negligent conduct in relation to poison.
- **328 I.P.C** → (P) Administering a poison with an intent to cause hurt to / to facilitate the offence

Legal duties of a doctor in case of poisoning

→ 2 duties

- Medical duty → to save the life of a person → Imp
- Legal duty

1. Intimation to police

39 CrPC → Any person who is aware of the crime should intimate police / nearby magistrate

- In homicidal poisoning
Doctor must intimate the police
- In suicidal poisoning: Not punishable
Attempt to suicide → Not punishable
Doctor need not compulsorily inform the police

→ **176 I.P.C** → (P) Noncompliance (doctor didn't inform to police)

→ **177 I.P.C** → (D) Doctor giving false information

2. Preservation of evidence

- Homicidal poisoning: Gastric lavage material is evidence

If the doctor fails to preserve this material

↓ Amounts to

Disappearance of evidence

↓

Punishable under **I.P.C 201**

3. Dying declaration

If the pt. is about to die, the doctor should arrange for dying declaration.

Drugs & cosmetics rules (1945)

- It gives many schedules.
- Every drug will be listed under one particular schedule.
- Every schedule has a specific regulation.
- If a drug is listed under one particular schedule, then that drug has to be maintained under that particular regulation.

SCHEDULES

- **Schedule C:** Contains biological products
- **Schedule E:** Contains poisons
- **Schedule F:** Contains poisons
- **Schedule G:** Hormones
- **Schedule H:** Drugs sold only on the prescription of registered medical practitioner
- **Schedule I:** Contain list of diseases; for which no cure is advertised.
- **Schedule L:** Contain all Anti - biotics
 - Antihistamines
 - Anti - Cancer drugs
- **Schedule X:** contain drugs of abuse

Voluntary miscarriage

- **I.P.C 312** → (P) Miscarriage with consent of the women
- **I.P.C 313** → (P) Miscarriage without consent of the mother
- **I.P.C 314** → (P) Death of mother due to miscarriage (Criminal abortion)
- **I.P.C 315** → (P) Act done to prevent the child being born alive.
- **I.P.C 316** → (P) Causing death of the unborn child → Amounts to culpable homicide
- **I.P.C 317** → (P) Abandonment of child by parent (< 12 yrs.)
- **I.P.C 318** → (P) Concealment of birth by secret disposal of dead body.

Transplantation of Human's organ Act: (THOA → enacted in 1994) – Latest amendment in 2014

HOTA

- Mainly enacted for removal, storage & transplantation of human organs
- Also meant to prevent commercial dealings of human organs.

Human Organ

- * Any part of the human body, which if removed cannot be replicated by the body.
- This act also enables about brain stem death declaration

Who declare brain stem death?

- * Team of doctor's containing
 - Doctor treating that pt.
 - Doctor who is in charge of hospital
 - Neurologist / Intensivist / Anesthetist (Neuro physician / Neurosurgeon)
 - Independent medical specialist

→ Clinical reflexes that should be checked are

	Light reflex – 2,3 C.N – Mid brain	Selected to check brain stem (Midbrain, Pons, Medulla)
M.B + Pons	Vestibulo – ocular reflex – 3,6, 8 C.N	
M.B + Pons	Doll's eye reflex – 3,6,8 C. N	
Medulla	Gag reflex – 9,10 th C.N	
pons	Corneal reflex 5 th , 7 th C. N	
Apneic test	for checking respiratory center	

If all these reflexes are negative, then the person is declared as brain stem dead.

Donor	
Living donor	Cadaveric (Brain Stem Dead) donor
→ Can donate to near relative <ul style="list-style-type: none"> - (Son, daughter, spouse, parents, brother/sister, grandparents, grandchildren, uncle & aunt) → Can donate to non-relative <ul style="list-style-type: none"> - He has to get prior approval from authorization committee 	

Swap transplantation

If there is

Near relative living donor – but not matching with recipient & another unmatched donor / recipient pair → The organs can be swapped b/w these 2 pairs

Authorization

→ Done by donor → Any person > 18 yrs. of age. Can be a doctor → at his/ her own will can

Donate organs

→ If the person expressed willingness to donate & dies, after his/her death the authorization should be given by a person who is under legal possession of the body.

→ Medico – legal cases

* Once the brain stem death is declared, the doctor has to get prior authorization from post – mortem doctor (that the organs are not required for determining C.O.D)

Punishment

- When doctor removes an organ without appropriate authorization → It is punishable with 5 yrs. imprisonment + Fine
- If a doctor conducts this offence → his name will be removed from S.M.R.

If 1st offence → name will be removed for 2 yrs.

If 2nd offence → name will be permanently removed from S.M.R

* If a person is involved in commercial dealings of organs.

- It is punishable with → 2-7 yrs. imprisonment + fine.

Juvenile Justice act

- Care & protection of the children – Enacted in 2000 but later amendment was in 2015
- Juvenile → Is a person who has not completed 18 yrs of age.
- It is not for punishment of child. It is mainly meant for socio – legal reforming / rehabilitation

- This act identifies the child into
 - Child in conflict with law
 - Child in need of care & protection

Child in conflict with law

→ Child < 18 yrs of age: Alleged to have committed an offence

Juvenile Justice Board

Have 3 members

- First class magistrate → (JM/MM)
 - 2 social workers
- } One member should be female

- Juvenile b/w 16-18 yrs. of age who has committed heinous crimes (like rape, murder etc.) → they will be tried as adults → Punishment will be same as adult.
- If Juvenile committed crime, punishment is reformation, rehabilitation / they are sent to reformatory schools (brostals) → max 3 yrs.

Euthanasia: Good death

- aKa mercy killing

- **Types**

i. Active euthanasia

- drug administration resulting in death of the patient in active euthanasia

ii. Passive euthanasia

- When pt it is terminal illness, if we withdraw the life support / not resuscitating → Passive Euthanasia

→ Other classification

* Voluntary euthanasia → Legal in India

- Done as per the patient's wish, with the consent of the patient

* Involuntary Euthanasia → Illegal in India

- Done against will of the pt. (pt. doesn't give consent)

* Non voluntary euthanasia → Legal in India

- The pt. would be in conditions like coma, where the pt is not in a position to give consent.

→ Indian legal status in Euthanasia

Living will

- It is a document mentioning the patient wishes regarding treatment options, in case of coma / terminal illness.
- This living will guide the physician about further treatments
- Any citizen who is major can write the living will.
- It should be attested by first class magistrate.
- The person can also nominate a relative in living will to decide on treatment options.

MEDICAL JURISPRUDENCE

- Legal Responsibilities of a doctor in relation to the state / Society, to the patient and towards another doctors.
- Law in medicine.

Medical Ethics (Towards all)	Medical Etiquette (Towards another doctor)
1. Moral Principles	Courtesy towards your colleague (another doctor)
2. Self-Imposed (MCI)	
3. Violation of Medical ethics → Punishable	Not Punishable

Violation of Ethics

- Is called as *Infamous conduct (or) Professional misconduct*.
- Disgraceful & Dishonorable act → Infamous conduct

Warning notice: - (List of infamous conduct)

- Given to all doctors by the State Medical council
- It is the list of Infamous conduct
- It is always Incomplete.

Examples of Infamous conduct

- A- Adultery
- A- Association
- A- Abortion
- A- Addiction
- A- Alcohol
- A- Advertisement (inappropriate)

- B- Bribery
- C- Covering / Commission
- D- Dichotomy (Fee Splitting)

- F- False Medical Certificates
- G- Gifts

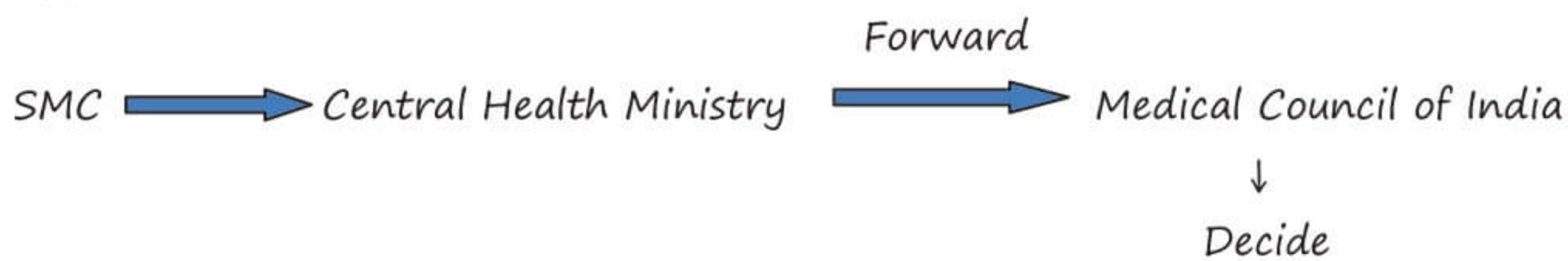
→ Disciplinary action against a doctor, who is imposed of Infamous conduct is taken only by the State Medical Council (SMC) not the Medical Council of India.

→ SMC will form a committee of doctors to judge the infamous conduct.

Punishment for Infamous conduct

1. Warning
2. Penal Erasure
 - Removal of name from state Medical Council (SMC) as a penalty for Infamous conduct.
 - It may be Temporary / Permanent
 - Permanent Penal erasure is also called as Professional Death Sentence.

Appeal



Professional Secrecy

Patient information → Confidential

Disclosure → It is the Breach of Professional Secrecy

→ Only with Patient's consent, the information should be disclosed even to the spouse.

Privileged communication

- Exception to Professional secrecy.
- It is done under following circumstances,
 - Patient's interest – Suicidal tendencies
 - Self-interest – court of law
 - Community Interest
 - 39 CrPC → Crime → Inform Police
 - Notifiable disease
 - Infectious disease

Formal Announcements in the Press

1. On starting a Practice
2. On changing address
3. On Temporary absence from duty
4. On changing the type of practice.

Consent

- Treating a Patient without consent → Assault (351 IPC)
- Consent is also called as Voluntary Agreement / Compliance / Acceptance.

Types of Consent

1. Express
 - Oral
 - Written

2. Implied → By means of Patient's act
3. Blanket / Open consent – During admission (or) Before Surgeries

- But Legally this consent is not valid, in that case specific consent is needed (Blood transfusion, specific Surgeries).
- **Best Consent** → Written, Informed Consent
- **Doctrine of Full disclosure**
 - Doctor tells everything about Patient's condition, treatment, modalities and its advantages and disadvantages.
- **Doctrine of Therapeutic Privilege**
 - Exception to full disclosure i.e., the Doctor Provides only the information that is relevant to the patient.
 - Information that is remote to the patient shall not be provided by the doctor.
- **Doctrine of informed Refusal**
 - Right to Refuse by the Patient

No need of consent

- Emergency
- Therapeutic waiver

Sections related to consent

87 IPC – Major Procedures → 18 years

88 IPC

- Any act done in Good faith
- Not intended to cause death
- Done with consent of patient
- Eg) Medical / Surgical Procedures with consent of patient.

89 IPC

- Act done in Good faith
 - o Child < 12 years
 - o Insane Person
- Physical examination done with consent of Guardian

90 IPC

- Consent given under Influence / Insane → Invalid

92 IPC

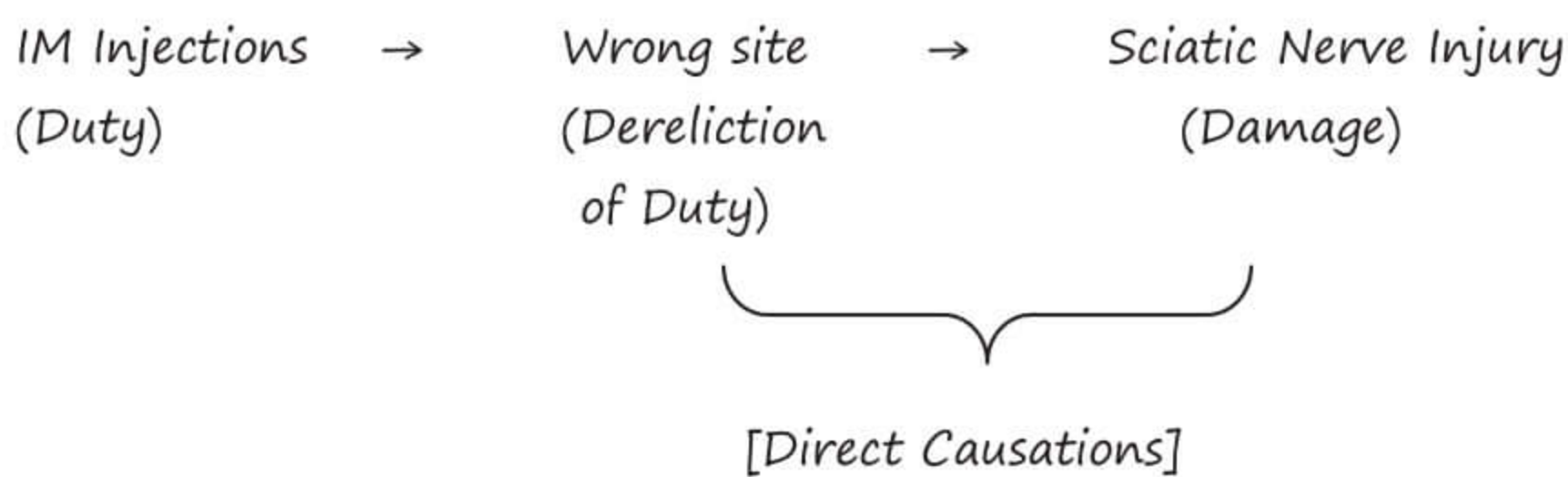
- Emergency Procedures → No need of consent

Professional Negligence / Professional Malpractice

- Omission – of Right things
- Commission – of wrong things

Essential 'D's for negligence

- **D**uty
 - **D**ereliction of Duty
 - **D**amage - Monetary loss/Pain/disability/Death
 - **D**irect Causation
- All these 4 'D's should be there, to be called it a Negligence Act.
 → Example of Negligence Act,



Types of Negligence

1. Civil	2. Criminal	3. Contributory
Simple lack of skilled care ↓ Damage (Monetary loss, Pain)	Gross/Utter Carelessness/ Willful ↓ Damage (Death)	Doctor negligence + Patient negligence

4. Corporate negligence

- Management is also responsible for the negligence act

1. Civil Negligence

- Wrong dose
- Wrong Prescription
- Burden of Proof lies with patient
- Any damage that can be compensated with money is civil negligence
- In civil negligence, cases are filed in civil courts.
- Punishment: Monetary Fine

2. Criminal negligence

- Wrong site
- Wrong Patient
- Wrong Surgery
- Mismatched blood transfusion
- Tried in Criminal Courts
- Punishment → Imprisonment for 2 years
- Punished under 304 (A) IPC

3. Contributory negligence

- Doctor not given proper drugs / medicine

(+)

- Patient not coming for follow up

↓

Contributory Negligence

- Both Doctor & Patient are Negligent

Burden of Proof → Doctor

- Partial defense
- Applies only to civil cases

Last clear chance doctrine

- Doctors is responsible

Avoidable Consequences rule

- Patient is responsible.

MEDICAL JURISPRUDENCE 2

Defenses Against medical Negligence

- No duty owed to the patient
 - Duty was done according to prevailing standard
 - Error of judgement
 - **RES INDICATA**
 - From the discovery of negligent out patient can file a case within 2 yrs known as Limitation Period
 - **RES JUDICATA** → the things have been decided already
 - **Therapeutic Misadventure**
 - During Rx, d/t mischance/ accident damage happened to the patient
 - Can be
 - Diagnostic
 - Therapeutic
 - Experimental
- } Doctor not liable
- **Contributory negligence**
 - Avoidable consequences Rule
 - Last chance clear doctrine
 - **Products Liability**
 - During the Rx of a patient, doctor prescribes a drug & patient suffers damage
 - Drug was found defective
 - When the product (drug/Instrument) defective / faculty, then the responsibility lies with manufacturer of the product

DOCTRINES

• RES IPSA LOQUITUR

- Thing or fact speaks itself
- Normally, in the case of professional negligence, the standard of care is proven by expert witness
- Ex:
 - Retaining swab / forceps inside abdomen
 - Wrong blood transfusion
 - Not giving TT Injection to Injury patient

• Condition to be fulfilled

- In the absence of negligence, the damage would not have occurred
- The doctor has exclusive control over the instrument
- The patient is not contributing negligence

• Doctrine of common Knowledge

- Variant of Res IPSA loquitur
- Expert opinion is not necessary

• Doctrine of Calculated Risk

- In spite of reasonable care, damage is unavoidable
- Every procedure has inherent risk

• Novus Actus Intervenus

- New act intervening
- Assault → Cut (arterial injury) → Wrong transfusion → death
- Burden of responsibility shifts from accused to doctor

VICARIOUS LIABILITY

- Respondent Superior / Let the master answer / Master servant Rule
 - Superior is responsible for the mistake done by junior
- Applicable only IF
 - Employee – Employer Relationship
 - Employee's Conduct should be within the scope of employment
 - Act should occur when he was on the job

DECLARATIONS

- **Geneva** → Modified hippocratic oath
- **Tokyo** → Torture; gives guideline for physician in case of torture
- **Helsinki** → Human Experimentation
- **OSLO** → Therapeutic abortion
 - Abortion can be done by a competent person in authorized institution
- **Sydney** → Declaration of death & Human organ respected
- **Venice** → Terminal Illness
 - Patient autonomy to be respected
 - Patient has right to refuse
 - Patient has right to decide on palliative Rx
 - Doctor should take 'advance directive' into consideration
- **Lisbon** → Rights of Patients
- **Ottawa** → Child health

- **Hong Kong** → Elderly abuse
 - Duty of doctor to prevent physical or psychological abuse of elderly of elderly person
- **Malta** → Hunger Strike → doctor should not do force feeding
- **Washington** → Biological weapon

VIOLENT ASPHYXIAL DEATHS

Hanging & strangulation

Asphyxia = pulselessness

Signs

1. Congestion of organs
 2. Cyanosis
 3. Petechial hemorrhages
 4. Rt. Ventricular enlargement
 5. ↑ fluidity of blood
- } asphyxia triad
- } Quintet of Asphyxia

Cyanosis



visceral congestⁿ



- Bluish discoloration of skin & mucous membranes
- If reduced Hb is $>5\text{mg} / \text{dl}$ - cyanosis
- Acro cyanosis (peripheral) seen in asphyxia

cyanosis petechial

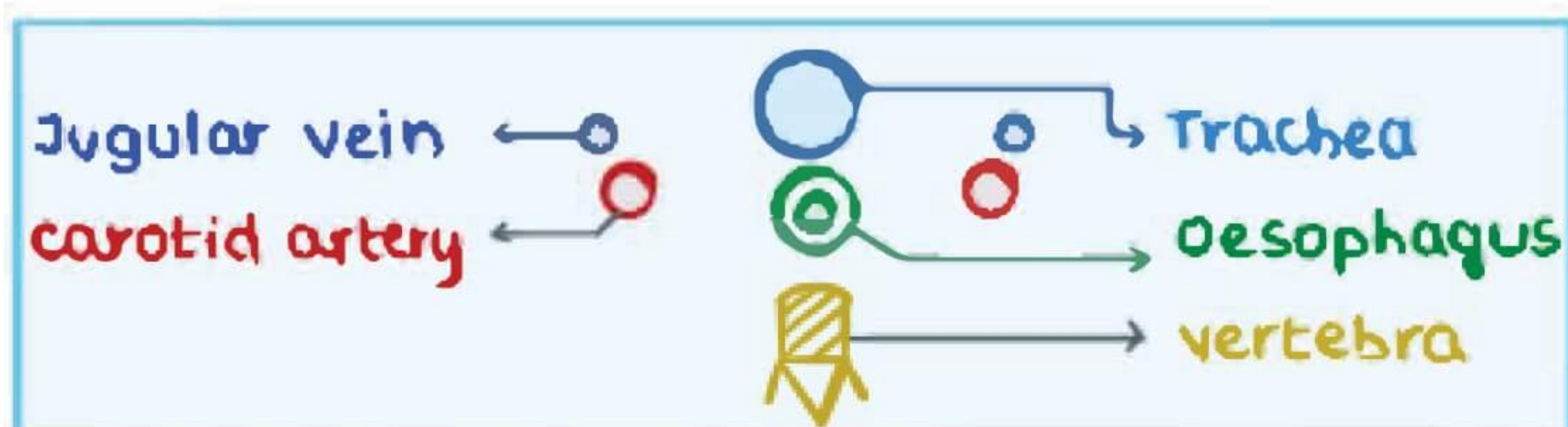
Petechial hemorrhages / TAR DEIU Spots / BAYARD's Spots

- Occurs d/t rupture of capillaries



- Seen in
 - o Fore head
 - o Eye lids
 - o Conjunctiva
 - o Post auricular
 - o Visceral organs
 - o Pleura
 - o Meninges etc

Neck constriction



- Pressure of 2 kg - jugular vein compressed - venous congestion
- Pressure of 5 kg - carotid artery occluded - cerebral ischemia
- Pressure of 15 kg - trachea occluded - asphyxia
- Pressure of 30 kg - vertebra involved along with vertebral artery
- Mc structure affected in neck compression - jugular vein
- Pressure of 14.3 kg - thyroid compressed
- Pressure of 18.3 kg - cricoid compressed

Hanging

- Mc method used for suicide – hanging > poisons
- Neck compressed by the body suspension

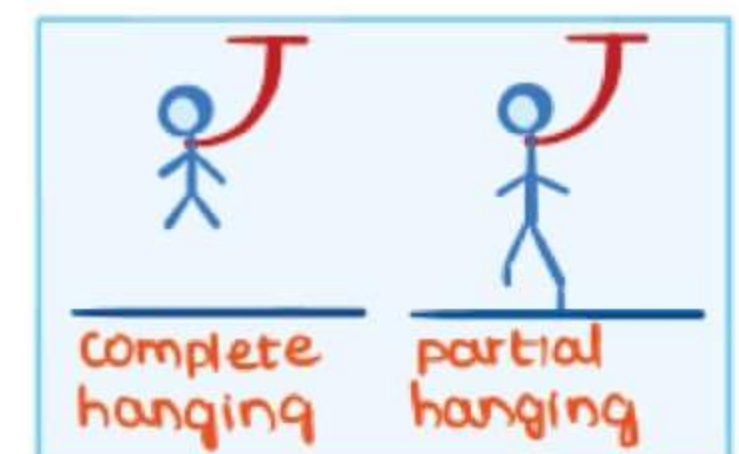
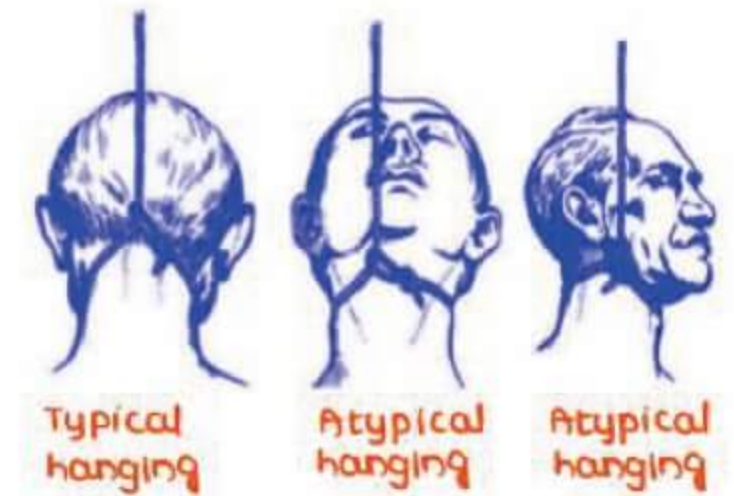
Types

I. Based on position of knot

1. Typical – knot placed on occipital region
2. Atypical – knot placed anywhere else

II. Based on suspension

1. Complete – body suspended without touching the ground
 - Entire body weight acts as constricting force
2. Partial – body part touches the ground
 - Constricting force is head weight



Fatal period – 3-5 minutes



Complete hanging



partial hanging

Ligature material

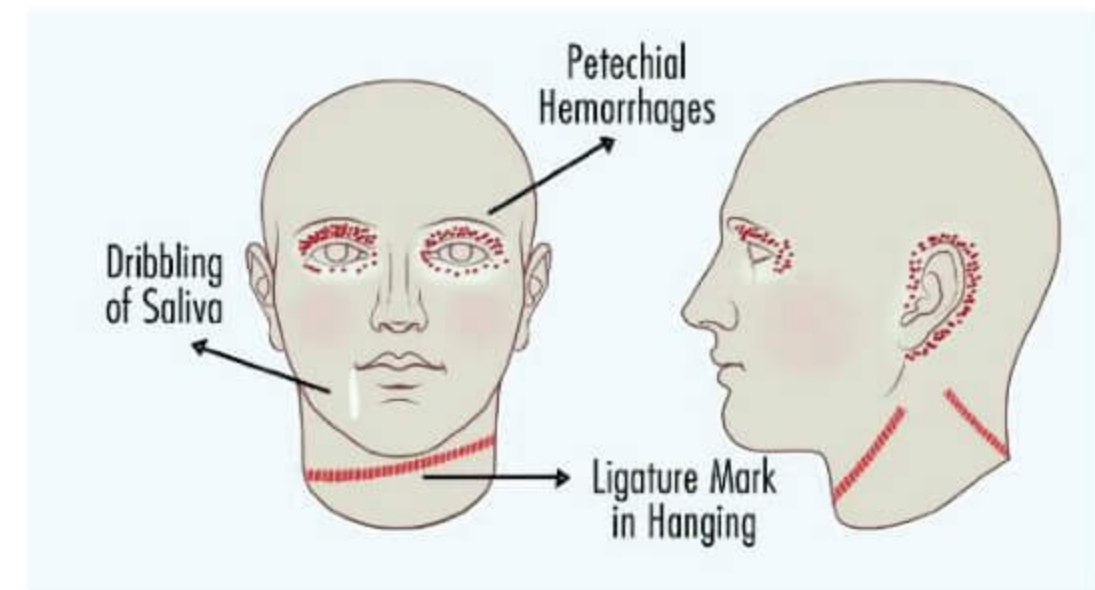
- Depends on availability
 - Removal of ligation material
1. Cut open the ligature material opposite to the side of knot
 2. Cut opened ligature material can be tied with another small thread & preserved
- Pattern of ligature material can be correlated with pattern of ligature mark, so proper preservation of ligature material is important



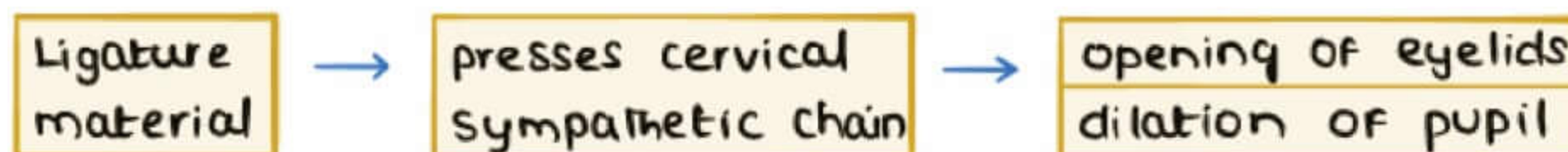
Postmortem findings

External findings

1. Glove & stocking hypostasis
2. Seminal discharge
3. Face
 - Congested (jugular vein occlusion)
 - Pale (jugular vein & carotid artery occlusion)
 - Protrusion of tongue
 - Dribbling of saliva
 - o Signifies ante mortem hanging
 - o Seen at dependent side



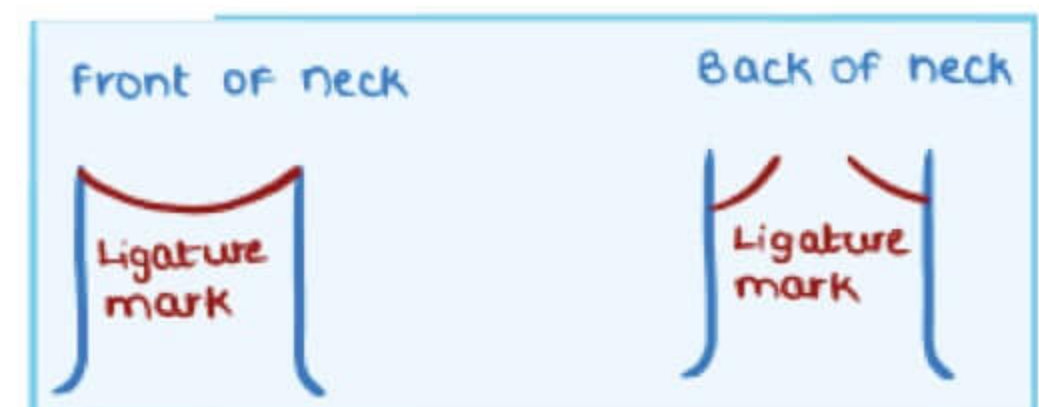
- Le facie sympathetic → skin of antemortem hanging



4. Neck

ligature mark

- Oblique above thyroid (85%) incomplete
- Pressure abrasion by itself patterned abrasion (if it is showing pattern)
- Skin under the ligature mark – pale, white & glistening



Internal findings

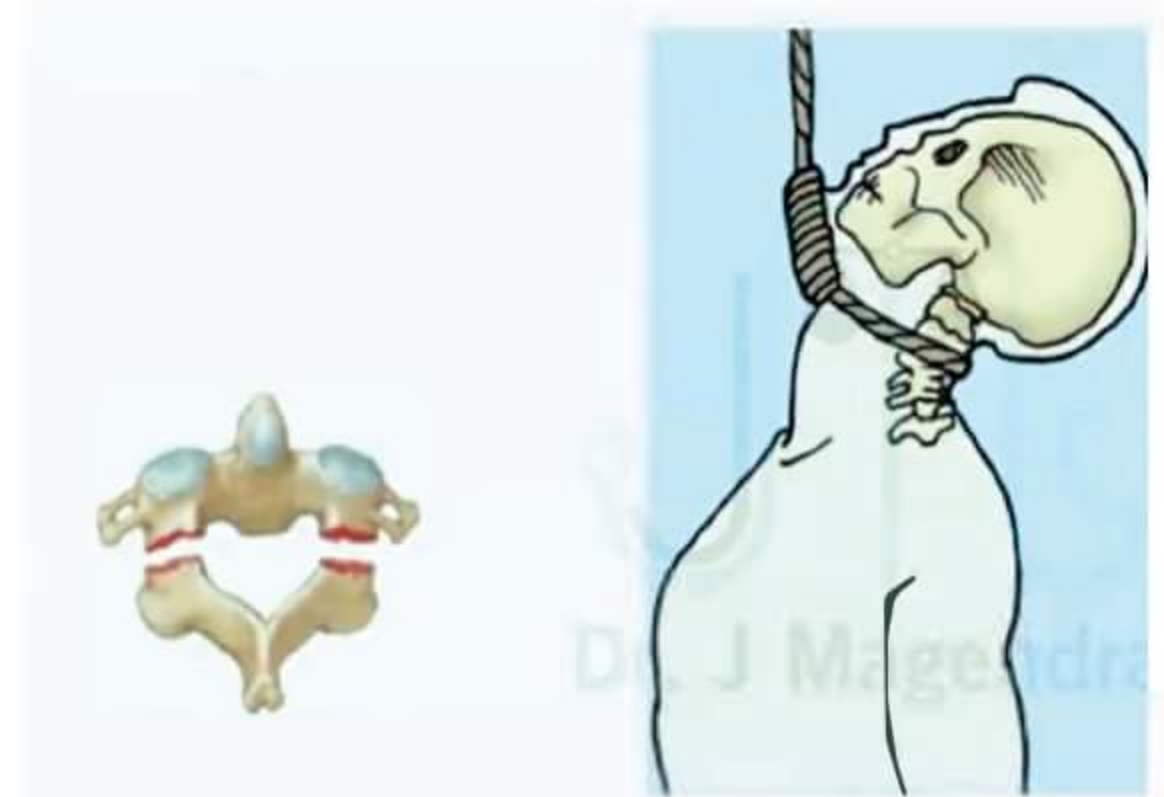
1. Hyoid bone fracture
 - Seen in 15-20%
 - Types
 - a. Abduction # / Antero posterior compression #
 - d/t AP compression – AP compression #
 - fractured segment displaced outwards – abduction #

- b. inward compression # - fractured segment displaced inwards
- c. side to side compression # - fractured segment displaced inwards on one side & displaced outwards on other side

- mc type of # in hanging - abduction #
- mc site - greater cornu
- mc seen - >40 years

2. long drop injuries

- a. carotid artery injury
 - transverse intimal tears seen - amussat sign
- b. vertebral injury - B/L pedicles fractures of axis
 - mc vertebra injured - c2
 - spondylolisthesis of c2 over c3 - hangman's #
 - occurs d/t sudden hyperextension
 - commonly a/w judicial hanging
 - hangman's knot - ideal position - submental



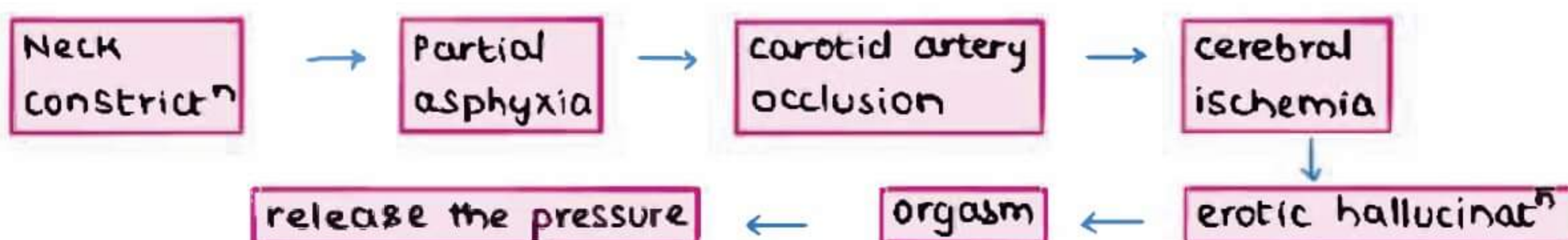
-In India - below the angle of jaw

- Simon's bleeding

- bleeding present in anterior surface of vertebra

Manner of hanging

1. suicidal hanging - (M/C), painless, fatal period - 3-5 mins
 - ligature material fibres can be found in the hands of victim
 - no other fatal injuries
2. accidental hanging - sexual asphyxia



- perversion
- seen in males
- practice masochism / Transvestism

- auto erotic / hypoxiphilia / asphyxiophilia
 - o accidental death
 - o no disturbance seen
 - o no suicidal note

3. homicidal hanging

- any other fatal injuries are present
- signs of struggle +nt
- absence of ligature material is present

→ Lynching

- captain willium lynch (north America)
- homicidal hanging by a mob in a public place



4. judicial hanging

- practiced in India
- long drop injuries occurs – hangman's #

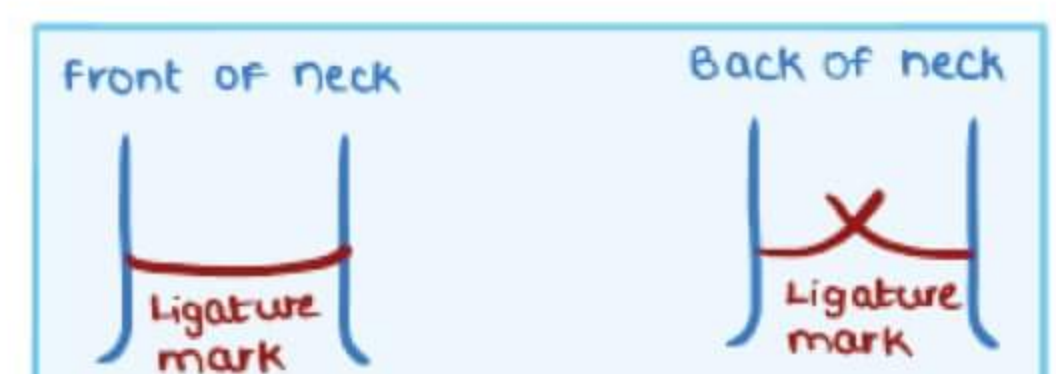


Strangulation

- neck is constricted
- by means of
 1. ligature material – ligature strangulation
 2. fingers – throttling / manual strangulation bamboo stick – bansdola
 3. elbow – mugging
 4. thin ligature cord – garroting

1. ligature strangulation

- ligature mark
 - o transverse
 - o below thyroid (mostly)
 - o complete
- skin under ligature mark – contusion & hemorrhage seen
- pace will be intensely congested



2. manual strangulation / throttling

External findings

- crescentic finger nail scratches are seen
- discoid bruises / six penny bruise seen

Internal findings

- extensive soft tissue contusions + nt
- hyoid bone # - adduction #, Inward and compression #
- cricoid cartilage # (typical of homicidal throttling)

Throttling is almost always homicidal



Mugging



garroting

Spanish WINDLAS technique

- type of garroting
- used for judicial execution in Spain



SUFFOCATION

1. SMOTHERING

- Closure of mouth and Nostrils → asphyxia When done manually by hand
 - Finger nail abrasions – Peri oral region
 - Contusions in the lip
- Homicidal



2. Gagging Obstruction of Pharynx by a GAG.

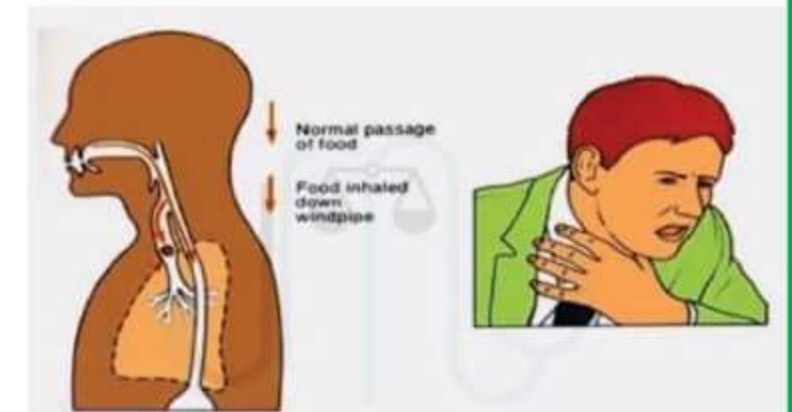


3. Choking

- Obstruction of airway by a foreign body or food
 - bolus
 - ↓
 - Asphyxia
- Causes of death in choking

1. Cardiac arrest(M.C.)
2. Laryngeal Spasm
3. Asphyxia

- First aid to be done
 - Heimlich maneuver



[Person stands behind the victim, keeping hand in the epigastrium, giving pressure upwards & backwards, and making the foreign body expelled out.]

→ Café Coronary

Haugen termed café coronary

Misnomer- Person dies d/t foreign body/food bolus entering into airway (NOT MI)

History

- Obese Person
- Under influence of alcohol

- While eating
- ↓
- Suddenly becomes bluish (cyanosed) and dies

Under the influence of alcohol the gag reflex/cough reflex is suppressed, and the person will not be able to bring out the foreign body.

→ Cause of death

Asphyxia → food bolus blocking the airway

4. Traumatic Asphyxia

Asphyxia due to mechanical fixation of chest

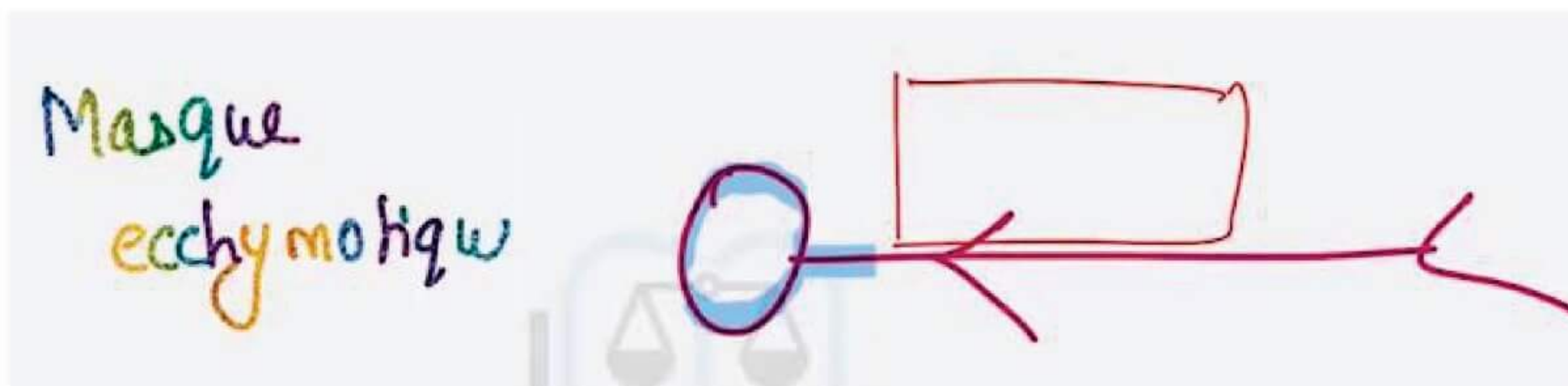
↓
Interference of Respiration
↓
Death



Situation

1. Stampedes
2. Motor vehicle accidents
3. Building collapses

Mosque Ecchymotique above the level of obstruction, it will be completely cyanosed.



5. Positional Asphyxia

Asphyxia due to position of victim

Due to abnormal position chest is Restrained

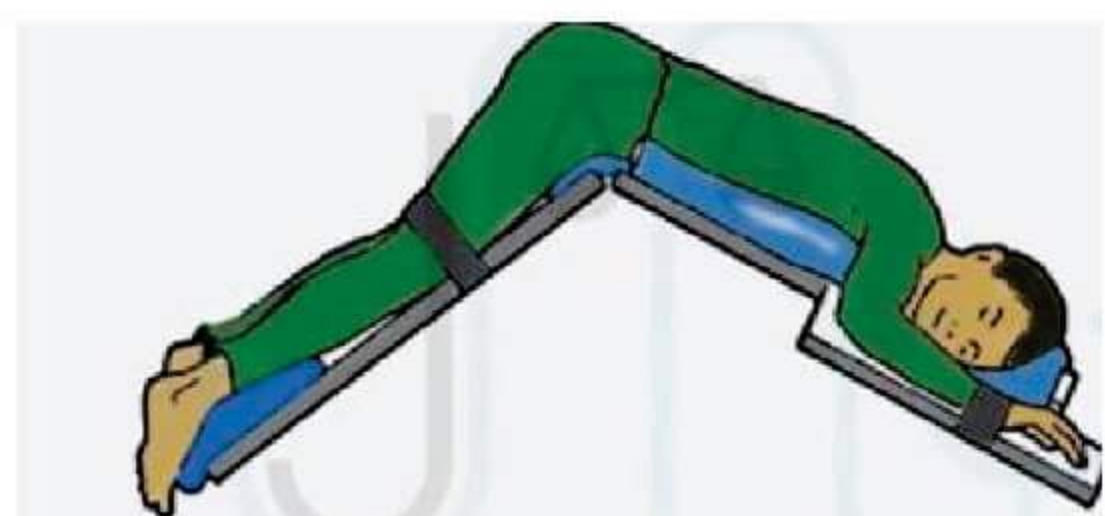
Child's respiration is interfered because of position.

Inverted Crucifixion

Abdominal organs compressing the diaphragm, making the lungs not to Expand.

Jacks Knife's Position

Persons not able to breath due to this positions.



BURKING

Homicidal Method

One person sitting on the body of the victim another person covering the mouth any struggle

Combination of smothering + Traumatic Asphyxia

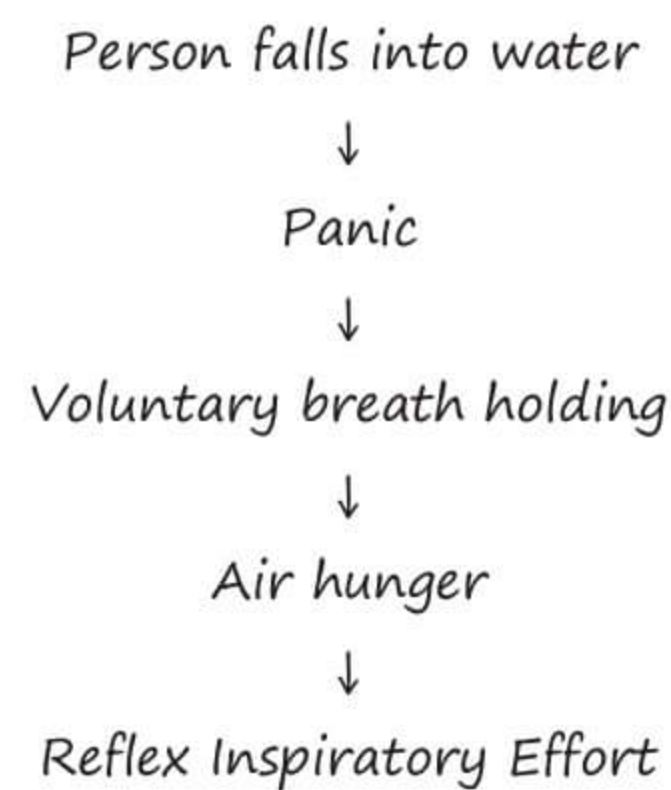
**OVERLAYING**

Happens when an obese mother sharing a small bed with an infant.

Accidental

DROWNING

As per WHO- Drowning is a process of Respiratory impairment d/t the submersion or immersion of the victim.

Pathophysiology of drowning

↓
Rapid Entry of Water into airway

Dry Drowning		Wet Drowning
Directly irritate vocal cords		Depends upon the amount of water Aspirated (3-4 ml/kg) (MC)
HYDROCUTION Vagal inhibition	Laryngeal Spasm ↓ Asphyxia ↓ Deaths Leave water is not coming down to Trachea.	↓ Enters alveoli & washes away Surfactants.

Wet Drowning

Depends upon the amount of water aspirated

(3-4 ml / Kg) (MC)	11 ml / Kg	
↓ Enters alveoli & washes out surfactants	↓ Depends upon the type of water	
↓ Alveolar Collapse	Fresh water Hypotonic	Salt Water Hypertonic
↓ Mismatch VP ratio	↓ Water Entering into blood Resulting in hemodilution	↓ Fluid entering into alveoli
↓ Cerebral Hypoxia	↓ Hemolysis	↓ Pulmonary Edema
↓ ↓ Death	↓ Hyperkalemia	↓ Respiratory failure
	↓ Cardiac arrhythmia	↓ Here it is Hemo Concentration
	↓ Death	↓ ↑Na ⁺ , ↑Cl ⁻ , ↑Mg ⁴ , Best parameter → ↑ Strontium in blood

↑ Mg⁺ can be determined by Maritz test

Electrolyte imbalance is noted when amount of water aspirated is about 22 ml/kg

HYDROCUTION

Aka Vagal inhibition of Heart

Immersion Syndrome

Cold H₂O (at least 5°C less than body temp of the victim)

1. Stimulate skin receptors
2. Epigastric Impact

↓

All these situation causes Stimulation of Vagus

↓

Bradycardia

↓

Cardiac arrest

That's why its called **Vagal Inhibition of heart**

- Here the water is not entering into lung. So it is also a type of DRY DROWNING

NEAR DROWNING.

- Victim dies of complications
- Survival period – 24hrs

Expected Complication like

- Pulm Infections
- Electrolyte Imbalance
- H/E – **Hypoxic Ischemia Encephalopathy**
- ARDS

Aka Post Immersion Syndrome

FATEL PERIOD

Fresh water drowning → 4-5 minutes

Sea Water drowning → 8-10 minutes

POSTMORTEM FINDINGS

Specific	Nonspecific
→ Finds in Antemortem drowning	→ Antemortem + Postmortem drowning

Specific Findings

1. **External → Cadaveric Spasm**

Alive person when fallen into water, he/she will struggle to come out of it and will grasp the grass/weeds/stem.

That muscle will continue to be in spasm after death that is known as cadaveric spasm.
Most Specific Sign of ante mortem drowning



2. Face → Froth

Whenever a person falls into there is entry of water into the airway. Which irritates the mucosa.

↓
↑mucus + surfactant+ water
↓

Vigorous agitation which mixes, mucus surfactants and water resulting in Froth.

Froth will be

- Fine
- Tenacious
- Lathery
- Persistent

3. Internal Aspect

Lungs

- Voluminous
- Edematous
- Rib markings on Lung

EMPHYSEMA AQUOSUM

- Conscious person drowns in water
- Lungs will be spongy and crepitant.
- Air bubble and water mixed inside airway.



NOTE :**Edema Aquosum**

Unconscious person thrown into water
Water replace the air in the airway

Seen in:- Postmortem drowning

→ **PALTAUF'S HEMORRHAGE**

Rupture of alveolar capillaries due to forced Respiration.
Commonly seen in anterior Surface of Lower lobe of Lungs.
Mud in the airway
H₂O in stomach

Non-Specific Signs**1. Washer Women's hand**

Wrinkled → 3hrs
Bleached → 12 hrs (1/2 day)
Soddened → 1 day
Peeling of skin → 2-3 days

→ Inhibition of water into the skin layers
→ It helps to calculate Time since death (TSO)

**2. Cutis Anserina /goose flesh**

→ d/t Contraction of Erector Pilori Muscles.
→ Goose bumps
→ Rigor Mortis of Erector Pilori Muscle
→ Goose bumps

**Signs In Drowning****Ueno's Sign**

Presence of H₂O in middle ear.

SUESHNIHOV'S SIGN

Presence of H₂O in Sinuses (Maxillary/Sphenoid)

SEHRT'S Sign

Micro Ruptures of wall of the stomach d/t stretching.

WYDLER'S SIGN

When taking the gastric fluid from the stomach and kept in becker for 1 hr we see 3 layers.

SABINSKY'S SIGN

Because of drowning spleen looks small and anemic.

TESTS DONE IN DROWNING**1. DIATOM TEST**

Diatom → Unicellular algae

Varies in Species size shape

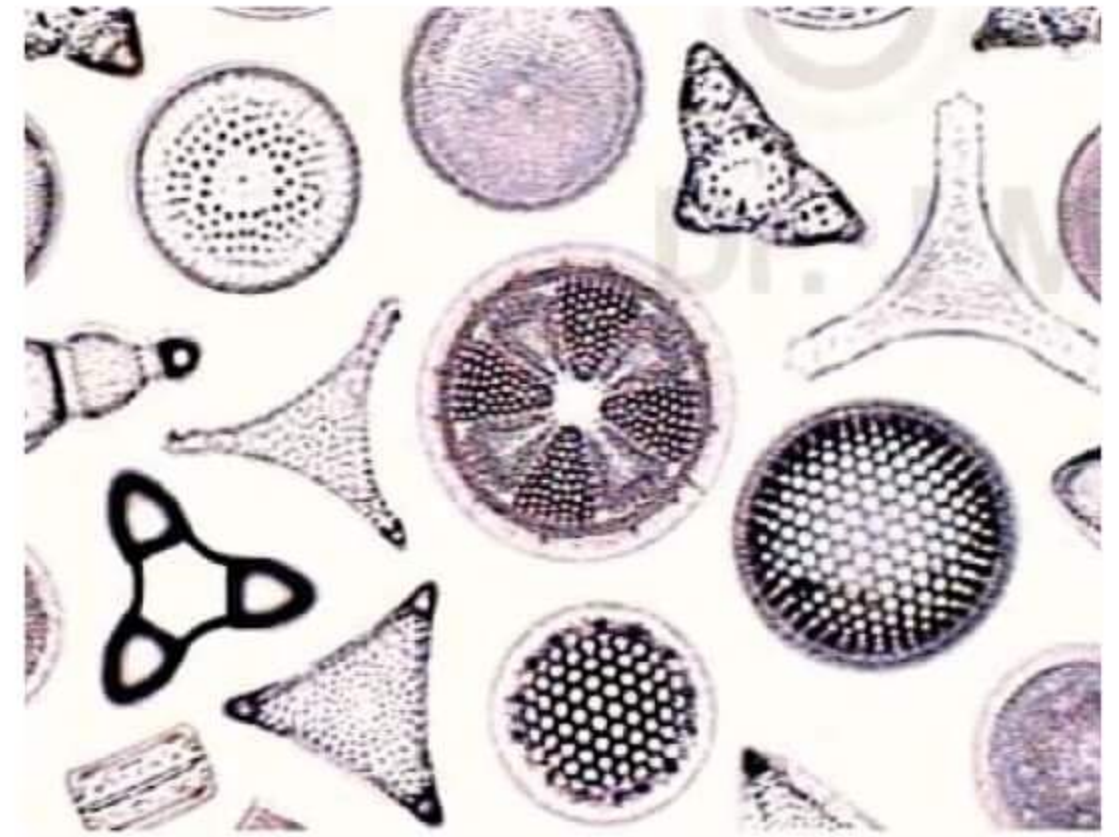
Acid & Alkali resistant

Wall Composed of Silica

These are 2 important types of diatoms based on Salinity of water

Oligo halophilic

Poly halophilic



Diatoms Present in water



Enters into the airway



Enters into Alveoli and Penetrates Pulmonary Capillaries

Diatoms of 60 M or less can penetrate pulmonary capillaries



If the person is alive and the heart is beating & diatoms will be circulated to different organs

[bone marrow, brain, spleen, kidney, liver]



Which is a sign of Antemortem drowning

- **Best Source** – Bone Marrow
- Femur is Preferred
- **Best visceral organ** → Spleen

Diatom Test Not Useful In

1. Dry drowning
2. Hydrocution

→ Test is done by Bone Sampling [Pulverized (powdered)]
 +
 HNO_3 (destroys all tissue samples)
 ↓
 DIATOMS → Seen under microscope

2. GETTLER TEST

Comparison of Cl^- concentration in Right Side of heart and Left Side of heart.

$N \rightarrow R^+ (\text{Cl}^-) = (\text{Cl}^-) \leftarrow +$

Fresh water drowning → $R^+ (\text{Cl}^-) > (\text{Cl}^-) \leftarrow +$ Hemodilution

Sea Water drowning → $R^+ (\text{Cl}^-) < (\text{Cl}^-) \leftarrow +$ Hemoconcentration

Not useful in

1. Dry drowning
2. Hydrocution
3. Putrefaction

Serum magnesium concentration }
 Serum strontium concentration } Both ↑ in SEA water drowning

- Among this 2-serum strontium is the best parameter for finding sea water drowning.

POSTMORTEM TECHNIQUES

* Autopsy / Postmortem examination / Necropsy

→ 1st autopsy done by – Varignana (Italy) in 1302

→ 1st medicolegal autopsy in India

- Done at Chennai
- By Edward Bulkley
- Done on a case of arsenic poisoning

Types

1. Medico legal autopsy

- Done in unnatural deaths
- M/C type in India
- Authorization given by investigating officer (IO)
- Body will be handed over to IO

2. Clinical / Pathological autopsy

- Done in natural deaths
- Relatives consent is mandatory

3. Virtual autopsy / Virtopsy

- Whole body imaging done
- Cause of death can be found

4. Obscure autopsy

- Gross findings are minimal / inconclusive
Eg. Hyperkalemia, adrenal insufficiency

5. Psychological autopsy

- Done to find out mental status of victim
- Done by interviews with parents or friends
- Done in suicidal cases

6. Verbal autopsy

- Conduct interviews with relatives / parents
- Get information regarding pt. illness → it determines cause of death
- Done for statistical purpose & research purpose.

7. Negative autopsy

- Dissection
 - Chemical analysis
 - Histopathological examination
 - Cause of death can't be found
- } Negative

* Cavity to start with

1. Poisoning cases → cranial cavity
2. New borns

→ Abdominal cavity

↓

To check the level of diaphragm (lower level → baby respired)

3. Asphyxial death

- Cranial → Thorax → Abdominal → Neck
- To achieve bloodless dissection of neck

4. Air embolism

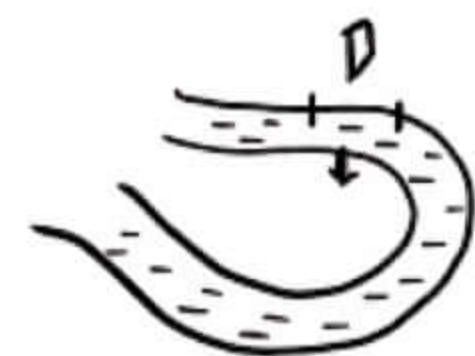
- Under water autopsy
 - Pericardium cut open & fluid with H₂O
 - Then ventricle opened
 - In case of air embolism, air bubbles are seen

→ Pyrogallol test

- Ventricle is aspirated by a syringe with pyrogallol test
- In case of air embolism, color change in color.

5. Pneumothorax

→ Chest cavity opened first



- Skin flap is reflected in thorax & filled with H₂O
- Then puncture the pleural cavity with a Sx blade
- In case of pneumothorax, air bubbles will be seen

6. Normal cases → Thoracic cavity

Types of skin incisions

1. 'I' Incisions (M/C)

- from neck to pubic symphysis

2. 'Y' Incisions

- Starts from shoulders, meets at xiphisternum & from xiphisternum to pubic symphysis

3. Modified 'Y' Incision

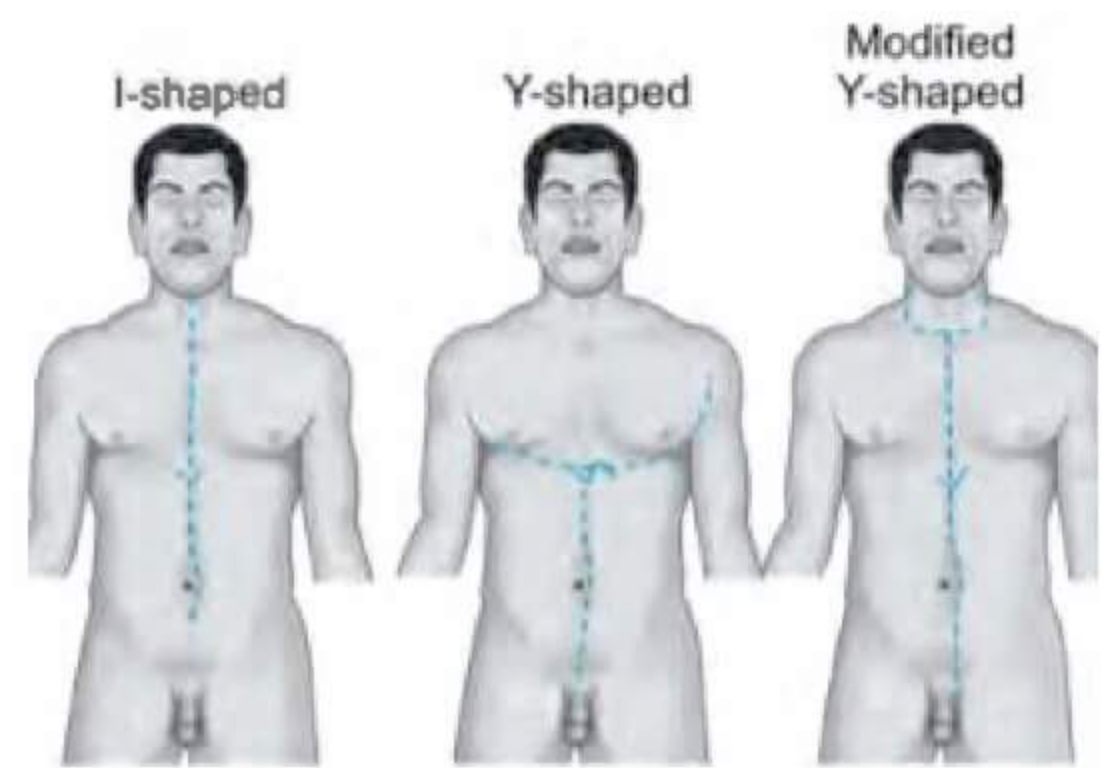
- Start in mastoid process, meets in suprasternal notch & continue to pubic symphysis

4. 'T' Incision

- Start in shoulder & moves to another shoulder & from midpoint of inter shoulder line to pubic symphysis.

5. 'X' Incision

- Incision on back of body preferred in custodial deaths.



Techniques of organ removal

1. Organ by organ / Virchow's method → M/C

- Interorgan relations can't be studied

2. En masse / Lettule's method

- Organs are removed at once (cervical, thoracic, abdominal, pelvic)
- Quicker, interorgan relations can be studied

3. En block, / Ghon's method

- Particular region is done [Cervical – thoracic block, abdominal – pelvic block]

4. In situ / Rokitansky

- Done in infections (HIV, hepatitis etc.) & radiation

Dissection

Heart

- RA → RV → LA → LV
- Inflow outflow method (Follow the blood flow direction)

Brain

- Ideal to fix the brain with 10% formalin for 1 week
- Coronal cutting method

Spinal Cord

- Not routinely opened
- Done by
 1. Anterior dissection method
 2. Posterior dissection method (best)

Stomach

- Stomach is dissected out with double ligation method
- Open along greater curvature

Small Intestine

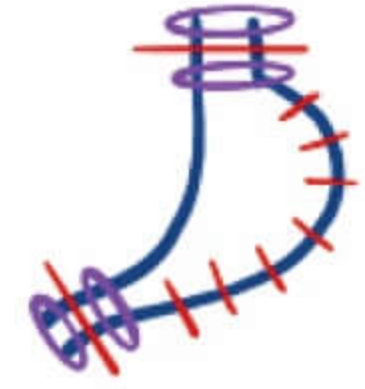
- Can be opened along mesenteric border

Large Intestine

- Open along anterior tenia

Liver

- Multiple parallel cuts along the liver

**Exhumation (176 (3) CrPC)**

- Digging the body out of earth
- Authorization given by magistrate
- Done in presence of
 - Magistrate
 - Police
 - Doctor
- Preferred to start in early morning.
- No time limit for exhumation
- M/C metal to go in PM inhibition → Arsenic
- 500 gms of soil sample taken.

THANATOLOGY

- Study of Death → Thanatology
- **Death defⁿ → Irreversible stoppage of**
 - Circulation
 - Respiration
 - Brain function

→ Definition of death → Given by → Declaration of Sydney

→ When a pt. is dead & brought to you in unconscious state. Check for vital signs → Circulation, respiration, brain functions → Not present

↓

Declare the person to be dead.

↓

This is called somatic / Clinical death

(Doesn't mean that cells in the body are dead. It is only the stoppage of clinical signs → so called as clinical death)

→ Every cell in the body dies after some time → This stage is called as molecular death / cellular death

→ There is a gap b/w somatic & molecular death

↓ Called as

Supra – vital period

(If we give any particular stimuli, the cells can respond)

- Life is like a tripod → Bcoz it stands on 3 imp limbs which are

<ol style="list-style-type: none"> 1. Circulation 2. Brain function 3. Respiration 	<p>Even if one function is stopped & other 2 functions are normal, the person cannot live (all the 3 limbs are imp for a person to live)</p>
<ul style="list-style-type: none"> - If circulation stops → the person goes into syncope - If brain function stops → the person goes into COMA - If respiration stops → the person goes into asphyxia 	<p>Mode of death</p>

→ The death can enter a person only through one of the above routes.

This is called a tria mortis / gate way of death.

→ Suspended animation (SA): aka apparent death (looks like dead person)

- Temporary stoppage of the life signs ie. Animation is stopped for some time is called as suspended animation.

Resuscitation

Apparently dead → Life

→ In this, BMR is ↓↓↓, where clinical signs are not detectable.

Condition in which suspended animation is seen:

Mnemonic: SA: IN new HD T.V

I – Iatrogenic / Insanity

N – New born (very commonly seen → MCC)

E – Electrocution

W – Wasting diseases → Cholera, T.B (terminal illness)

H – Heat stroke / Hypothermia

D – Drowning

T – Typhoid (enteric fever)

V – Voluntary

- A person can voluntarily induce S.A

Eg. Yoga practitioners

Post – Mortem (PM) changes

- PM resorption aka → Taphonomy

Immediate changes	Early changes	Late changes
- Seen within few minutes	- Seen within hours to days	- Seen in days to months
1. Loss of Vol. Movement (Insensibility) 2. Loss of vol. respiration 3. Loss of vol. circulation	1. Eye change (E→E) earlier days 2. Rigor mortis → PM staining of body 3. Livor mortis → PM staining of body 4. Algor mortis → PM cooling	- Decomposition

Eye changes

1. Retina

- Retina is checked with ophthalmoscope
- Segmentation of retinal vessels is seen → bcoz after death, blood circulation stops.

→ It looks like a railway truck → so called as railway trucking sign / Cattle trucking sign aka Kevorkian sign.



Importance:

It is seen within few minutes after death → Helps us to find out Time since death (T.S.D)

- Of all the eye changes, this sign is the earliest change.

2. Cornea

- Normally → Transparent
- After death → Cornea becomes hazy in 1 hour
- Hazy cornea goes into opacities within 6 hrs.

3. I.O.P (Intra ocular pressure)

- Normal I.O.P = 15 mm of Hg – 20 mm of Hg
- After death = I.O.P ↓ses → 20 mm of Hg $\xrightarrow{2\text{hrs}}$ 0 mm of Hg
- Helpful in detecting T.S.D

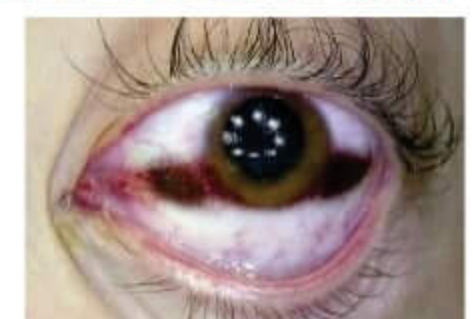
4. Sclera

- After death, if the eyelids are open; dust present in the atmosphere will settle down in sclera (dust deposition) → gives 2 brownish Δ le shaped opacities on both sides of cornea → called as **TACHE NOIRE SCLEROTICA**
- Appear in 3–6 hrs. → helpful in detecting F.S.D.

5. Vitreous humor → Last change

- Best medium for estimating T.S.D

→ As it is enclosed within eyeball; bacteria cannot have access to it easily





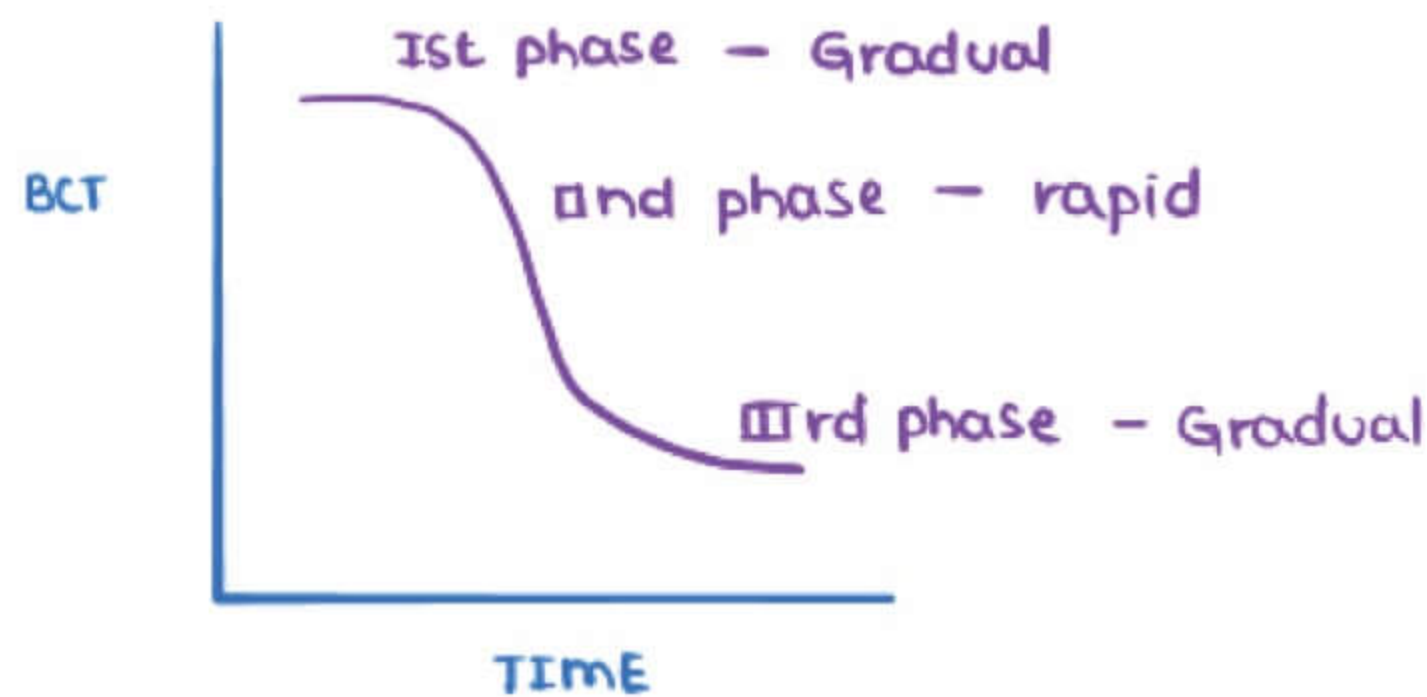
- So, even in advanced decomposed body, this medium is very helpful
- K^+ levels of vitreous humor → ↑↑ after death
- 2 formulae for finding T.S.D
 - (i) STURNER'S FORMULA
 - (ii) MADEA'S FORMULA

Algor mortis

- Also called as P.M chill / PM cooling
- AM → ↓se in body core temperature. (BCT)
- Site for recording B.C.T → Rectum (Common site)
Sub - hepatic space (Ideal site)
- Instrument used to record B.C.T → Thanatometer / Chemical thermometer
 - It is 25 cms long
 - Calculated b/w 0°C - 50°C

Pattern of decreasing BCT

ALGOR MORTIS CURVE



- Occurs in 3 phases
 - 1st phase → gradual ↓se
 - 2nd phase → Rapid ↓se
 - 3rd phase → Gradual ↓se

- ↓ is BCT → starts in 15 mins after death
- Shape of Algor mortis curve → Sigmoid
- HENSQE Monogram →

By measuring both B.C.T and environmental temp we can plot it in HENSQE'S monogram and know the T.S.D

Rate of fall of temperature

- Summer → $0.5^{\circ}\text{C} / \text{hr}$
- Winter → $0.7^{\circ}\text{C} / \text{hr}$
- By knowing rate of fall we can determine T.S.D

$$\text{TSD} = \frac{\text{NBT} - \text{BCT (RT)}}{\text{Rate of fall of Temp.}}$$

N.B.T = Normal body temp

BCT = Body core temp

R.T = (Rectal temp)

ROF = Rate of fall of temp

PM Caloricity (Calor = heat)

- Special entity, in which body remains warm for first 2 hrs.
- Where ever there is ↑sed B.C.T at the time of death, PM caloricity is seen.

↑BCT seen → due to ↑ Muscle contraction → Tetanus, Nux vomica poisoning

Defect in thermoregulation → heat stroke, pontine Hg, ↑ bacterial activity → septicemia

PM caloricity is seen in both of this

→ In burns, PM caloricity is not seen because burn is due to external heat & there is no ↑ in B.C.T

Livor mortis

→ aKa post mortem staining / PM hypostasis (blood pools down) / Cadaveric lividity / PM lividity / Suggillation / Vibices

Mechanism of livor mortis

After death,

Blood in the body

↓

Pools down

↓in

Vessels of (capillaries & venules) dependent parts

↓ resulting in

Staining

→ As the blood pools down in capillaries & venules, it is called as capillo – venous distention → particularly in RETE MUCOSA of dermis

Position	Dependent parts
- Supine position	Back of head (not in cont with ground), back of chest, abdomen are dependent parts
- Prone position	Front of face, front of chest, front of abdomen

<ul style="list-style-type: none"> - Vertically suspended 	<p>Lower part of forearm & lower part of legs</p> <ul style="list-style-type: none"> - Glove and stocking distribution - Seen in hanging cases.
--	---

- Depending on the distribution of hypostasis we can find the position of the body
- Drowning in the river → PM staining is absent
 - Bcoz in fast flowing, river, body will be rolling there is no fixed dependent part.
- L.M is absent, at the places in the body which are in tight contact with the ground. (pressure points)
 - Called as contact pallor.

* Supine position → Pressure points are at back of head, shoulder blades, gluteal region, back of foot.

Staining

- Normally → Bluish / purple → due to de-oxy haemoglobin
 - Co poisoning → Cherry red hypostasis → due to excess free O_2 in the blood
 - Cyanide poisoning → Brick red hypostasis → due to excess free O_2 in the blood
 - H_2S → Bluish - Green hypostasis due to excess sulf Hb
 - $KClO_3$
 - Phosphorous
 - Nitrates
 - Aniline
- ↑ meth Hb → Brown color hypostasis

→ Based on color of hypostasis → we can find cause of death (COD)

→ Livor mortis

Onset → 20 mins after death & starts as a small patch

Visible → Prominently in 4 hrs

Max hypostasis → seen in 6-12 hrs.

→ Fixation of hypostasis

- Hypostasis will be fixed at that particular part. After this, even if we move the body, hypostasis will not change
 - Time limit for fixation → 8hrs
 - When we apply pressure, if it blanches (become pale) → not fixed
- By looking at hypostasis we can know
- T.S.D (Time Since Death)
 - Position of the body
 - Cause of death (Depending on color of hypostasis)

Rigor mortis: aka cadaveric rigidity / Cadaveric stiffening

- Muscle status after death of a person:



→ ↓ in A.T.P → Causes stiffening of the muscle.

→ Rigor mortis is generalized → seen in both voluntary & involuntary muscles.

- 1st seen in → involuntary muscles
- 1st site of rigor mortis → Myocardium
- 1st external site of mortis → Eyelids
- Onset of R.M. → 1hr

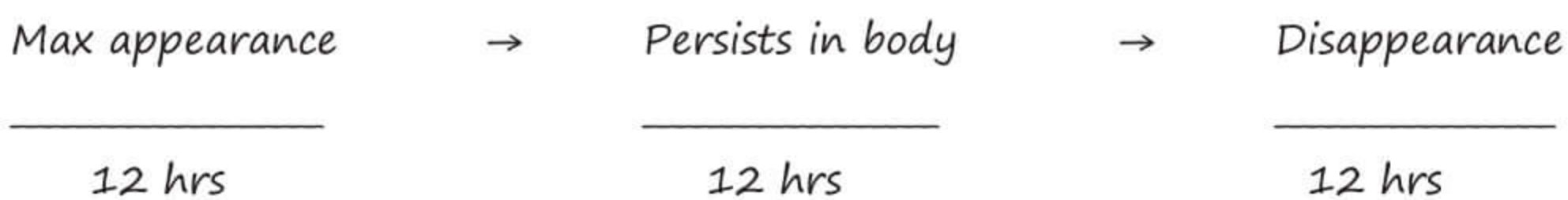
(1950) - Shapiro's Rule:

R.M. is physio - chemical process occurring simultaneously in all the muscles.

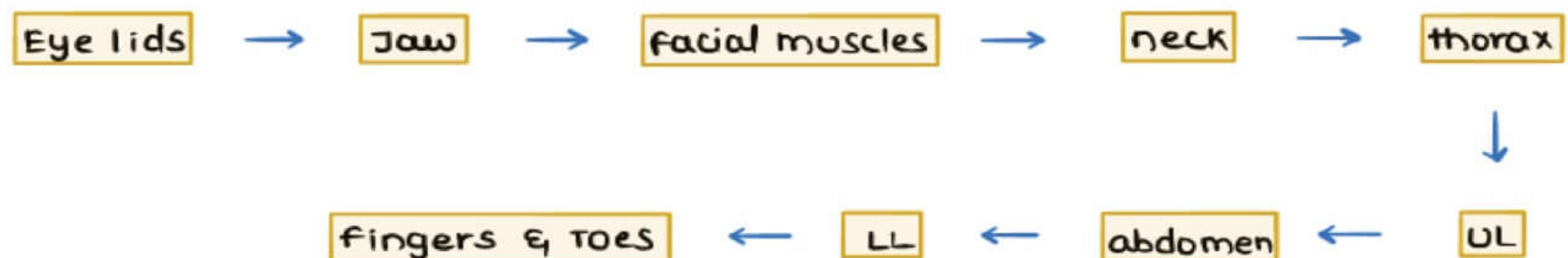
Small muscles → Rigid early
 Large muscles → Rigid late } Looks like seq distribution

- **Nysten's Rule**
- R.M. Occurs sequentially

- **Rule of 12**
- R.M. has 3 phases



Order of appearance of R.M. (externally)



Factors Influencing Rigor Mortis

- i. Age – baby < 2 months of (gestation) I.U.L → R.M. is not seen as the muscle development is absent
- ii. Nature of death – if the RM appearance is early; its disappearance would also be early
 - In cases of deaths due to cholera, T.B, Typhoid, Tetanus, strychnine poison
 - Person will be exhausted at time of death → A.T.P sources will be depleted
 - So R.M. appearance & disappearance will be early
 - In cases like asphyxia, RM appearance & disappearance will be delayed
- iii. Season:
 - Summer → RM appears & disappear early
 - Winter → RM appears & disappear lately
- iv. Bulk of the muscle
 - If muscle thicker → RM appears & disappear lately
 - If muscle is thin → RM appears & disappear early

Conditions that stimulate (look like) R.M.

1. Heat stiffening

Muscle → Protein → Stiffening
 ↑ 65°C Coagulation

- Thus, heat stiffening is also called as Boxer's Attitude / Pugilistic attitude / Defense Attitude

2. Cold stiffening

Body fluids becomes Ice crystals → Joints cannot move → becomes stiff → cold stiffening

3. Gas stiffening

→ Seen with decomposition

Decomposition → Gas production & accumulation → resulting in stiffness of the body

↓
Gas stiffening

4. Cadaveric Spasm: aKa instantaneous rigor – occur 1 mm after death

- Commonly seen in cases of drowning deaths.
- It is spasm of group of voluntary muscles
- Antemortem sign
- Primary relaxation phase is absent
- Manner of death can be known

Grass in the hands – in drowning

Weapon in hand – in suicides

Late changes

- Body gets decomposed
- Occurs by 2 processes

i. Autolysis → Body is lysed by own enzymes

ii. Putrefaction → Body is lysed by enzymes of external bacteria

Autolysis	Putrefaction
<ul style="list-style-type: none"> - Due to lysosomal enzymes - 1st site: Glands / Brain - Externally 1st site : Seen as clouding of cornea - Maceration : (Type of autolysis) → Occurs in Intra – uterine death of fetus 	<ul style="list-style-type: none"> → Due to bacteria → Most imp bacteria involved → clostridium welchii ↓ With the help of enzyme Lecithinase - So clostridium welchii is known as chief destructive agent in putrefaction. → Occurs in 3 stages <ul style="list-style-type: none"> - Color change - Gas production - Liquefaction of tissues.

Color change

- 1st site: Externally → Right iliac fossa → bcoz R.I.F. have caecum which
→ Contain lot of bacteria & is very close to the skin (superficial)

Loads of bacteria forms H_2S → Combines with Hb form sulf – Hb → green in colour

↓

Thus, we find greenish discoloration in R.I.F. → 1st ex sign of putrefaction

Reddish / Brownish discoloration in

1st internal site: Aortic Lumen (intima)

Marbling

[Greenish, linear branching pattern on the skin]

Corresponding to vascular channels

→ Marbling is differentiated from arborescent burns as arborescent burns doesn't correspond to vascular channels

→ Appearance of marbling = 36-72 hrs after death → helps to determine T.S.D



Gas production

- Predominant gas produce in decomposition is H_2S
- Gas in skin → at dermo – epidermal Junction → result in Blister Formation

Post mortem Blister Content → air (Gas bubble) Base → pale	Burns blister (Ante – mortem) Content → Inflammatory fluid Base → Erythemic
--	---

- Abdomen bloated → Entire body bloated → Becomes C/a → Gas stiffening (resembles rigor mortis)

PM Purge

→ Due to excess production of gas	→ There is ↑used pressure in abdomen & chest	Resulting in Rupture of capillaries → Oozing of blood from nostrils / called as [Post Mortem Purge]
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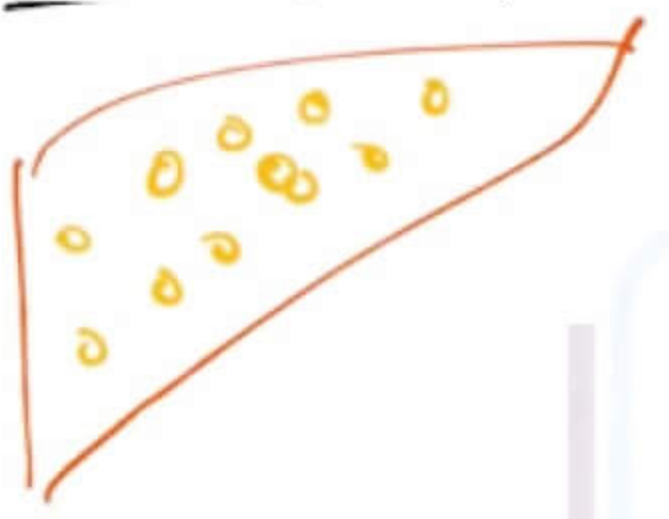
- PM delivery also occurs due to ↑ in pressure in abdomen (rate)
- Loosening of hair/ nails → occur in 3-5 days
Skin around the hands & legs peel off → Degloving / Destocking pattern

Liquefaction of tissues

- Takes 5-10 days
- Order of putrefaction

Larynx / Trachea – 1 st site Stomach Intestine Spleen Liver / Lung Brain Heart	Mnemonic → Sister Lilly's Brittle Heart
Prostate / Uterus (non gravid uterus – early) Skin Tendon Bone → Last organ	

- In liver, during decomposition lot of gas is produced giving /feature of [Honey comb liver / foamy liver]



Post – Mortem luminescence:

→ Body glowing after death

1. Bacteria → Photobacterium
 2. Fungus → Armelliria
- } Presence of this bacteria makes the body glow

Casper's Dictum:

→ It is about rate of putrefaction

→ Rate of putrefaction is compared b/w 3 imp medium

Air	Water	Earth
If a body takes 1 week in air	Takes 2 weeks for same amount of putrefaction	Takes 8 weeks

* Fastest putrefaction occurs

* Slowest putrefaction (Soil Slowest)

Modified forms of putrefaction**→ Adipocere**

- Hydrolysis and hydrogenation of fat
- Fat in the body converted into fatty acids and combines with Ca^{+2} in body forms adipocere (SOAP)
- Most imp acid formed → Palmitic acid

↓

Factors required for conversion

- i. Warm moist climate
- ii. *Clostridium welchii*
- iii. Intrinsic lipases (lipases within body)

↓

It starts conversion of fat into fatty acids

Adipocere → Fatty acids formed in the body → ↓pH (acidic medium) → Inhibits multiplication of bacteria
(Further putrefaction is inhibited)

→ Hence body is preserved

→ Smell of adipocere → Ammoniacal

→ Appearance – Fresh → White & greasy → Looks like rancid butter

Later → Hard & brittle

→ 1st site where adipocere starts → Sub – cutaneous fat

→ Where ever the fat is present in the body → Adipocere formation is seen

* Time for appearance of adipocere → 3 days to 3 months

Medico – legal importance of adipocere

- i. Identification (as the body is preserve) / injuries
- ii. Place of disposal (climate of that place)
- iii. Time since death



Mummification



- * Drying & dehydration of the body is mummification
- * Dry / Hot climate → Body is dehydrated → Mummification → Body is preserved
 - * Body is shrunken
 - * There is loss of weight
 - * No specific smell

→ Skin color becomes brown & all bony prominences become more marked

Medicolegal importance of mummification

- * Place of disposal can be known (hot & dry climate)
- * Time taken → 3 months – 12 months

Embalming / Thanatopraxia

→ Artificial method of preserving the body by using anti – septic's & preservatives

Typical embalming solution – constituents

<ol style="list-style-type: none"> 1. Preservative 2. Germicide (Antiseptic) 3. Wetting agent (moisturing agent to prevent drying of body) 4. Buffer 5. Dye 	<p>Added in diluent (vehicle)</p>
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1. Preservative
 - It is mixture of formalin, Glutaraldehyde, methanol (sometimes)
 2. Germicide : phenol
 3. Wetting agent: glycerol
 4. Buffer : Sodium citrate / sodium carbonate / sodium borate
 5. Dye : Eosin
 6. Anti – coagulant : EDTA
- Vehicle is water (10lit), in which all of these are added.

Method of injecting this solution into body

- Best method → Discontinuous injection / Drainage
- Best vessel → Femoral artery
- Embalming prior to autopsy → all poisons are → Poison cannot be detected amount to

↓

Punishable under 201 I.P.C

- So embalming should be done only after receiving the death certificate.

HUMAN IDENTIFICATION (PART 1)

Parameters for identification of person

Incomplete identification/ Presumptive identification

- I) Race
- II) Sex
- III) Age
- IV) Stature/ height

Definitive identification parameter

- 1) Tattoo
- 2) Scar
- 3) Finger printing → Most reliable method of identification
- 4) DNA printing → It will not differentiate b/w monozygous twins

I) RACE

3 main Races

A. Caucasoid: Europeans	B. Mongoloid: Asians	C. negroid: Africans
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Indians C/B in b/w Caucasoid & negroid features

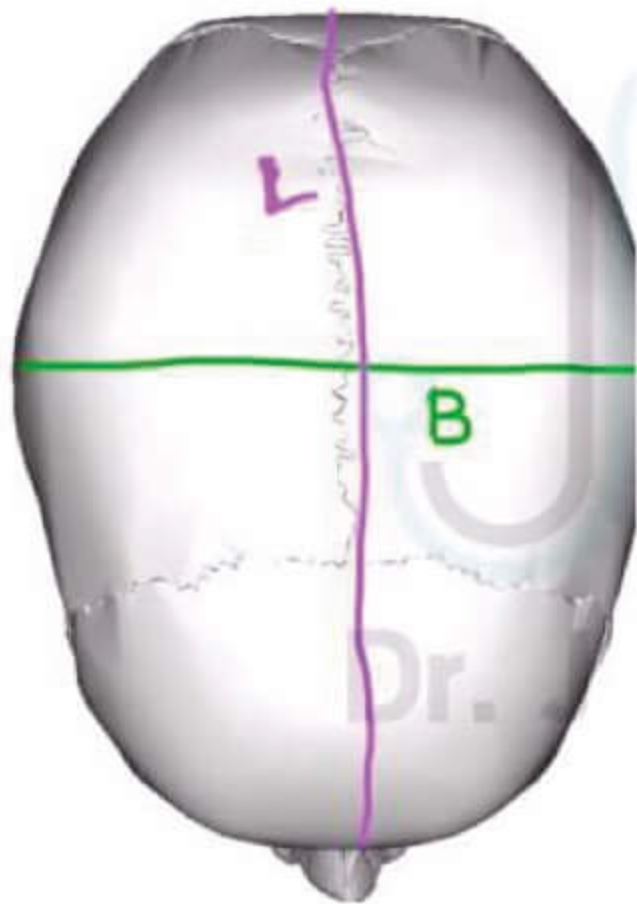
Determination of Race by

I) Bones

II) Teeth

Bones

→ Best bone for race determination: skull



We measure max Transverse breath & max longitudinal length of skull.

To calculate cephalic index.

$$\text{Cephalic index: Ratio} = \frac{\text{max Breath}}{\text{Max length}} \times 100 = \frac{B}{L} \times 100$$

70-74.9 → Dolichocephalic → Negroid

75-79.9 → Mesaticephalic → Caucasoid

80-85 → Brachycephalic → Mongoloid

Indian Skull is mesaticephalic category with Caucasoid with few negroid features

Other indices for race determination

$$1) \text{ Crural (Crus) Index} = \frac{\text{Length of fibia (T)}}{\text{Length femur (F)}} \times 100$$

$$2) \text{ Brachial index} = \frac{\text{Length of radius (R)}}{\text{Length Humerus (H)}} \times 100$$

$$3) \text{ Intermembral Index} = \frac{\text{Length of (H+R)}}{\text{Length of (F+T)}} \times 100$$

$$4) \text{ Humoral Femoral Index} = \frac{\text{Length of Humerus}}{\text{Length femur}} \times 100$$

Teeth

Have Carabelli Cusp. → is additional Cusp in molar,

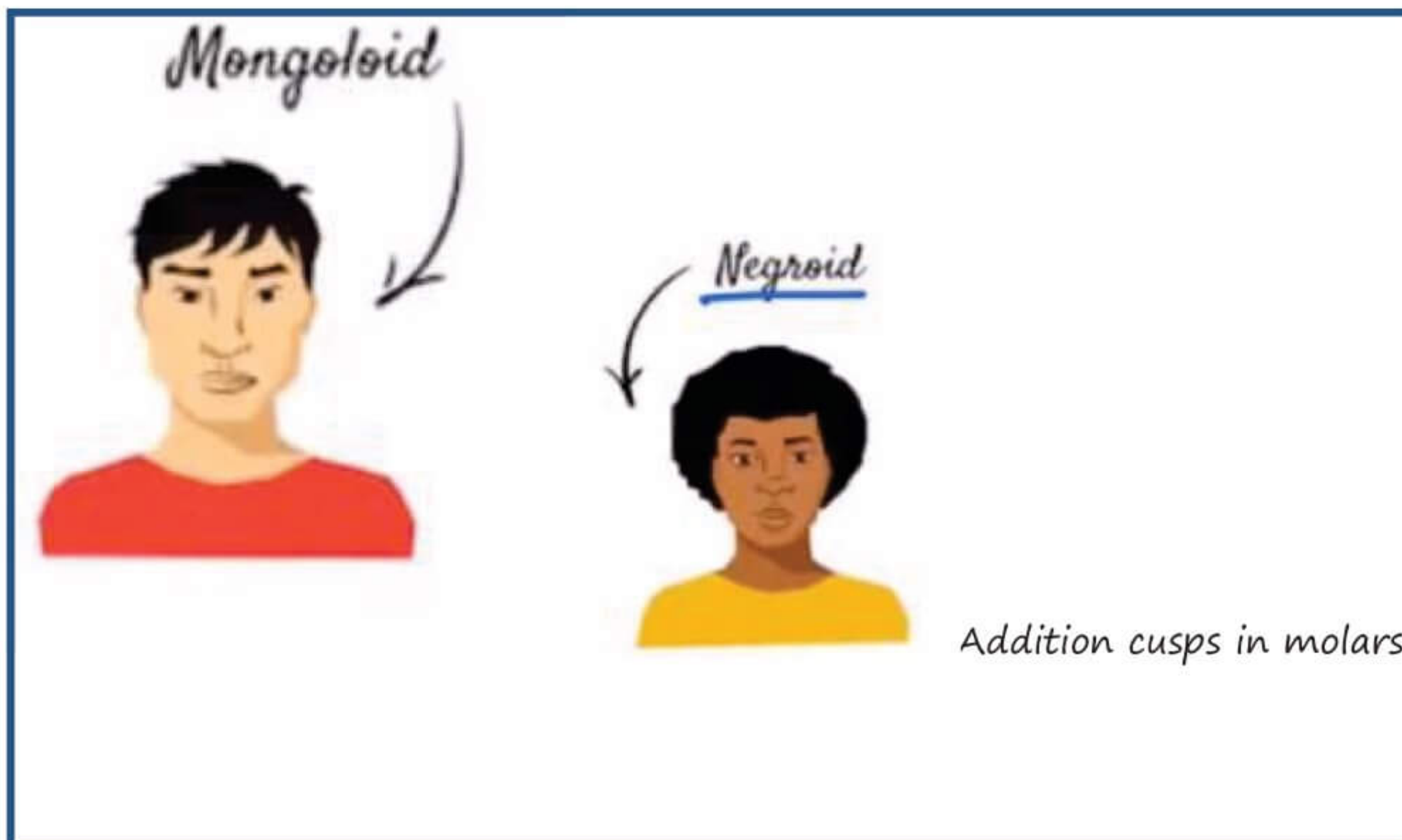


“SET”

S → Shovel Shaped incisor

E → Enamel pearl seen with premolar

T → Taurodontism – Bull tooth wide pulp cavity, tooth itself is big.



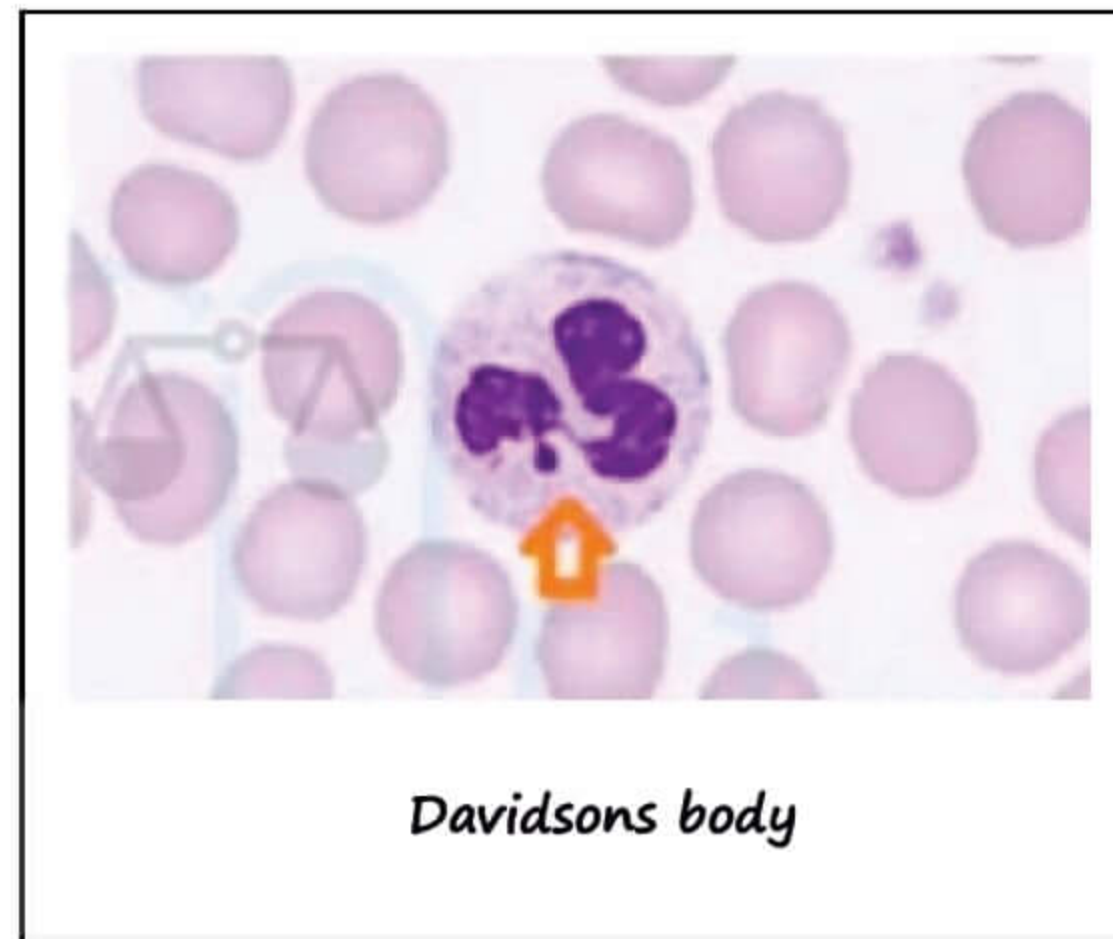
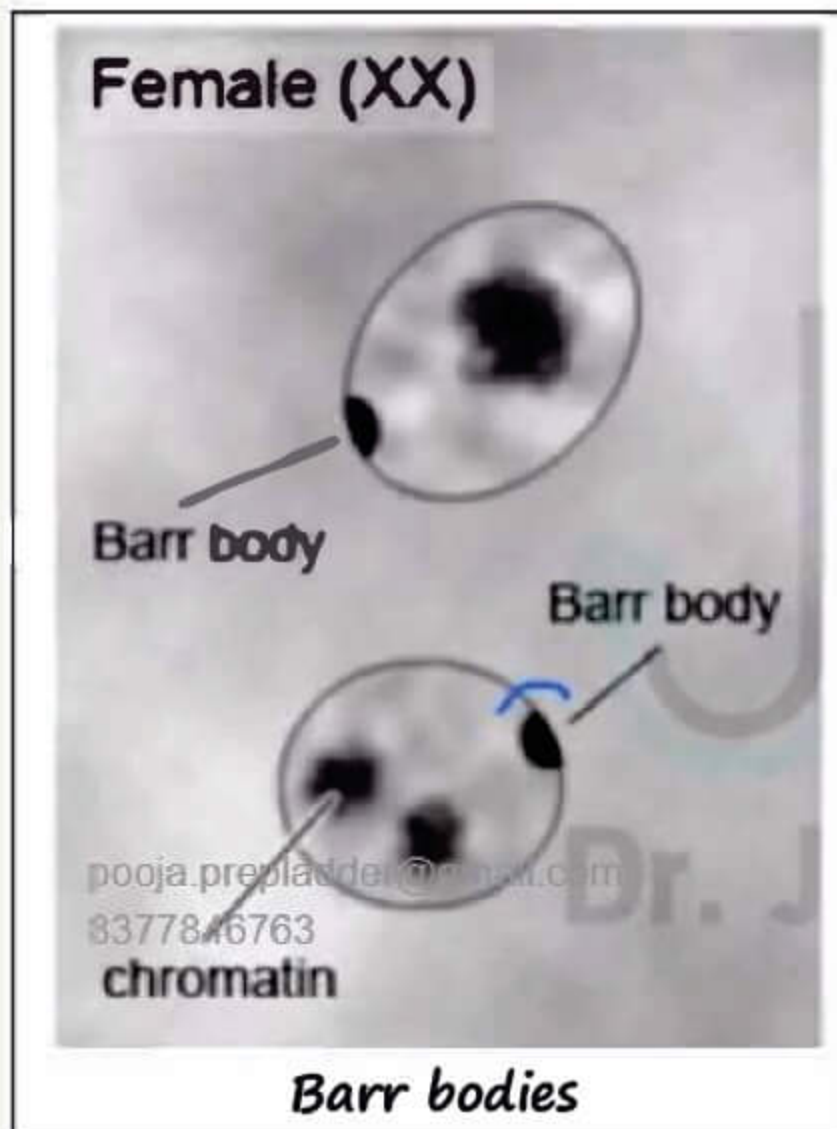
II) Sex Determination

a) By secondary sexual characters

b) Chromatin study

Barr body – seen in cells of female – It is inactivate X chromosome (mass of chromosome in nucleus)

→ Sample taken from 'Buccal Smear', hair follicle, Saliva



Davidson's Body

Neutrophils – have additional mass of shape of drumsticks body k/a Davidsons body seen in Female.

Staining of X chromosome

F → Demonstrates Feulgen reaction

A → Add – acriflavine reagent.

X → It stains X chromosomes.

Staining of Y chromosome

To above add one more reagent – QDH

i.e. Quinacrine dihydrochloride reagent

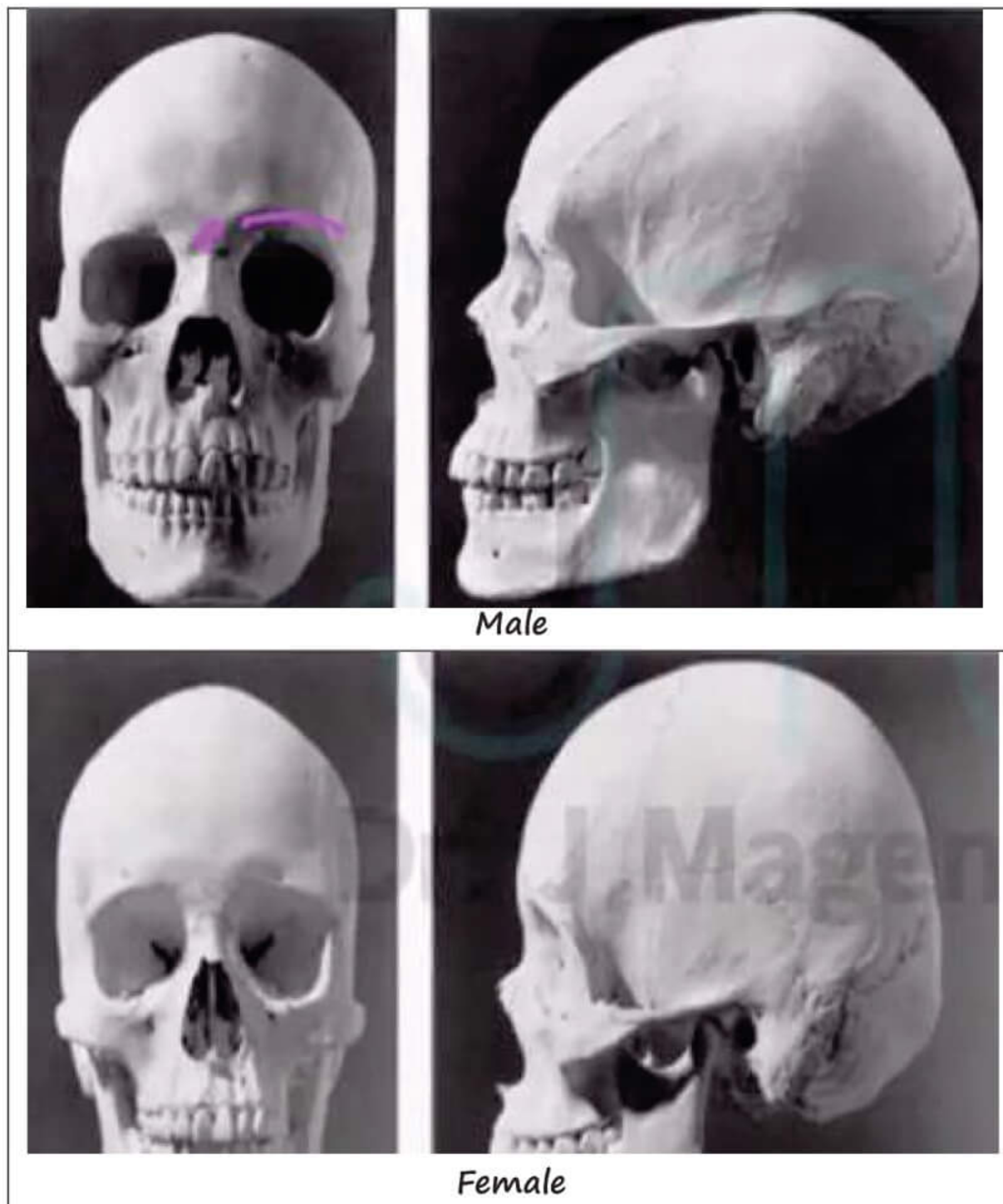


Sex Determination with bones



	Male	Female
1. Muscle marking ridges	More prominent	Less prominent EXCEPTION: Frontal parietal eminence - more in females
2. Index Sciatic notch Ischiopubic (Washburn) Sternal index	Less	More
Corporo basal index	More	Less

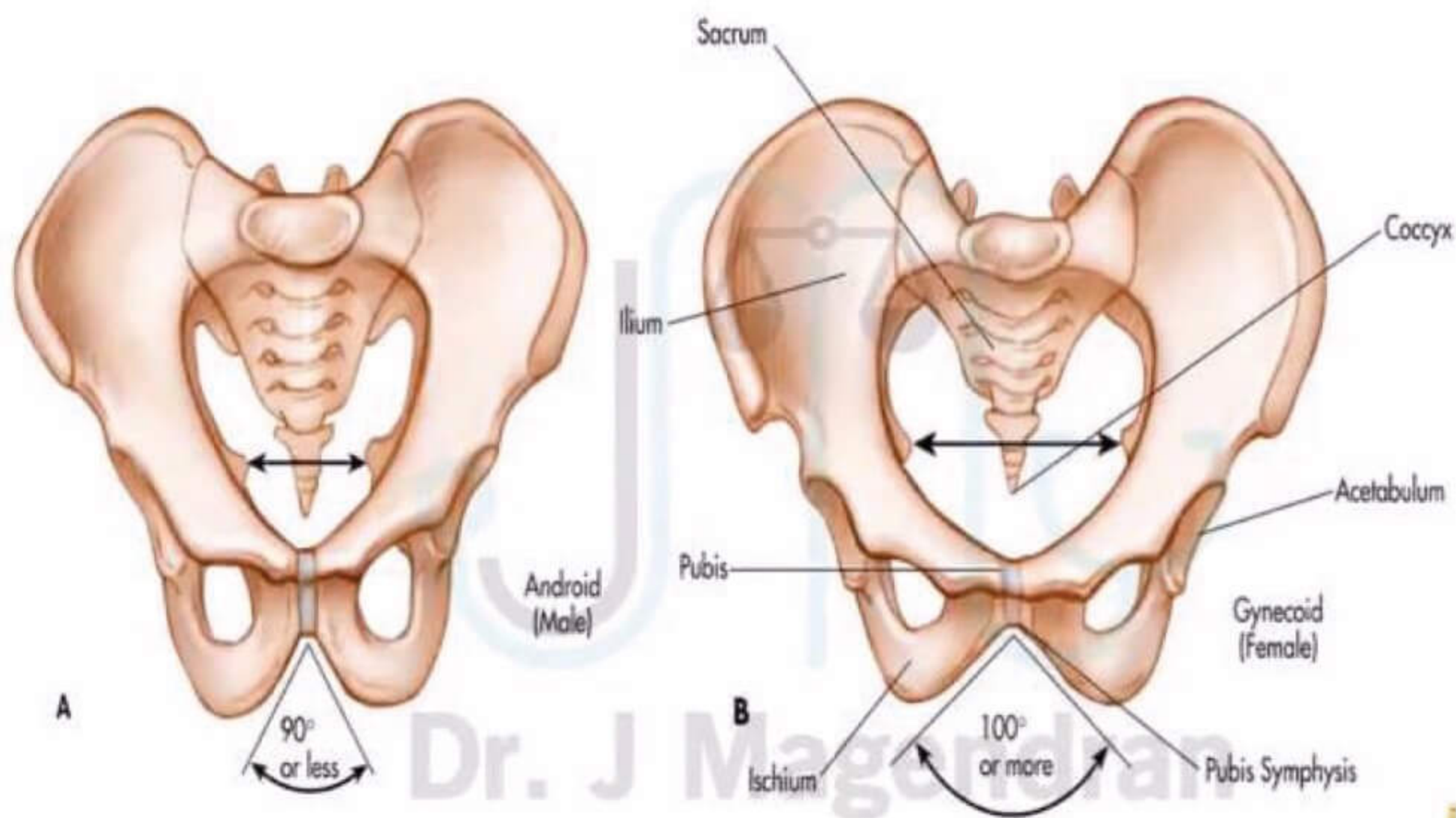
Features	Male	Female
Architecture	Rugged	Smooth
Frontal Eminence	Small	Large
Parietal Eminence	Small	Large
Orbits	Square with smooth margin	Rounded with sharp margin
Fore Head	Steeper	Vertical
Palate	Large, Broader & U shaped	Smaller & Parabola
Occipital Condyle	Large	Small

Features	Male	Female
Glabella	More pronounced	Less Pronounced
Fronto Nasal Junction	Distinct & Angulated	Smooth
Supra Orbital Ridges	Prominent	Less prominent
Mastoid Process	Large & Blunt	Small & Pointed
Zygomatic Arch	More Prominent	Less Prominent
Occipital Protuberance	Well marked	Less marked



Pelvis: Best bone for sex determination.

Features	Male	Female
Pre Auricular sulcus (Evidence of pregnancy)	Narrow, Shallow Not frequent	Broad, Deep More frequent
Sub Pubic Angle	'V' Shaped Acute	'U' Shaped Obtuse
Greater Sciatic Notch (75%)	Narrower & Deeper	Wider & Shallower
Obturator Foramen	Large & Oval	Small & triangular
Greater Sciatic notch	 Deep and narrow	 Wide and shallow
Ischial Tuberosity	Inverted	Everted
Body of Pubis	Triangular	Square
Pelvic Inlet	Heart Shaped	Circular
Pelvic Cavity	Conical & Funnel Shaped	Smooth & Rounded
Sciatic Notch index	4-5	5-6
Ischio pubic index	< 90	> 95



Best parameter to determine sex from pelvis is greater sciatic notch.

Rule of ASHLEY

- Based on sternal length
- Used for Sex determination
- Measurement of sternal length
 - > 149 mm - Male
 - < 149 mm - Female

Sex determination accuracy with bones

- a) Pelvis → 95% - Gives max accuracy
- b) Skull → 90%
- c) Long bones → 80%

to increase accuracy,

combine pelvis + skull or
 pelvis + long bone } gives 98% of accuracy

100% accuracy with complete Skelton.

This is k/a Krugman's accuracy.

(It is for sexing of bones)

→ Best long bone for sex determination: femur

various parameters of femur which help determine sex is → Femoral head diameter – best criteria

Chilotic line index: is also used for sex determination.

it is line extending from posterior part from auricular surface of pelvis up to level of iliopubic eminence.

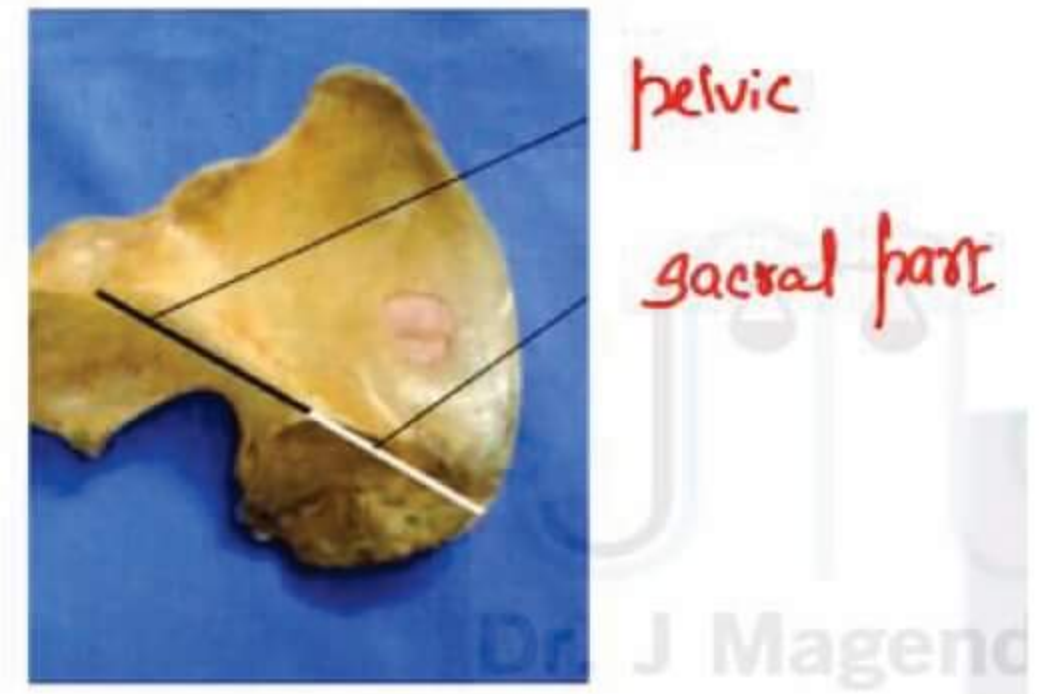
Chilotic line has 2 parts

1. Pelvic part

- Pelvic part
- More prominent in females

2. Sacral part

- Sacral part
- More prominent in males



Chilotic index is given by $\frac{\text{Sacral part}}{\text{Pelvic part}} \times 100$

Index more in male

Index less in female

Summary

2 indices more in males

1) Corporo basal index

2) Chilotic index



HUMAN IDENTIFICATION -2

Age determination: (Parameters)

- 1) Ossification center
- 2) Dentition

In fetus

→ Rule of Hasse, is used to determine gestational age of fetus.

→ Fetal length is used to determine gestational age of fetus.

1st 5 months = $\sqrt{FL} = GA$

2nd 5 months = $FL/5 = GA$ → Morrison's rule

As per, rule of Hasse, fetal length in each month of gestational age.

Organs	Month	Fetal Length	Characteristic development
Limbs	1	1 cm	
	2	4 cm	Limb buds (+)
	3	9 cm	Nail (+)
Hair	4	16 cm	Lanugo (+)
	5	25 cm	Scalp hair (+)
Eye	6	30 cm	Eyelids, Lashes (+)
	7	35 cm	Eyes open
Testes	8	40 cm	Left testis (+)
	9	45 cm	Right Testis (+)
	10	50 cm	

→ By 4th month, sex can be recognized.

Ossification centers

- Primary ossification centre – Forms diaphysis
- Secondary ossification centre – Forms epiphysis

→ secondary ossification centre appears at the end of long bone and it fuses with long bone.

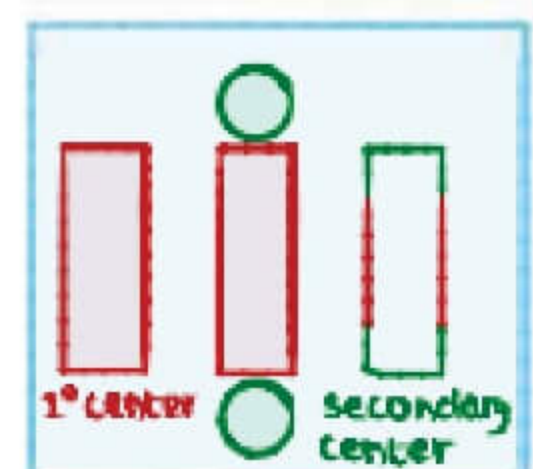
→ 1st ossification center to appear → clavicle

Centers that appear in Intrauterine life

Mnemonic: CTFTC

- 5th month – Calcaneum appears
- 7th month – Talus appears
- 9th month – Lower end of Femur appears
- Term – Upper end of Tibia,
Cuboid appears.

$\frac{C}{5m}$ $\frac{T}{7m}$ $\frac{F}{9m}$ $\frac{T}{Term}$ $\frac{C}{Term}$



Carpal bones

Scaphoid	Lunate	Triquetral	Pisiform
Trapezium	Trapezoid	Capitate	Hamate

Mnemonic:

She Looks Too Pretty
Try To Catch Her

Capitate - 1 st to appear	→ 2 months
Hamate -	→ 3 months - 1 year
Triquetral -	→ 3 years
Lunate -	→ 4 years
Scaphoid -	→ 5 years
Trapezium -	→ 6 years
Trapezoid -	
Pisiform -	→ 9-11 years

Complete fusion of upper limb joints:

- Shoulder joint - 18 years
- Elbow joint - 16 years
- Wrist joint - 18 years

For lower limb joints

- Hip joint - 17 years
- Knee joint - 18 years
- Ankle joint - 17 years

→ In females, the ossification centers fuses, 1 year earlier than normal, due to hormonal changes.

Skull fontanelles

1. Posterior fontanelle closure → 2 to 6 months of life
2. Anterior fontanelle closure → 2 years
3. Metopic suture fuses by → 2 to 8 years

4. Sagittal suture

↓

Divided into 3 points

- Posterior 1/3 → 30 to 40 years
- Middle 1/3 → 50 to 60 years
- Anterior 1/3 → 40 to 50 years

5. Coronal suture



Divided into 2 parts

- Upper half - 50 years
- Lower half - 40 years

6. Lambdoid suture



Divided into 2 parts

- Upper half - 50 years
- Lower half - 60 years

Skull base

Junction between basiocciput with basisphenoid closes / fuses by → 18 to 22 years

Dentition:

- Dental eruption
- Secondary changes

Types of dentition

- (i) Temporary teeth
 - Milk / deciduous teeth
 - Primary
 - 20 temporary teeth

- (ii) Permanent teeth
 - Secondary
 - 32 permanent teeth

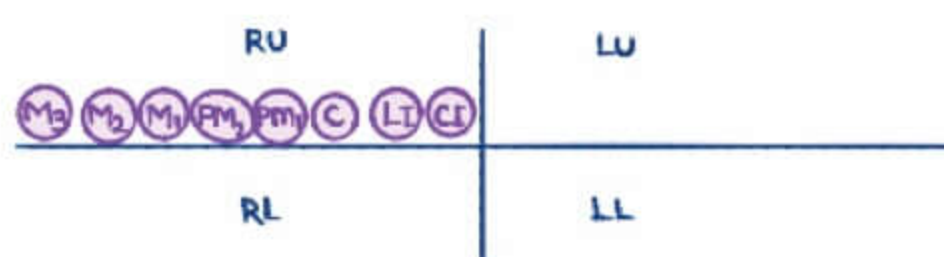
Temporary dentition:



$$5 \times 4 = 20$$

→ There are 5 teeth in each of the 4 quadrants so, that is 20 temporary teeth.

Permanent dentition:



$$8 \times 4 = 32$$

→ There are 8 teeth in each quadrant so, that will be 32 permanent teeth.

Sequence of eruption:**Temporary teeth**

I – 6 months M ₁ – 12 months C – 18 months M ₂ – 24 months	Rule of half dozen
---	--------------------

→ 1st temporary tooth to erupt – lower central incisor

Permanent teeth:

M ₁	Mamma	6 years
CI	Is	7 to 8 years
LI	In	8 to 9 years
MP ₁	Pain	9 to 10 years
PM ₂	Papa	10 to 11 years
C	Can	11 to 12 years
M ₂	Make	12 to 14 years
M ₃	Medicine	17 to 25 years (wisdom tooth)

- Complete temporary dentition → 2 years
- By 12 years all the temporarily tooth is replaced.
- Period of mixed dentition = 6 to 12 years
- Total number of teeth in 6 to 12 years = 24 teeth
- No. of permanent teeth between 6 to 12 years = (Age - 5) × 4

Successional teeth: (12)

- Set of permanent teeth which replaces and comes in place of temporary teeth is called Successional teeth
- CI, LI, C, PM₁, PM₂

Superadded teeth: (20)

- Set of permanent teeth that comes by itself without replacing temporary teeth is superadded teeth.
- M₁, M₂, M₃

- No. of Successional teeth → 20
- No. of superadded teeth → 12

Secondary changes**Boyde's method:**

- Electron microscopic method used in Neonates
- Incremental lines / Haustrations are seen and counted for determining age.

Neonatal line:

- On electron microscopy, cut section of enamel shows neonatal line on 2nd, 3rd day after birth
- It is an indicator of birth.

Incremental Lines

- Rate of incremental lines is 1 line per day
- aka cross striations
- Upto 33 months of age it can be used
- But more reliable during infancy

Gustafson's criteria

- A – Attrition
- P – Parodontosis
- S – Secondary dentition
- R – Root resorption
- T – Transparency of root (Most reliable parameter)
- C – Cementum opposition

Dalitz Formula

- A – Attrition
- P – Parodontosis
- S – Secondary dentin
- R – Root resorption

Lamendin's method: (1992)

- Parodontosis
- Transparency of root

Benefits

- Single tooth
 - No gender difference
- Maximum reliable result seen in 40 to 60 years
- Age estimation by pubic symphysis
- Suchey brook's method

Iscan's method – Sternal end of rib (4th rib)

Dental charting

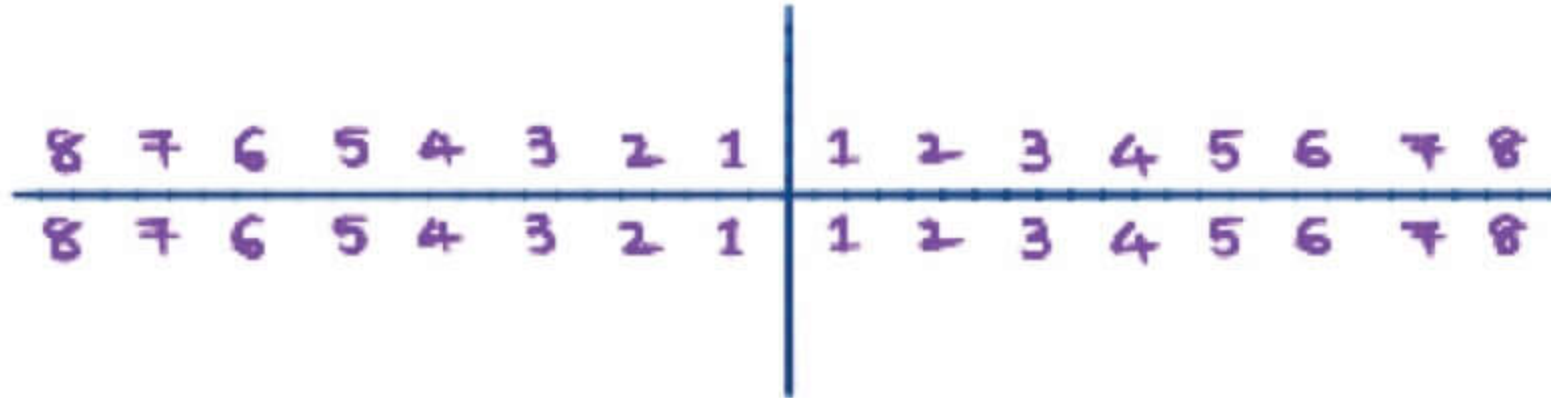
1) Universal (Cunningham's) method

- Continuous adding of numbers from 1 – 32 for Permanent dentition.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

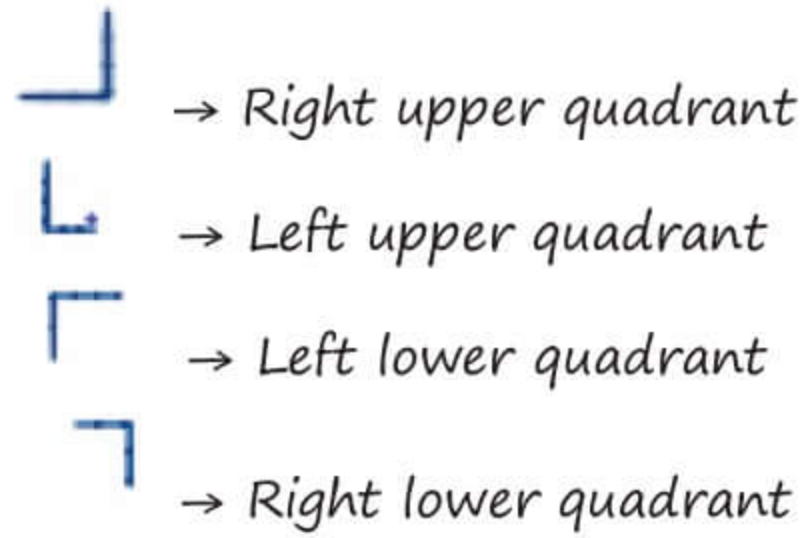
2) Palmer's notation (Zigmondy's system)

→ Addition of numbers from 1 – 8 in each quadrant of Permanent dentition.

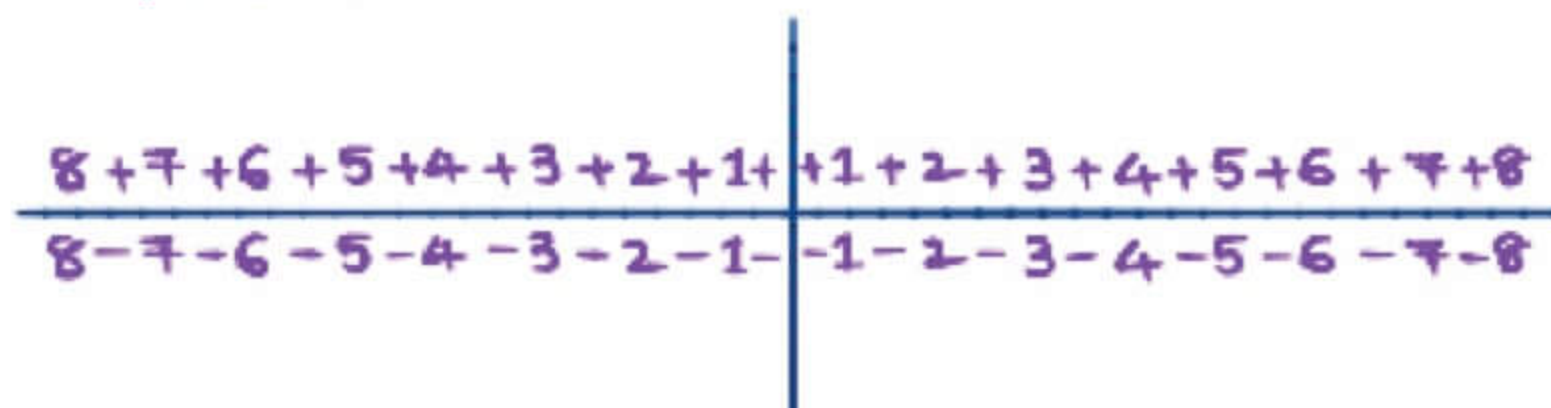


→ Canine in Right Upper quadrant is specified as 3

3 → Canine



3) Hadrup's system



→ Similar to palmar notation

But '+' symbol is used for all teeth of upper jaw &

'-' symbol is used for all teeth of Lower jaw

→ '+' teeth → maxillary teeth

→ '-'teeth → mandibular teeth

4) FDI system (Federation dentaire internationale):

Permanent Teeth															
Upper Right							Upper Left								
18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
Lower Right							Lower Left								

Primary teeth									
Upper Right					Upper Left				
55	54	53	52	51	61	62	63	64	65
85	84	83	82	81	71	72	73	74	75
Lower Right					Lower Left				

→ most widely used

→ aka Two Digit system

→ For Permanent dentition



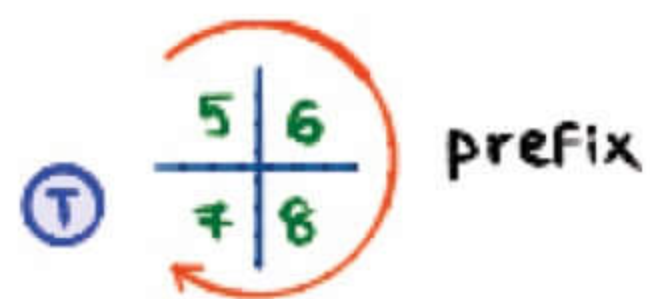
11 - 18 → Rt. Upper quadrant

21 - 28 → Lt. Upper quadrant

31 - 38 → Lt. Lower quadrant

41 - 48 → Rt. Lower quadrant

→ For Temporary dentition



51 - 55 → Rt. Upper quadrant

61 - 65 → Lt. Upper quadrant

71 - 75 → Lt. Lower quadrant

81 - 85 → Rt. Lower quadrant

HUMAN IDENTIFICATION – PART 3

Stature – height of the person

Methods

- Regression formula
- Multiplication factor
- Percentile formula



Hepburns osteometric board

1. Regression formula

- Given by KARL PEARSON & TROTTER GLESSOR
- **HEPBURN's osteometric board** – used to measure the given bone
- Best estimate for stature given by – **FEMUR**

2. Percentile formula – contribution to stature

Femur – 27% of entire stature

Tibia – 22% of entire stature

Humerus – 20% of entire stature

Vertebral column – 35% of entire stature

Skull height – 1/8th of stature

Stature from fragmented bone calculated by

- STEELE/McKERN method
- BIDMOS Method

Medullary Index – diameter of medulla / diameter of cortex
(gender can be known)

Definitive / complete identification

Bertillon system

1. Based on anthropometry

2. Parameters

- Descriptive data – color of hair, eyes, complexion etc.
- Body measurements – 11 measurements
- Body marks – 4 photographs



DACTYLOGRAPHY

Finger prints – impressions produced by dermal papillary ridges on the skin

Dactylography – study of fingerprints



- World's 1st finger print bureau present at – **Kolkatta (1897)**
- **William Hershal** – 1st person used this method
- **GALTON** – classified the fingerprints
- Appears by **12 weeks of IUL**, completely formed by **20 weeks of IUL**

Dactylography is **most reliable** method of identification **because** finger prints

- Not inherited
- Different even in twins

Patterns

Loop – most common

Whorls

Arch

Composite – least common

Types

- Visible prints
- Latent prints – need to develop to make it visible
- Plastic prints – impression of FP can be seen

Permanent alteration in finger prints seen in

1. Leprosy
2. Electrocution
3. Radiation
4. Charring

Fingerprint development

For non-porous surfaces

1. Vacuum metal deposition (VMD) method
 - Thin metals like zinc or gold used in vacuum
 - Most sensitive method
2. Finger print powders

For porous surfaces

1. DFO (1,8 - diaza -9 - Fluorenone) (most sensitive method for porous surface)
2. Ninhydrin
3. Superglue fuming

Minimum points of comparison - 12

LOCARD'S POROSCOPY

- opening of sweat glands
- arrangement of sweat glands is unique
- invented by Locard
- Locard's principle of exchange

exchange of materials present whenever 2 surfaces contact each other



CHELIOSCOPY

- study of lips
- classified by Suzuki into 5 types



Chieloscopy



Rugoscopy



Podogram



Frontal Sinus Patterns



Tattoo marks

RUGOSCOPY/PALATOSCOPY

- study of rugae in hard palate (anterior 1/3rd)
- types of rugae
 1. primary rugae
 2. secondary rugae

PODOGRAM

- study of footprints
- mainly used in hospitals to prove exchange of newborns

IDENTIFICATION BASED ON FRONTAL SINUS PATTERN

TATTOO MARK

- deposition of dye into skin - tattoo mark
- dye deposited in lymph node too
useful in identification
- **DYES (pigments) COMMONLY USED ARE**

1. INDIGO	4. CADMIUM
2. INDIAN INK	5. CARBON
3. COBALT	6. PURSSIAN BLUE
- old tattoo marks can be visualised by UV / INFRA RED light
- **MEDICO LEGAL IMPORTANCE**
 1. Race identification
 2. Religion identification
 3. Place identification
 4. political interest identification
 5. IV Drug abuse identification

SUPER IMPOSITION

- Skull and photograph of missing person are required
- need to find out anatomical landmarks
- more of negative value (exclusion can be done)
- **Types**
 1. Photographic superimposition
 2. videographic superimposition

SEXUAL OFFENCE

Classification

- I. Natural sexual offence.
- II. Unnatural sexual offence
- III. Sexual perversions/ paraphilia

Natural sexual offence	Unnatural sexual offence	Sexual Perversion
Peno-vaginal intercourse	Penis inserted into → Anus → Mouth → Animal	Sexual gratification not by intercourse BUT by any other method
Rape Incest Adultery	Sodomy Bestiality Lesbianism Buccal coitus	

1. Natural sexual offenses

1. Rape

a) Definition: Section 375 IPC

A man is said to commit rape, if

- Penetration of penis – into vagina, anus, urethra, mouth.
- Insertion of object/ body part – into vagina, anus, urethra
- Applies mouth to – vagina, anus, urethra
- Manipulates the body part of victim – for penetration into vagina, anus, urethra

If all these acts done:

- 1) Against her will
- 2) Without her consent
- 3) Consent d/t fear of death/ hurt
- 4) Consent d/t impersonation/ fraud
- 5) Consent d/t insanity, intoxication, influence of any drug.

- 6) Consent given < 18 year of age
- 7) Unable to communicate her consent

Exception:

Any kind of medical intervention shall not constitute rape.

SUMMARY:

- 1) Min age for giving Consent → 18 years
- 2) Sex with a girl < 18 years = **statutory rape**
- 3) As per 375 section, only males will be prosecuted for rape

[Exception: gang rape – female prosecution is possible]

- 4) Penetration: To any extent (even slight touch to labia majora)

B) Punishment: Section 376 IPC

376 IPC

- 1) Minimum punishment: 10 years
- 2) Rape under special circumstances
 - i) Custodial rape
 - ii) Rape during communal violence
 - iii) Rape of pregnant women
 - iv) Rape by armed forces
 - v) Rape on Same female repeatedly
- 3) Rape of girl < 16 years

376 IPC

- A) Rape victim – comatose/ dies/ persistent vegetative state
- AB) Rape of a girl < 12 years.
- B) Sex with wife by husband during separation forcefully [no punishment of marital rape]
- C) Sex by a person in authority
- D) Gang rape

DA) Gang rape of a girl < 16 years

DB) Gang rape of a girl < 12 years

E) Rape of repeat offender.

C) Examination: of accused & victim

Accused:

53 (A) crpc: Examination of rape accused.

→ Under request of police: min shld be sub-inspector.

→ Even using reasonable force.

54 crpc: Examination of rape accused at his own request.

Victim Examination:

No consent ↔ No examination.

→ 164 (A) crpc: Medical examination of Victim.

Test done for victim:

Toluidine blue Test: (TBT)

→ Recent micro injuries are seen.

Test done for Accused:

Lugol's iodine Test

→ Finds out vaginal epithelial cells:

→ Method: Swab from glans penis → expose to Iodine vapor → Brown color

↓

Confirms 'positive' Test: presence of vaginal epithelial cells.

→ Test C/B done up to 4th day.

327 (2) Crpc: In camera trial.

327 crpc: open verdict: accessible to public/ press.

Almost all cases are open verdict/ court

Exception: Rape → conducted In camera.

327(2) crpc: Rape trial conducted inside the closed chamber public/ press cant access without permission.

Burden of Proof:

Burden of proof: Accused has to prove valid consent was attained.

II. Adultery

“A male having sexual contact with another married female”

→ Not a crime

→ It can be ground for divorce.

III. Incest

→ Sexual intercourse with Blood relations

→ Incest is not punishable

- Oedipus complex: Relation b/w mother & son
- Electra complex: Relation b/w father & daughter
- Pharaon Complex: Relation b/w brother & Sister

2. Unnatural sexual offences [Against order of nature]

Punishable under 377 IPC

i) Lesbianism/ Tribadism: Female – Female

- Active partner → k/a dyke
- Passive partner → K/a femme

ii) Sodomy/ Greek love/ Buggery [GBS]

- It is penile – anal intercourse
- Passive agent: is elderly person → k/a Gerontophilia
- Passive agent: is child → K/a pederasty

↓

K/a catamite

→ sodomy not punishable

→ consensual sodomy b/w 2 adults.

iii) Buccal coitus/ oral sex/ Sin of Gomorrah.

Oral stimulation of penis -**Fellatio**

Oral stimulation of vagina -**Cunnilingus**

iv) Bestiality

Sex with animal: common animals used are lower goat, sheep, cow [spermatozoa in anus of animal]

3. Sexual paraphilias [no intercourse sexual gratification WITHOUT intercourse]

1. **Sadism**: Sexual gratification by infliction of pain

2. **Masochism**: Sexual gratification by suffering of pain.

3. Combination of 1 & 2: k/a **Bondage**.

4. **Exhibitionism**: SEXUAL GRATIFICATION by showing his private parts in public place.

- i) Flashing
 - ii) Streaking
 - iii) Moaning
- } are types of exhibitionism

5. **Voyeurism (Peeping Tom)/ Scotophilia**: Punishment 354 (C) IPC by watching the private acts of female

6. **Fetichism**: sexual gratification with inanimate objects

7. **Frotteurism**: sexual gratification with rubbing the private parts of a female

8. **Transvestism/Eonism**: sexual gratification by wearing dress of opposite sex most commonly seen with males.

9. **Necrophagia**: Eating dead bodies

10. **Necrophilia**: Sex with dead bodies

} Punishment 297 IPC

11. **Partialism**: Has affinity towards one particular body part

12. **Coprophilia**: sexual gratification by sight/ smell of feces.

13. **Urophilia/ Undinism**: sexual gratification by sight/ smell of urine.

14. **Ipsation/ Onanism:** Masturbation → in public place it is punishable.

15. **Klismaphilia^Q:** Sexual gratification by enema to himself.

16. **Triolism:** Three/ group sex

17. **Bobbit syndrome:** Female partner cuts the genitalia of male partner.

18. **Lust murder:** To have Sexual gratification Male will kill the female

19. **Sexual asphyxia:** Sexual gratification on partial occlusion of neck → cerebral ischemia → causes erotic hallucination → person achieves Sexual gratification commonly practiced by male.

PREGNANCY, IMPOTENCY, ABORTION & VIRGINITY

→ **Impotency**

Inability of a person to achieve & maintain penile erection.

MCC: Psychological

→ **Impotence Quad HANC:** impotence towards particular woman. Aka psychogenic impotency.

→ **Frigidity:** Sexual coldness: female impotency.

→ **Sterility:** Inability to reproduce children can be seen in bout Female/ male.

→ Increase sexual desire

- Male → satyriasis
- Female → Nymphomania

ART [Artificial reproduction Techniques]

1. Artificial insemination [AI]:

→ Artificial introduction of semen into female genital Tracts

→ Semen can be form

- Husband → AIH: impotency, Indication anal defect, cervical stenosis
- Donor → AID: Disease – HIV, Heredity Single female, lesbians
- Pooled (Both Husband & Donor) → AIDH: husband has oligospermia

→ **General Requirements**

1. Consent from couple (both Husband & wife)
2. Identity should not be disclosed (both recipient & power)
3. Same doctor should not conduct delivery.

→ **Prerequisites for Donor selection**

1. Age < 40 years
2. Should have children
3. Absence of any disease
4. Preferably be of same blood group.
5. Same race
6. Donor should be unrelated to couple.

→ **Medicolegal importance**

1. Child born is illegitimate/ it can be adopted
2. it doesn't amount to adultery
3. Ground for Nullity male impotent/ divorce without consent of husband
4. Remote chance of incest.

→ **Dissolution of Marriage (as per Hindu Marriage Act)**

3 situations in marriage		
Null & Void [Never existed]	Voidable [one party can apply for nullity]	Divorce [Wife is eligible for alimony]
1. One party has living spouse or 2. Prohibited relationships of family.	1. Impotence 2. Insane either @ time of marriage 3. Consent by fraud 4. Wife was pregnancy by other person	1. Adultery 2. Cruelty 3. Desertion (2 years) 4. DS - Leprosy Venereal DS } 3 years 5. Not heard to be alive continuous for 7 years

Virginity

→ Person who has not experienced sexual intercourse.

→ Signs of Virginity

- Intact hymen
- (N) fourchette & posterior commissure
- narrow vagina with rugosity

→ Types of Hymen

Mc types – semilunar/ crescentic

→ Causes of hymen rupture

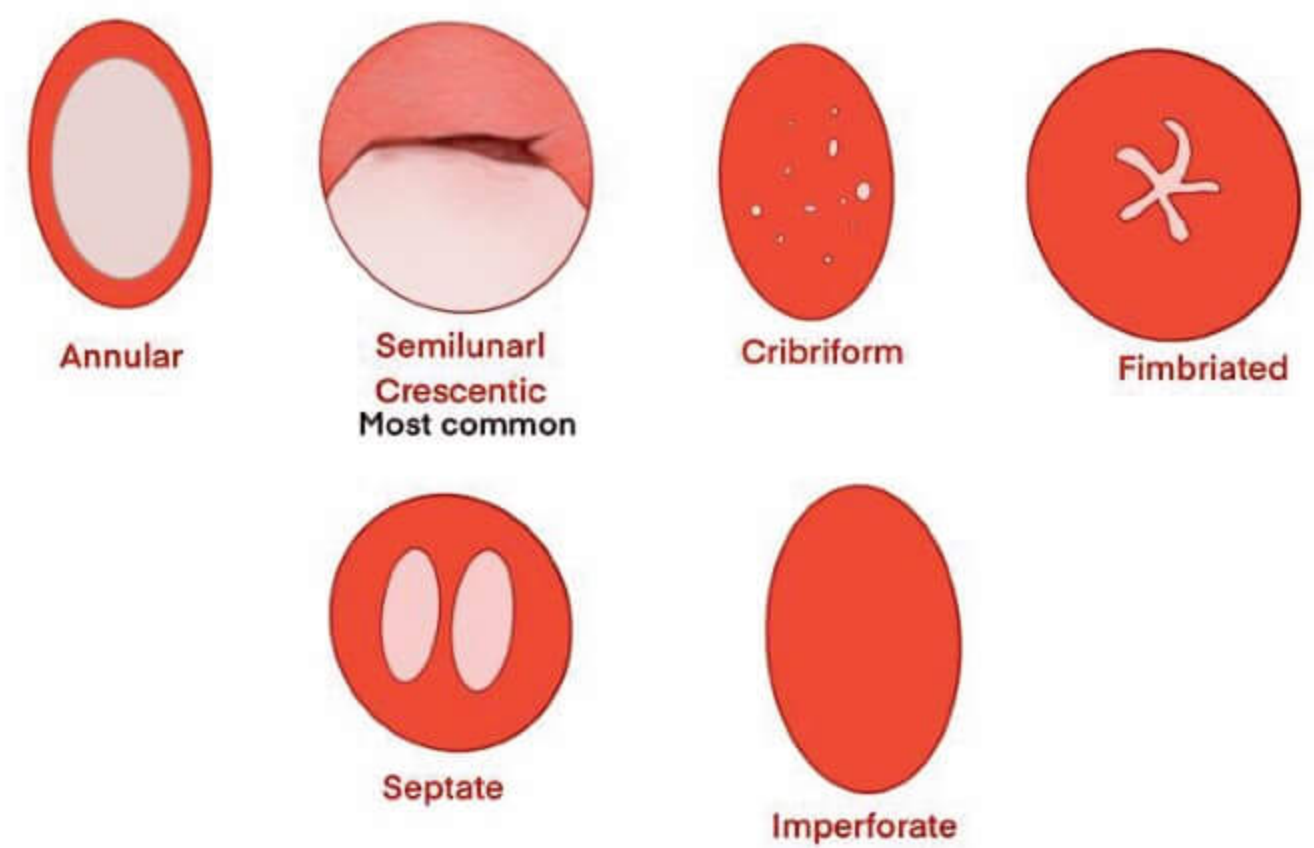
1. Sexual intercourse
2. Masturbation
3. Trauma
4. Surgery
5. Sanitary tampons
6. Solapith → used for female child to increase vagina size.

→ Defloration

loss of virginity

→ Signs of Defloration

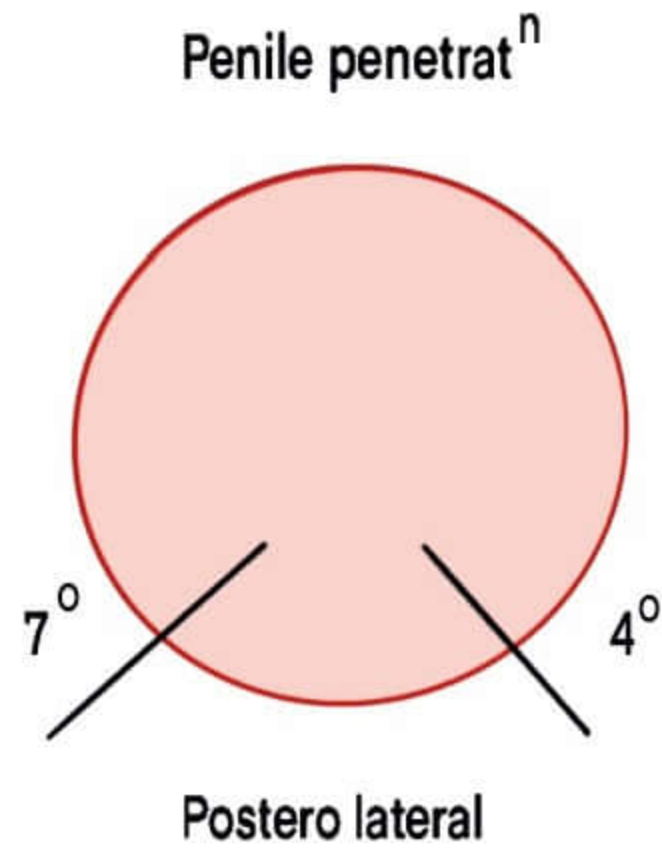
- Absolute sign of defloration → Hymenal rupture.
- Hymen rupture may not be seen in
 1. Female child → as hymen is deep seated/ under developed.
 2. False Virgin → Female have intact hymen after intercourse, as hymen could be thick, loose, elastic



→ *Site of hymen rupture*

Due to penile penetration

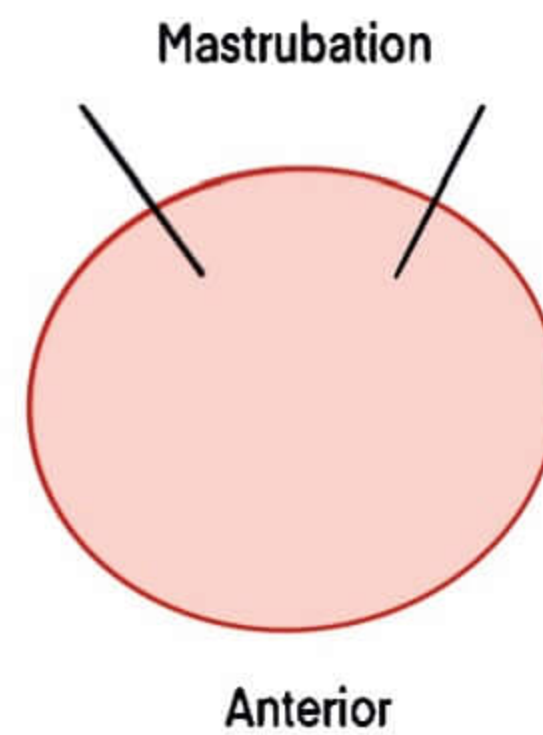
Site: Postero lateral



Between 4° to 7° o'clock

Due to masturbation

Site: Anterior



Signs of Pregnancy

→ *Presumptive*

→ *Probable*

→ *Positive/ definitive/ Confirmatory signs*

1. *Palpation of fetal parts*
2. *Palpation of fetal movement*
3. *Auscultation of fetal heart sound.*
4. *Placental souffle*
5. *X-ray: Fetal part present*

→ *Crescentic shadow*

→ *Small dots in linear arrangement*

→ *Parallel lines*

→ *Linear shadow of limbs.*

*Any other signs apart from this C/B
presumptive & probable signs*

6. *USG*

Spurious/ Phantom/ Pseudocyesis pregnancy

→ It is seen in female nearing menopause or young female intensely desiring a child

→ This condition is d/t hormonal imbalance/ psychological disturbances.

[Female believes she is pregnancy → will also show subjective signs of pregnancy i.e. presumptive & probable on USG no fetus inside uterus]

[Female may also show abdominal distension d/t fat deposition], if not dx – patient may go through full term of pregnancy, may even have false labor pains.

Super fecundation

→ Fertilization of 2 ova in same ovarian cycle by 2 separate acts of coitus same male or different male.

→ Very rare phenomenon

Legitimate child (sec 112 IEA)

Child born during the continuance of a legal marriage (or) within 280 days. After the dissolution of the marriage by divorce or death of the husband & the mother remaining unmarried.

Suppositious child [Fictitious child]

A child produced by a woman who claims it as her own, but not her child

Posthumous child

Child born after the death of father

Atavism

Child resembles the grand parents

Lochia

It is a sign of recent delivery

Types of Lochia

a) Lochia rubra

b) Lochia serosa

c) Lochia Alba

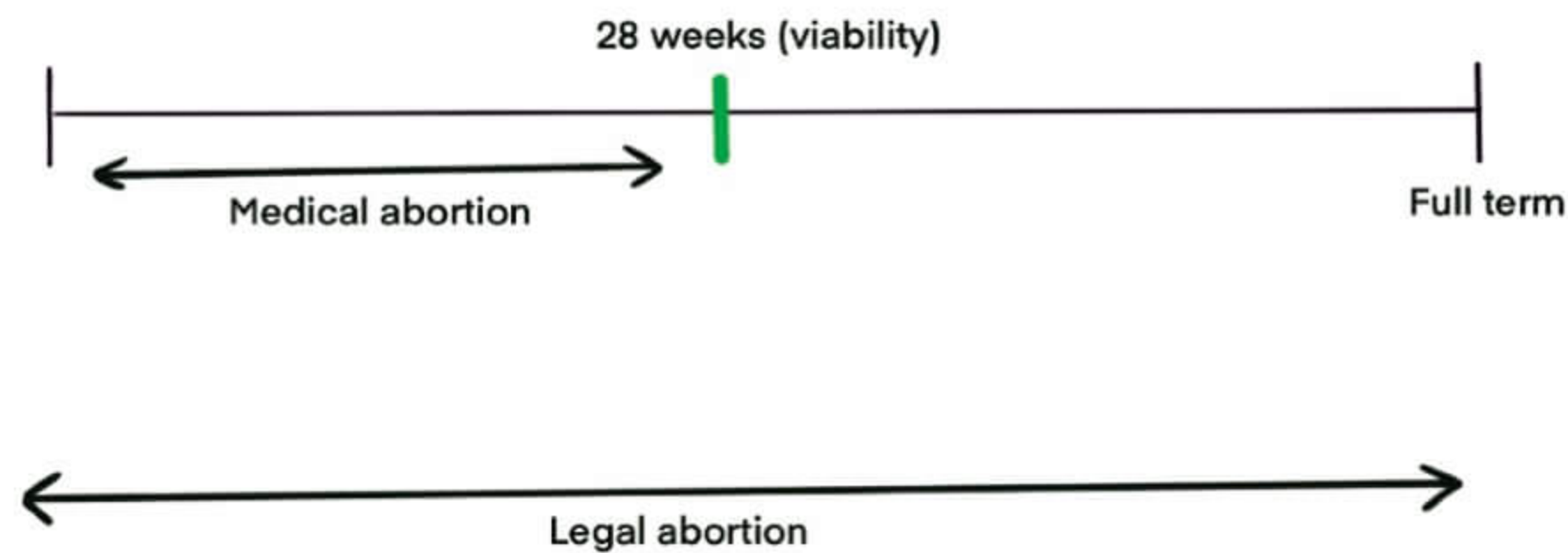
Mnemonic for order "RSA"

RSA → Republic of South Africa

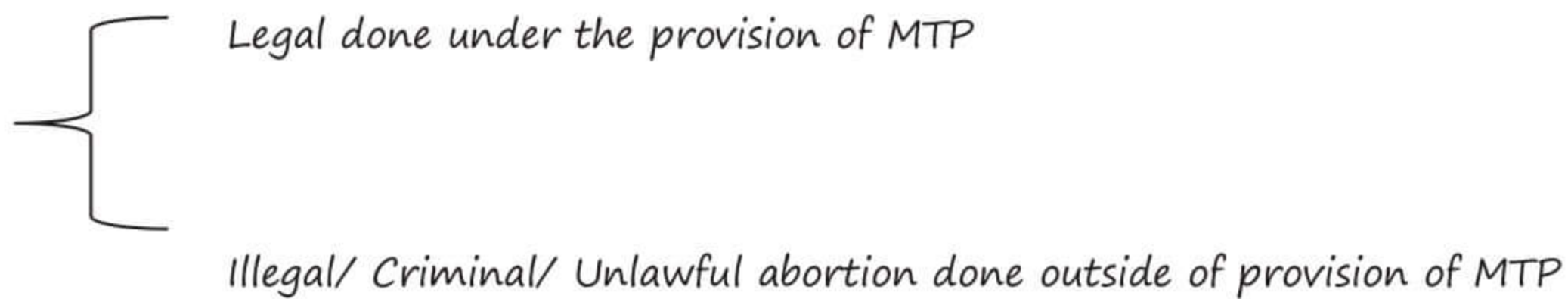
Abortion

Medical definition: Spontaneous or induced expulsion of product of conception before viability.

Legal definition: Expulsion of products of conception from the uterus at any period prior to full term.



Abortion



MTP Acts 1971		Specifies
MTP act	→ Passed in parliament	When & where
MTP RULES	→ made by central govt.	Who
MTP regulation	→ by state govt.	Procedures in recording, reporting punishment

Indications of MTP

1. Therapeutic → Risk of physical/ Mental injury to mother
2. Eugenic → Exposure X-ray, teratogenic drugs, Torch
3. Humanitarian → Rape
4. Socio economic → Failure of contraception

Where can MTP be conducted?

→ In hospitals Established/ maintained by govt./ or place approved by authority

When can MTP be conducted?

- < 12 weeks - 1 doctor
- 13-20 weeks - 2 doctor opinion
- > 20 weeks - not done, except in emergency

Eligibility criteria of conducting MTP

→ Doctor with

- Diploma/ degree in OBG
 - 6 months internship in OBG
 - 1 Year experience in obg. dept.
 - Done 25 cases of MTP, out of ≤ 5 cases are done in place approved by govt. → < 12 week
- } can conduct MTP < 20 week

Consent

- Is obtained in form (e)
- Min age for getting consent: 18 years
- If girl < 18 year = Consent from legal guardian, & preserve products of conception & intimation to police.
- Husbands consent → not necessary

Reporting

- Hospital has to maintain records at least for 5 years
- Every month – monthly report submitted to CMO of the area.

Criminal Abortion

Induced expulsion of the fetus from the mother womb unlawfully & when there is no therapeutic indication.

Methods adopted for criminal abortion

1. Mechanical violence
2. Abortifacient drugs
3. Instruments

Abortifacients drugs

1. Ecbolics

→ Act directly on the uterus & increases uterine contraction → resulting in abortion

Eg: Ergot, Quinine, $Kmno_4$ tablet, lead pills, strychnine.

2. Emmenagogues

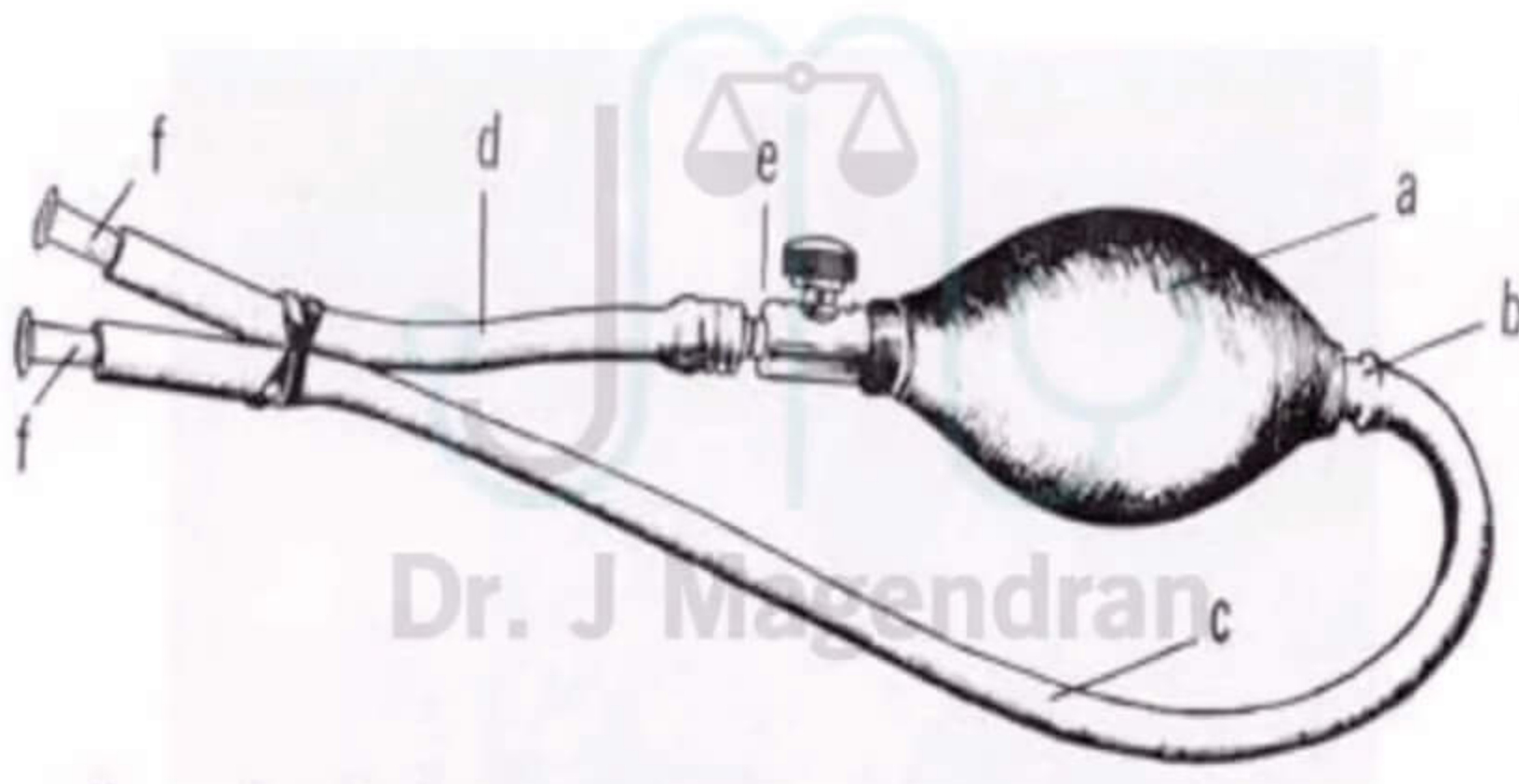
→ Produce increased menstrual blood flow

→ Act as abortifacient in large doses

Eg: Savin, Borax, Prostaglandins, Estrogens

Instruments

1. Those causing rupture of membrane
2. Those causing deletion of cervix (slippery Embark)
3. Abortion stick (12-15 cm)
4. Paste
5. Syringing → Higginson's syringe



Cause of death in criminal abortion:

1. Immediate causes

- Hemorrhage
- Perforation
- Vagal shock
- Fat embolism
- Air embolism

2. Delayed causes

- Generalized peritonitis
- Septicemia, pyemia

→ Toxemia

Sections & Punishments: Woman/ mother (abortion)

Sec 312 IPC: consent

Sec 313 IPC: without consent

Sec 314 IPC: Death of the mother

Sec 315 IPC: Act done to prevent the child from being born alive or cause it to die after birth.

Sec 316 IPC: Death of the quick unborn child & death of the woman (offender known the act was likely to cause death)

INFANT DEATHS

→ **Infant:** Child < 1 years.

→ **Infanticide:** Killing of infant.

→ **Neonaticide:** Killing of a neonate.

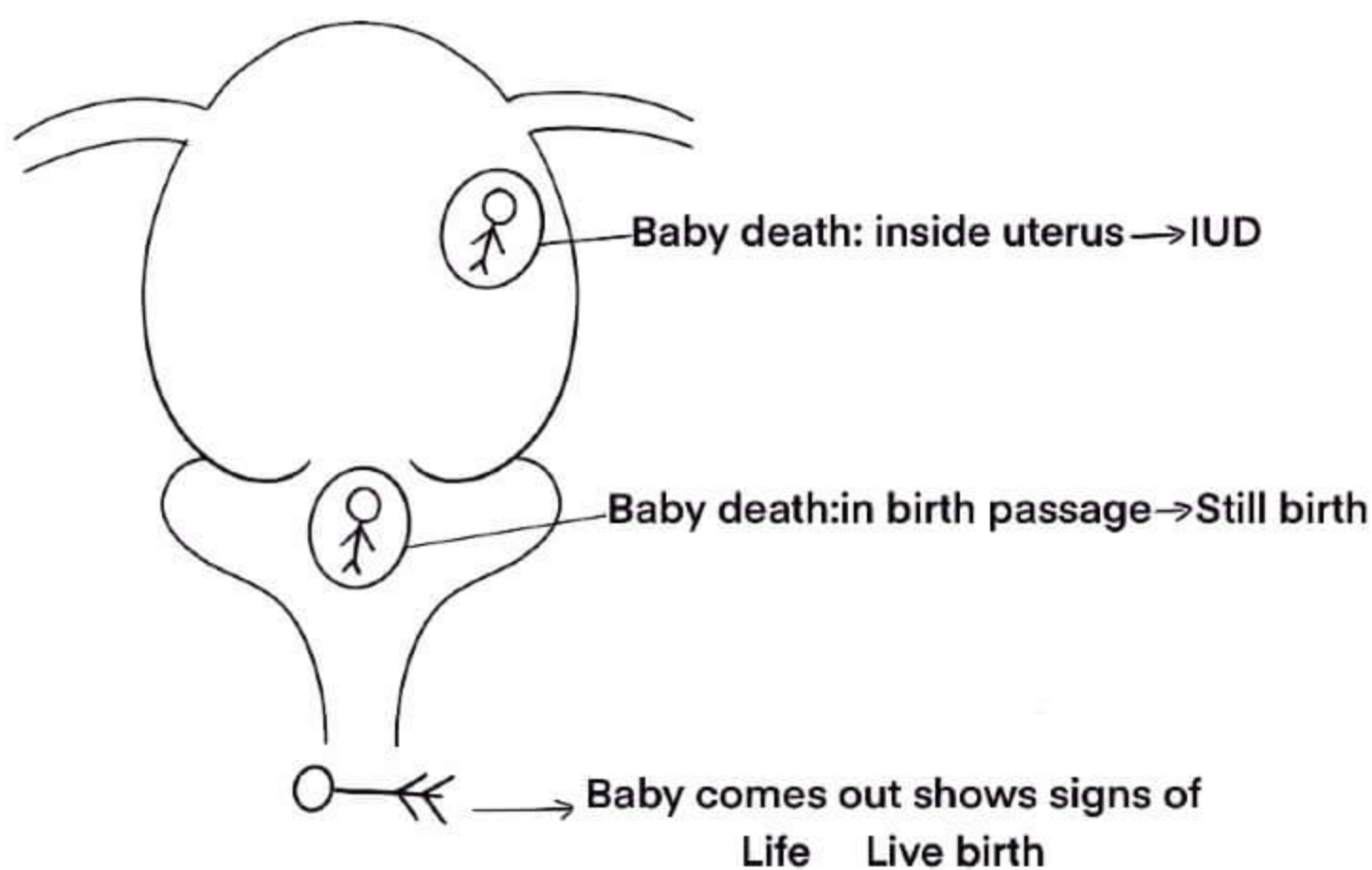
→ **Filicide:** Killing of fetus by parents

→ **Viability:** Ability of fetus to live separate existence apart from its mother.

It comes by virtue of its development.

Period of viability: 28 weeks / 7 months.

→ Infanticide has no separate Law. Accused will be punished under same law as for murder. i.e. 302 IPC.



Signs of viability

→ Count to heel length (by rule of HAASE) → 35 cm.

→ Eyelids open/ papillary membrane disappears.

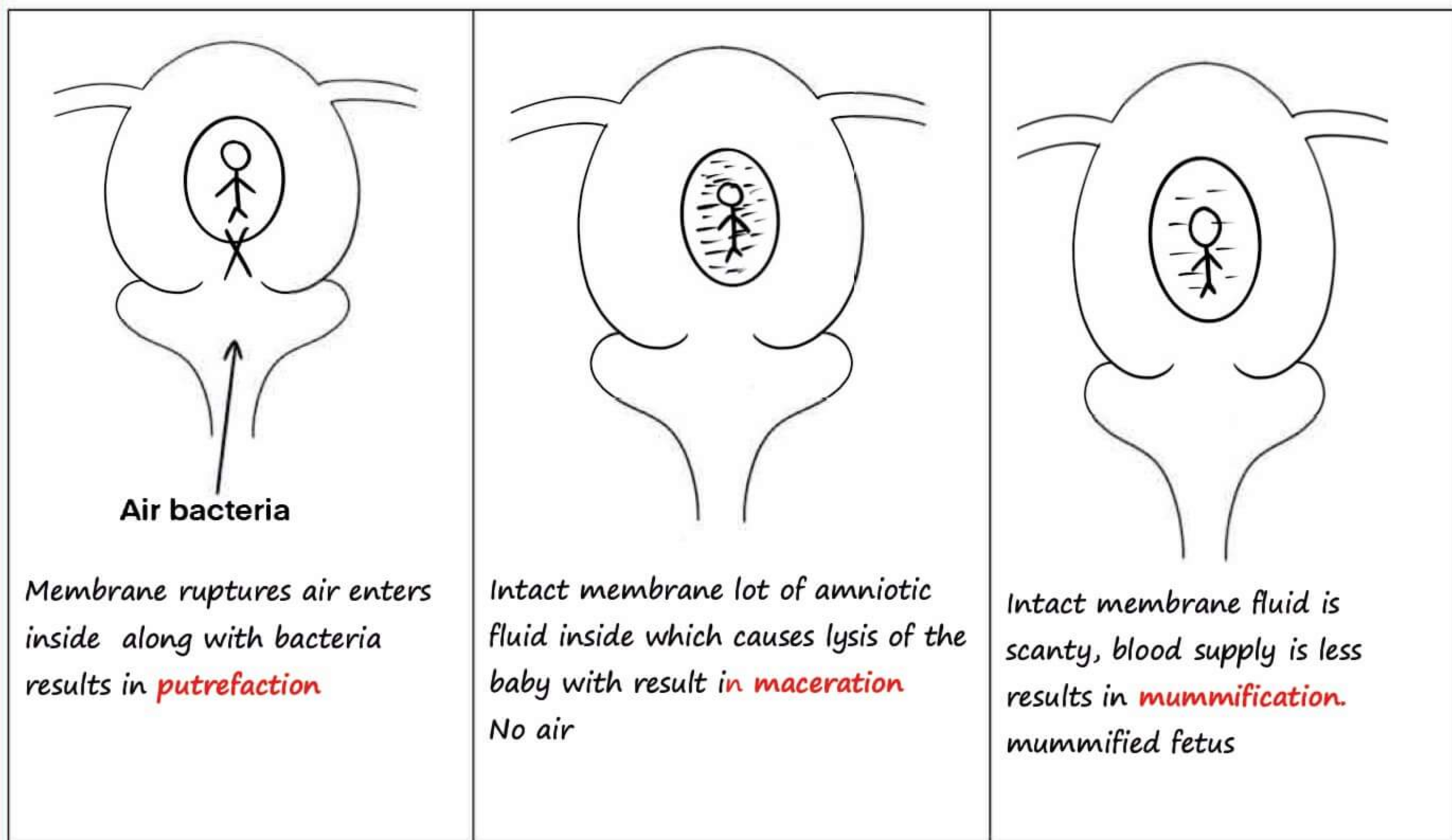
→ Ossification centers → Talus, Sternum

IUD signs [if just born fetus shows any of these signs means it died inside uterus]

M: Maceration:

M: Mummification:

M: Rigor Mortis:



MACERATION: Is an e.g. of autolysis [Lysozyme digest itself] aka. aseptic autolysis (as without bacteria)

Signs

- 1) Skin slippage (earliest sign as early as 12 hrs)
- 2) Skin blebs
- 3) Abdominal bloating
- 4) Hypermobility joints
- 5) Ammoniacal Smell



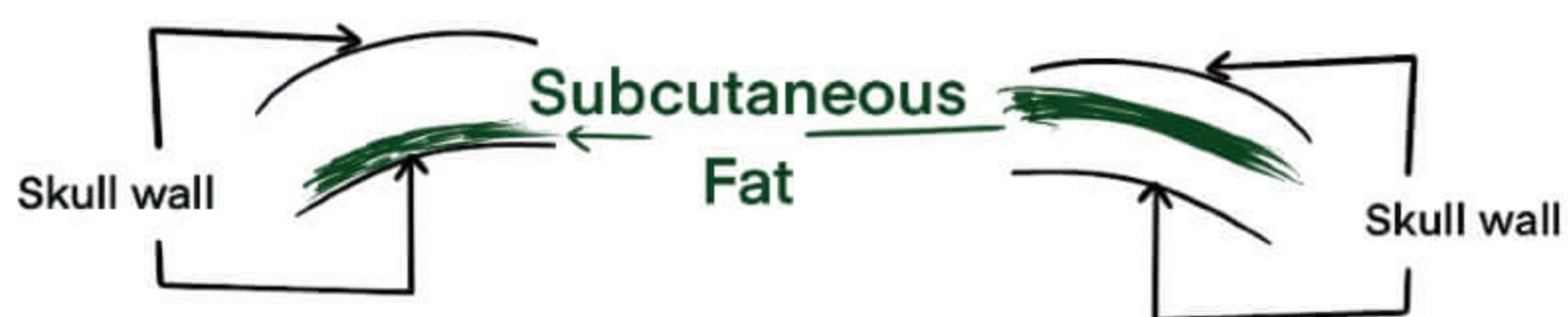
Radiological Signs:

1) **Robert Sign:** Presence of gas shadow in chambers of heart & great vessels (aorta)

→ Earliest radiological sign as early as 12 hours.

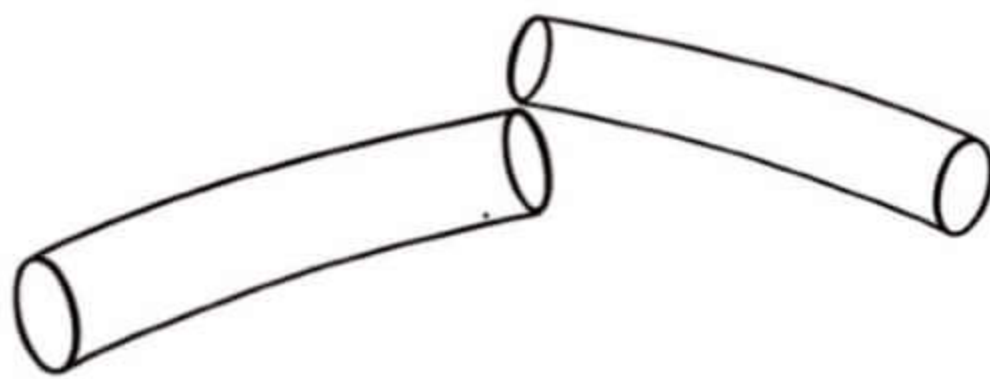
2) **Ball's Sign:** Hyperflexion of spine of body. fetus curves like a ball

3) **Dual Halo sign:** After fetal death the subcutaneous fat in scalp separates from the skull wall



It is seen from 3rd day onwards.

4) **Spalding's sign:** In IUD → Shrinkage of cerebrum → Vault bones override each other



Grades of maceration

Stage 0: Reddened skin

Stage I: Skin slippage/ peeling of skin

Stage II: Extensive blistering along with peeling

Stage III: Mummification of fetus.

→ Based on appearance of fetus we can find time since death.

At 6 hours: Skin desquamation > 1 cm

At 12 hours: Skin desquamation face, back, abdomen.

At 18 hours: Skin desquamation 5% BSA

At 24 hours: Skin desquamation is generalized.

At 2 weeks: Mummification

Tests for live birth:

[Objective of autopsy in dead fetus → is to know if baby respired or not]

1. Level of diaphragm

→ Not respired: 3/4th ribs

→ Respired: 6th ribs

2. Fodere's test: Check weight of both lungs.

→ Not respired: 30 gm

→ Respired: 60 gm (weight ↑ d/t ↑ vascularity)

3. Plocquer's test: Check ratio = $\frac{\text{Weight of lung}}{\text{Weight of baby}}$

1:70 On respiration → 1:35

4. Wreden's test: Checking of middle ear

Presence of gelatin → Baby not respired properly

Presence of air → Baby respired

5. Breslau's Second life test

→ It is stomach bowel test

→ Place the stomach in bowl of water

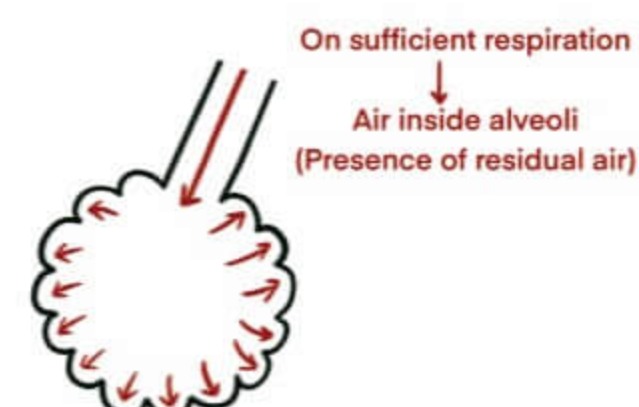
- Sinks: Not respired
- Floats; Baby respired → swallowed air → Presence of air in stomach.

6. Hydrostatic test/ Raygat's test

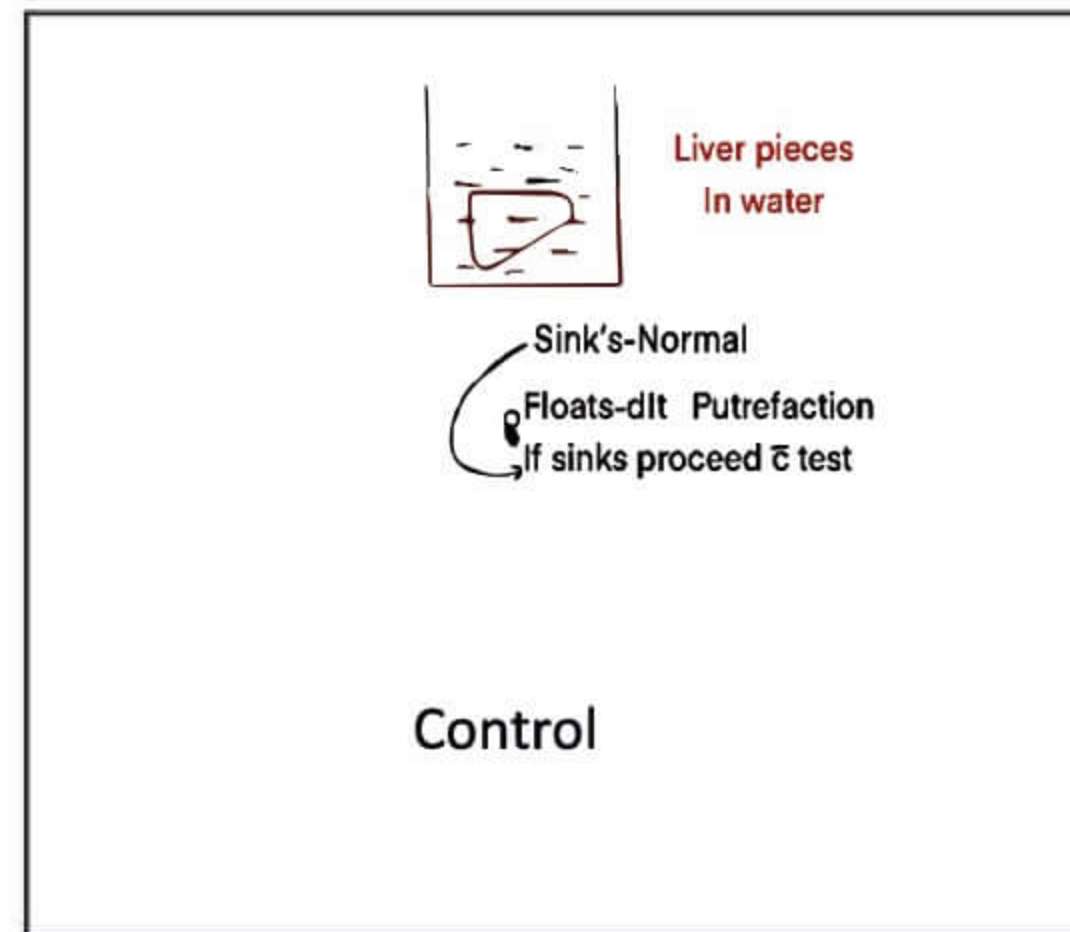
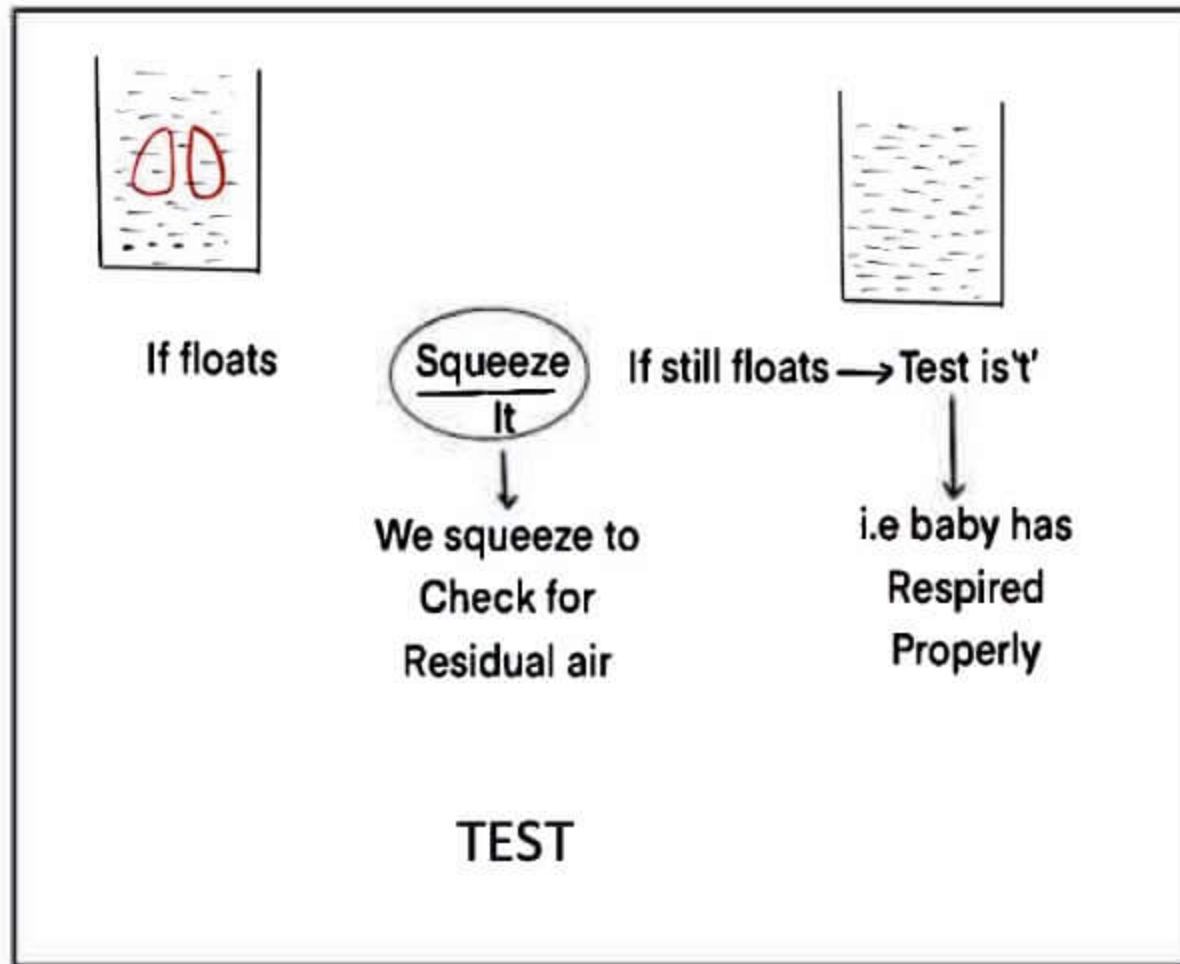
→ It is lung floating test

→ Lungs

Unrespired Lung: specific gravity: 1.04



Respired lung: specific gravity: 0.940



<i>False positive</i>	<i>False negative</i>
Baby not respired still lungs pieces float	Baby respired but lungs do not float.
d/t i) Putrefaction [we are control with liver] ii) Artificial ventilation	d/t i) Atelectasis ii) Lung infection – pneumonia iii) Pulmonary edema iv) Feeble respiration

→ Vagitus vaginalis: It is cry of baby in vagina.

→ Vagitus uterinus: It is cry of baby in inside uterus

Umbilical cord changes after birth

S → 2 hours - Clotted blood in umbilical cord

I → 1 day - Shrunken cord.

M → 2 days - Inflammatory ring around cord

Falls → 3 day - Mummified cord

5 day - Cord falls

10 day - Cord heals with a scar.



TRACE EVIDENCES

TEST FOR BLOOD STAINS

PRESUMPTIVE / SCREENING TESTS	CONFIRMATORY TESTS
Sensitivity ↑ (1 in 10^5 dilutions)	Sensitivity ↓
Specificity ↓	Specificity ↑
False positives are common	False negatives are common

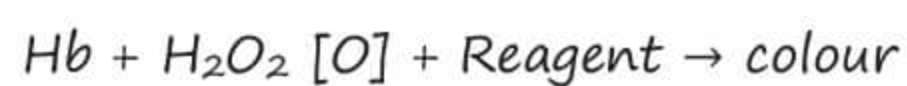
PRESUMPTIVE / SCREENING TESTS

Types

- i) COLOUR TEST
- ii) LUMINESCENCE TEST

i) COLOUR TEST

Principle → Hb [[Heme] contains peroxidase property (r/f color)



1. **BENZIDINE TEST/ ADLER'S TEST** → **Blue** → Positive
2. **PHENOLPHTHALEINS TEST/ KASTLE MYER TEST** → **Pink** → positive
3. **ORTHO TOLUIDINE TEST** → **Blue** → positive

ii) LUMINESCENT TESTS → Useful for washed stains

1. LUMINOL SPRAY
2. UV LIGHT

CONFIRMATORY TESTS

i) MICRO CRYSTAL TEST

ii) SPECTROSCOPY

iii) MICROSCOPY

i) MICRO CRYSTAL TEST

Principle

Stain with Heme → Heme derivatives (crystals) → examined under microscope

1. TEICHMANN'S TESTStain (Heme) + Teichmann's reagent → **Brown rhombic crystals** → Hemin crystalsStains (Heme) + Takayama reagent → **Pink feathery crystals** → Hemochromogen**ii) ABSORPTION SPECTROSCOPY**

→ Used for recent or old stains

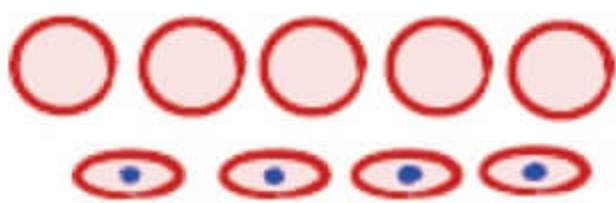
→ most reliable test for blood stains

→ Multiple Hb bands are produced

iii) MICROSCOPY

→ Human RBC → Circular, concave, non-nucleated cells

→ Animal RBC → Oval, biconvex, nucleated cells

**SEMINAL STAINS****NORMAL CONSTITUENTS OF SEMINAL FLUID**Per ejaculate → (N) volume → **2 - 6 ml****SEMEN** → White, viscous, sticky/ odour

Cellular	Acellular (enzymes)
Sperm cells	Seminal vesicle → Choline
→ Every ml contains 60-150 millions cells	Prostate → Spermine
→ 90% motile	→ Acid phosphatase

<p>→ In vivo motility</p> <p>Vagina → 6-12 hrs</p> <p>Uterus → 3-5 days</p>	Bulbourethral gland secretions
---	--------------------------------

SEMINAL STAINS

- seen on cloth or scene or crime
- Starch, pus, vaginal / nasal secretions \equiv semen

SEMINAL STAIN EXAMINATION

- i) Physical examination
- ii) Chemical examination
- iii) Enzymatic studies
- iv) Antigens
- v) Microscopy

i) PHYSICAL EXAMINATION

→ dried stain (cloth)

- Grayish white/ yellow
- Starchy, irregular in outline]
- Mousy odour

→ Under UV light

- Florescence (bluish white)
- d/t choline
- False positive

Starch, vaginal / nasal secretions

ii) CHEMICAL EXAMINATION

1. FLORENCE TEST

→ Non specific test

Stain extract (choline) + Florence reagent → Dark brown rhombic crystals (choline iodide)

2. BARBERIDS' TEST

→ d/t spermine

→ Non specific test

Stains extract + Barberio's reagent → yellow needle crystals (spermine picrate)

3. ACID PHOSPHATASE TEST/ BRENTAMINE TEST

→ Purple colour → positive

→ Qualitative test

iii) ENZYMATIC TESTS

1. ACID PHOSPHATASE TEST

→ Qualitative test

→ 340-360 Bu/ml → Normal

→ > 100 BU → Suggestive of sexual intercourse in < 12 hrs

2. CREATINE PHOSPHO KINASE (CPK)

→ 660 IU/ml

→ Non specific

→ can detect both recent & old (upto 6 m) stains

iv) ANTIGENS

→ Advantages

1. Even positive in Azoospermic semen
2. Specific to human serum

Tests

1. PROSTATIC SPECIFIC ANTIGEN (PSA) (P30) (highly suggestive)

2. MAB 4 EB TEST

→ 4 EB → Sperm coating antigen

→ Mab → antibody

3. SEMINAL VESICLE SPECIFIC ANTIGEN (SVSA)

→ can detected using MHS – 5 antibody

4. SEMINOGLIN – I

Secreted from seminal vesicles

SEMINOGELIN – II

5. SPERM SPECIFIC LDH

→ LDH – C4

Seminal specific

→ LDH – X

V) MICROSCOPY

→ Presence of 1 intact spermatozoa → confirmatory

→ STAINS USED

1. Christmas tree stain (commonly used)
2. Baechi stains
3. Papanicolaou's stain
4. Giemsa stain

TRICHOLOGY

→ Study of hair

→ STRUCTURE

1. Root with root sheath
2. Shaft
3. Tip

→ CUT SECTION

1. Cuticle with scales

→ Outermost

→ scales arrangement

- Coronal (animal)
- Spinous (animal)
- Imbricate (Human)

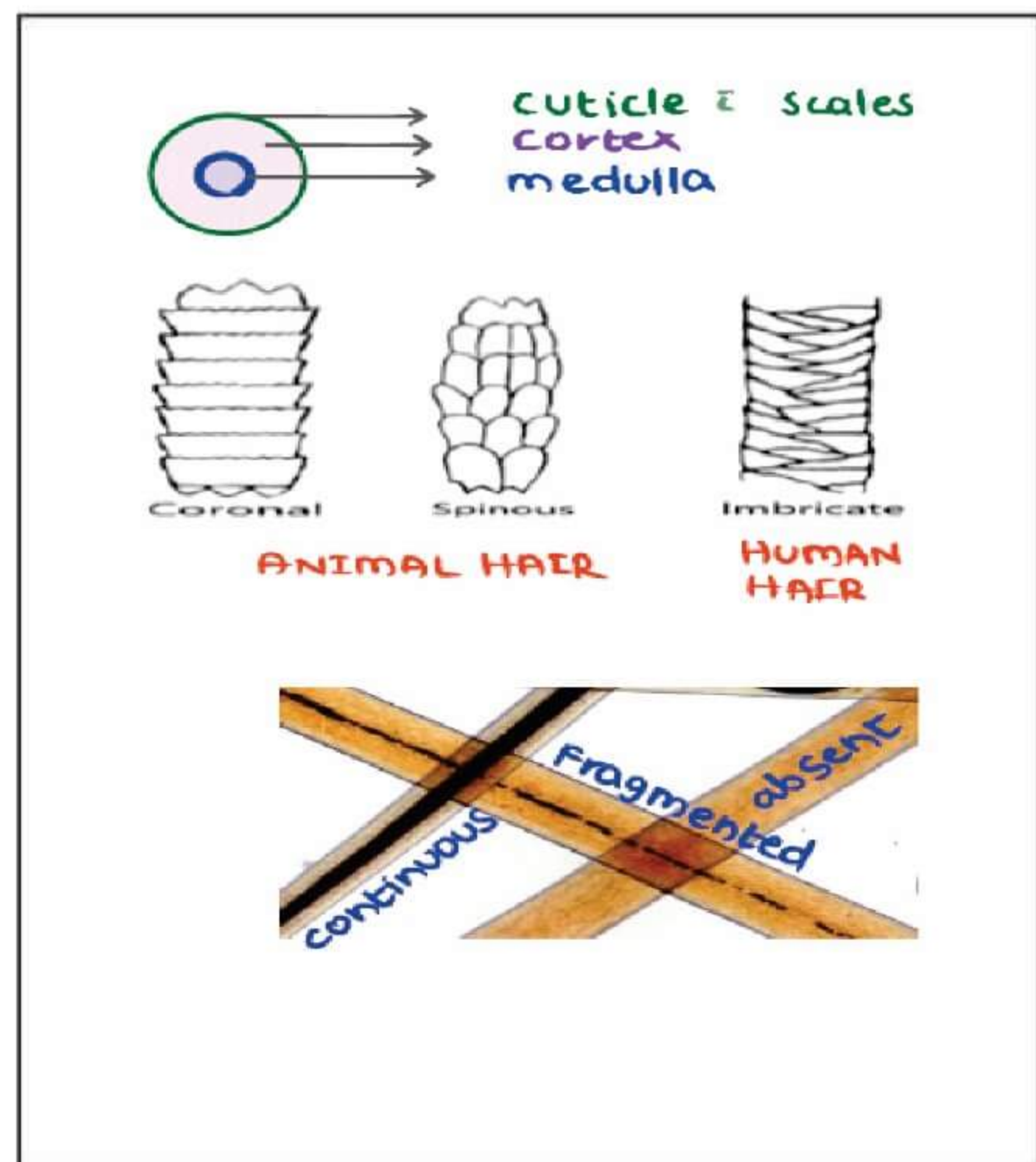
2. Cortex with pigment deposition

3. Medulla

Continuous

Fragmented

Absent




EXAMINATION



1. Check for hair/ fibre
2. Human hair vs Animal hair

	HUMAN HAIR	ANIMAL HAIR
Appearance	Fine, thin	Coarse, thicker
Cuticle	Thin, Imbricate	Thick, coronal/spinous
Cortex	Wider than medulla	Narrower than medulla
Medulla	Narrow, fragmented	Continuous
Medullary index	<p>< 0.3</p> 	<p>> 0.5</p> 
Pigment	Evenly distributed	Densely distributed
Arrangement	Towards cortex	Towards medulla
Precipitin test	Specific for humans	Specifics for animals

Medullary index → diameter of medulla / diameter of cortex

MEDICO LEGAL IMPORTANCE OF HAIR**RACIAL DIFFERENCES IN HUMAN HAIR**

Race	Appearance	Pigment granules
European	Generally straight or wavy 	Small and evenly distributed

Asian	Straight 	Densely distributed
Africa	Kinky, curly, or coiled 	Densely distributed, clumped, may differ in size and shape

SEX DETERMINATION Male or Female

By DNA analysis or

By Barr body

AGE DETERMINATION

Pubic hair

Post puberty

Axillary hair

Greying of hair → > 40 years

LANUGO HAIR

soft, non-pigmented, → Fetus

non medullated

PART OF BODY IDENTIFICATION

Eyelid/ eye lashes → Short & stiff

Scalp hair → Long & soft

Beard → Thick & straight

Pubic/ axillary hair → Short, thick, curled

CAUSE OF FALL

- Root is atrophied → Natural
- Ruptured sheath → Trauma

CAUSE OF DEATH

→ Burns → singeing of hair → curled, twisted, fragile

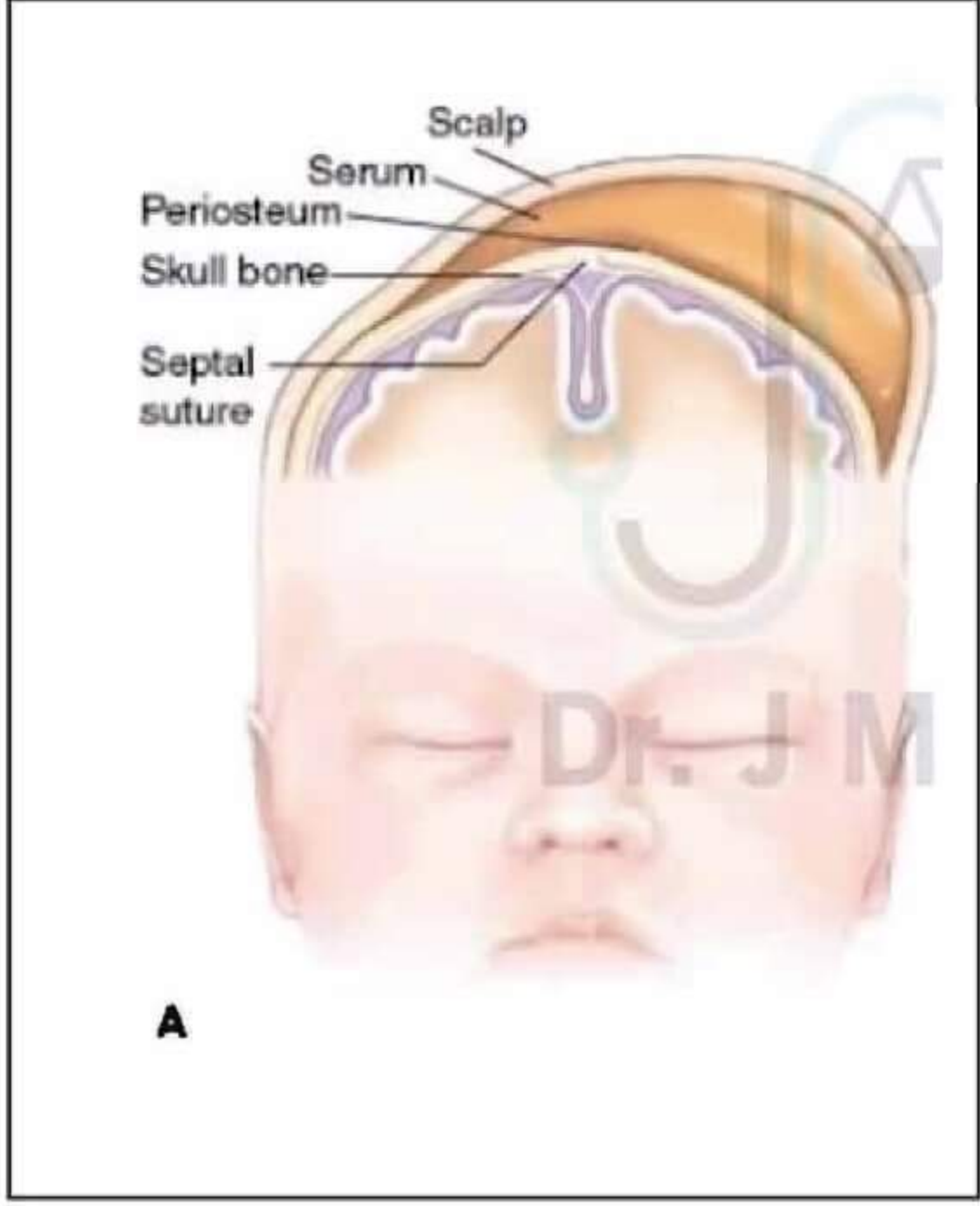
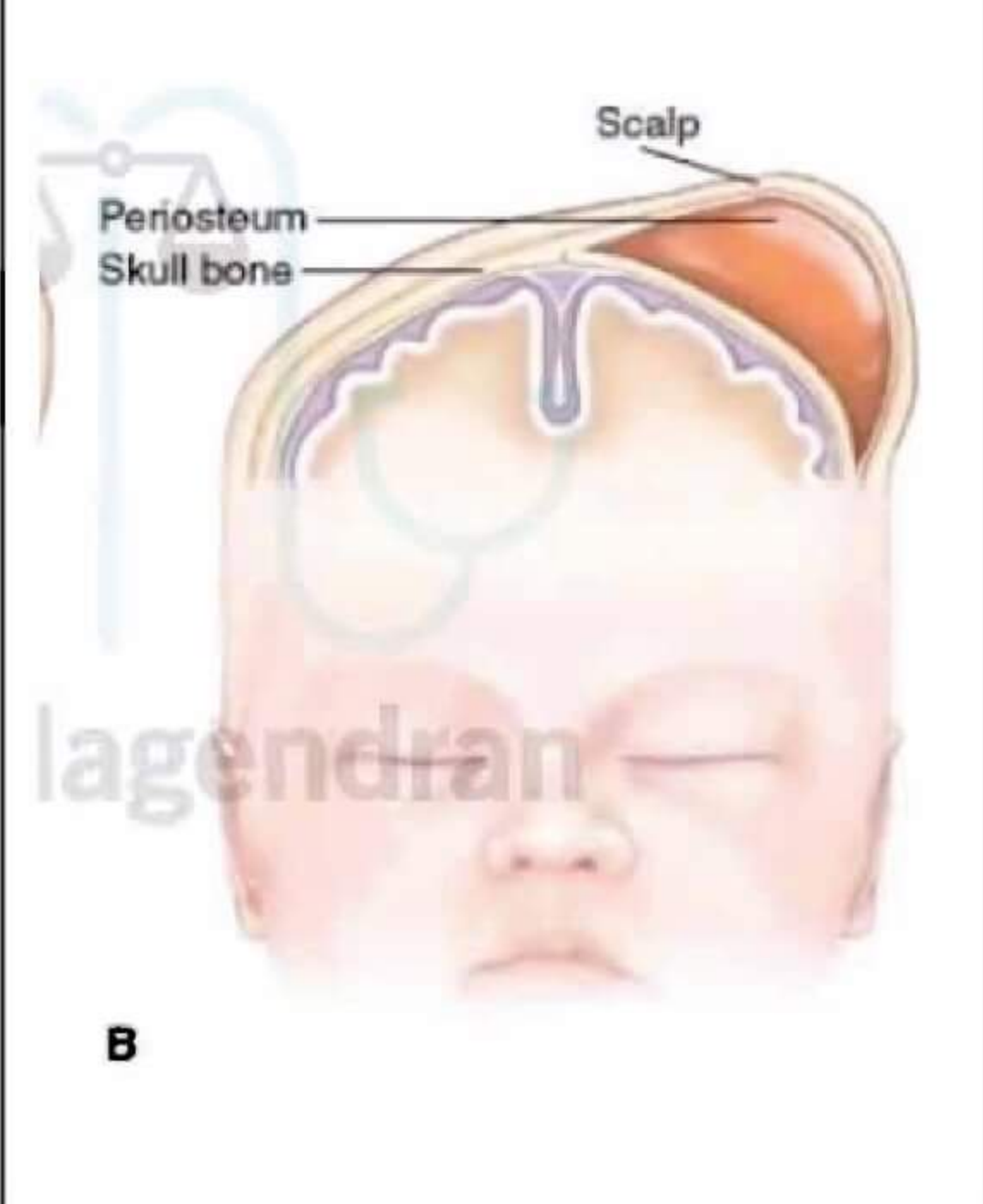
Cut trauma → cut end

Blunt trauma → crushed end

TYPE OF POISONING can be analysed → arsenic, thallium

TIME SINCE DEATH can be known from last time of showing

→ Growth of scalp hair → 0.4 mm/Day

Cephal hematoma	Caput Succedaneum
<p>→ Bleeding d/t rupture of vessel (d/t prolonged II stage labor) results in sub periosteal hematoma.</p> <p>→ No crossing of sutures</p>	<p>→ Swelling d/t edema.</p> <p>→ Presenting part compressed on outlet.</p> <p>→ It will resolve in 1 days itself.</p> <p>→ Crosses the sutures.</p>
 <p>A</p>	 <p>B</p>

BATTERED BABY SYNDROME

→ AKA CAFFEY SYNDROME

→ AKA KEMPE SYNDROME

→ AKA INFANT TRAUMATIC STRESS SYNDROME [OBJ]

→ **BATTERED CHILD**

- One who received repetitive physical injuries
- As a result of non-accidental violence
- Produced by a parent or guardian

→ **FEATURES**

RELATED TO CHILD

- Age: < 3 years
- Sex: More common with male
- Status: Usually, illegitimate & unwanted children
- Position: eldest or youngest

RELATED TO PARENTS/ GUARDIAN

- Status: unmarried couple
- Age: young
- Education: Lower level of education
- childhood History: Parents themselves are the victims of battering
During childhood

CLASSICAL FEATURES

- Discrepancy b/w the natures of injures & explanation offered by parents
- Gap b/w the injury & medical attention which can't be explained
- Different stages of injuries

INJURIES

1. SOFT TISSUES INJURIES

- Bruises, abrasions & lacerations
- Laceration of oral mucosa along with labial frenulum of lower lip (Characteristic features)

→ Slap marks, lash mark, knuckle punches, pinch marks, butterfly bruise & 6 Pennie bruise are seen

2. CNS INJURIES

→ Shaken baby syndrome/ infantile whiplash syndrome

→ Occurs d/t violent shaking of baby

→ TRIAD OF INJURIES

- Encephalopathy
- Retinal hemorrhages
- Subdural hemorrhages
 - Most consistent
 - 1st clinical sign of CT scan

3. SKELETAL INJURIES

LONG BONE INJURIES

→ Highly suggestive of BBS

→ Corner fracture

→ Bucket handle fractures

- d/t avulsion injury in metaphysis

SKULL FRACTURES

→ FISSURE FRACTURED

→ EGG SHELL FRACTURES

RIB INJURIES

→ Fracture at different stages of healing

→ STRING OF BEADS APPEARANCE (CALUS)

4. OTHER INJURIES

VISCERAL INJURIES

→ Injuries to spleen, liver or hollow viscera

BURNS

→ Small circular pitted burns may indicate deliberate stubbing of cigarette ends on skin

→ Scalds also common

MUNCHAUSEN'S SYNDROME BY PROXY

→ A type of child abuse involving the parent/ guardian

→ Children are brought to doctors,

For induced signs or symptoms of illness with fictitious history

→ Child is admitted frequently in the hospitals for non-existing conditions

- Mother may prick the child's finger & adds blood to urine of child & take the sample to doctor
- A pillow may be put on the face of child & then pushed onto the bed
- She may give insulin to child & take him to doctor hypoglycemia
- She may also give emetics, laxatives etc.

DIAGNOSIS

→ The illness does not confirm to the expected presentation

→ Signs & symptoms are not substantiated by laboratory or imaging finding

→ Failure of wounds to heal

→ The child becomes ill Or worsens when the parent or guardian is present with recovery when separated

→ Finding that the patient has been admitted to multiple hospitals & has been seen by multiple physicians

SUDDEN INFANT DEATH SYNDROME/ CRIB DEATH/ COT DEATH

→ Sudden unexpected death of healthy infants, whose death remains unexplained even after thorough investigation

→ FEATURES

Incidence → 0.2 – 0.4% of all live births

Age → 2 weeks to 2 years (2m-4m)

Sex → Male: Female ratio

Twins → ↑ risk among twins

Time of death → During sleep & early morning

Prematurity → Higher risk

Socio-economic status → Lower status

Cigarette smoking → By mother has got higher risk

→ AUTOPSY FINDINGS

- Usually negative autopsy finding
- Milk or blood stained froth at mouth & nostrils

- The only constant findings are multiple petechial hemorrhages on visceral surfaces of heart, lungs & thymus which are agonal in nature
- Hands are clenched to bed sheets

→ **PROPOSED THEORIES**

- *Prolonged sleep apnea (most acceptable cause)*
- Respiratory infection
- Laryngeal spasm
- Hypersensitivity to cow's milk
- Other causes:

Conductⁿ system anomalies

Mechanical upper airway obstruction

Adrenal insufficiency

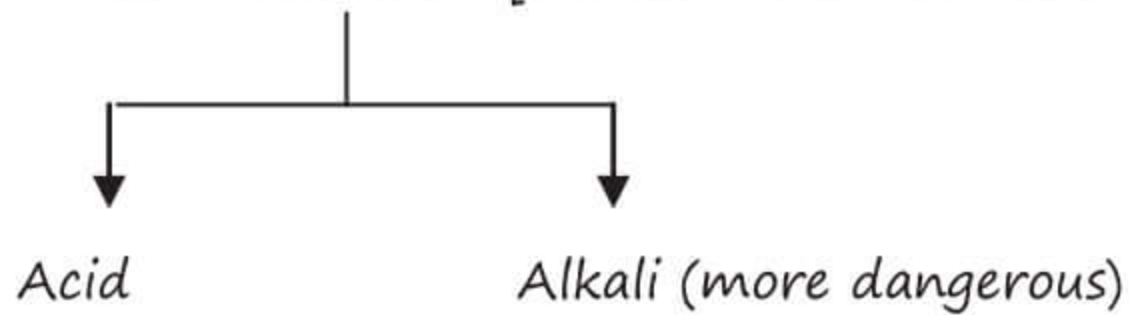
Gastro-esophageal reflux leading to bradycardia etc

Toxicology Introduction

- **Def**– It is the study of poison.
- **Poisons** – Any substance in any form (Solid, liquid, gas) injected in the body through any route (injection, ingestion, inhalation, brought in contact) it produces ill health or death by its local / remote action.
- **Ecotoxicology** – Study of poisons in relation to environment.
- **Occupational toxicology** – Study of poisons with occupations.
- **Toxinology** – Study of toxins.
- **Toxin** – Any biological substance produced by living organism.
- Classification of poison

“CINCAM”

- **C** – Corrosives [Causes maximum tissue damage]



Acid → Cause damage by coagulative necrosis [except hydrofluoric acid]

Alkali → Cause damage by liquefactive necrosis.

I – Irritants (Poison causing inflammation)

Metal

M – Mercury

L – Lead

A – Arsenic

Nonmetallic

Phosphorus

Plant

Ricinus communis

Abrus precatorius

Semecarpus anacardium (BILAWA)

Croton tiglium

Catotropis

Animal

Snake bite

Scorpion sting

N – Neurotoxic

Brain poison

Stimulation ↓ Deliriant Eg. Datura	Depress ↓ Somniferous Eg. Opioids	Intoxication ↓ Inebriant Eg. Alcohols
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Cocaine

Cannabis

Spinal poison

- Strychnos

Eg. Nux Vomica

Peripheral nerve poison

- Conium maculatum (hemlock)

- **C** – Cardio toxic [death by inducing cardiac arrhythmias]

CAR – DONA**D** – Digitalis**O** – Olendar**N** – Nicotine**A** – Aconite**Asphyxiants**

- Causes anoxia

Eg. Toxic gases like Co, Co₂, H₂S, HCN

- **M** – Miscellaneous
 - Agricultural poisons
 - Food poisoning

* Ideal homicidal poison

Properties

- (1) Easily available
- (2) Cheap
- (3) No colour
- (4) No taste
- (5) No odour
- (6) Should be able to mix with food/drink
- (7) Should produce delayed symptoms
- (8) Symptoms should mimic natural disease
- (9) Should not produce any specific post mortum findings
- (10) Should not be detected by routine tests.
 - The poison which covers most of these properties is thallium (but not easily available)

- So M/C used is arsenic
 - * Ideal suicidal poison

Properties

- (1) Cheap
- (2) Easily available
- (3) Pleasant taste
- (4) Should produce definite fatality
- (5) Should produce painless death

Eg. Cyanide (M/C used)

Barbiturates

Organophosphorus

* List of poisons which causes PCT necrosis

- (1) **P** – Phenol
- (2) **C** – Cresols, Corrosive, Sublimate, cantharides
- (3) **T** – Tetrachloride (carbon tetrachloride)

* List of Nephrotoxic poisons

- N** – NSAID's
- E** – Ergot
- P** – Potassium chlorate
- H** – Heavy metals
- R** – Rhabdomyolysis
- O** – Oxalic acid

DIAGNOSIS OF POISONING IN CASE OF DEAD

1. SMELL
2. COLOUR OF HYPOSTASIS
3. CHEMICAL ANALYSIS

SMELL *** Q

- | | |
|-------------------------|---|
| 1. Garlic | → Arsenic, phosphorous, Aluminium phosphate |
| 2. Fruity odour | → Alcohol |
| 3. Rotten egg | → H ₂ S |
| 4. Burnt rope | → cannabis |
| 5. Oil of bitter almond | → cyanide |
| 6. Fishy | → Zinc phosphide |
| 7. Shoe polish | → nitro benzene |
| 8. Acrid pear | → Chloral hydrate, paraldehyde |
| 9. Mothball | → Naphthalene |
| 10. Carrot like | → Hemlock (conium maculatum) |

HYPOSTASIS & POISONS *** Q

- | | |
|-----------------|---|
| 1. Cherry red | → CO |
| 2. Brick red | → Cyanide |
| 3. Brown | → KClO ₃ , all nitrates, aniline, bromides |
| 4. Bluish green | → H ₂ S |
| 5. Opium | → Black |

CHEMICAL ANALYSIS

ROUTINE ORGANS

1. Stomach
 2. Small intestine (organ of absorption)
 3. Liver (organ of metabolism)
 4. Kidney (organ of excretⁿ)
 5. Blood
- Best sample
- Can qualify & quantify
- All above organs can be preserved in **GLASS CONTAINER**

SPECIFIC ORGANS

1. Strychnos → Heart, spinal cord
2. Aconite → Heart
3. Metal → Bone, hair, nail sample *** Q
4. Gaseous poisons → Whole lungs (Nylon bag)
5. Bile → Opium, Barbiturate & Glutathione
6. Brain → cerebral poisons

PRESERVATIVES

1. Saturated solution of NaCl → commonly used
2. Rectified spirit (95% alcohol) → best preservative

AVOID SALTS IN

1. Corrosive except phenol
2. Aconite

AVOID RECTIFIED SPIRIT IN

1. Alcohol
2. Formalin
3. Phenol
3. 10% Formalin → For histopathological examination
4. 50% glycerol → For virology
5. NaF → For CO, cyanide, Alcohol poisoning

GENERAL GUIDELINES IN THE MANAGEMENT OF A CASE OF POISONING**DUTIES OF A DOCTOR**

1. Medical duty (prime priority)
2. Legal duty

MEDICAL DUTY**TREATMENT OF POISONING CASE****SEQUENCE**

1. ABCD → stabilization
2. Remove the unabsorbed poison

3. Remove the absorbed poison
4. Neutralise with antidotes
5. Symptomatic Rx

1. STABILIZATION

- A → Airway
- B → Breathing
- C → Circulation
- D → CNS depression

2. REMOVAL OF THE UNABSORBED POISON (DECONTAMINATION)

→ depends on route of exposure

1. Skin → wash with H₂O
2. Inhalation → O₂
3. Oral → gastric lavage, emesis, catharsis

GASTRIC LAVAGE

→ within 3 hrs → very effective

→ Position → Left lateral/ Trendelenburg (↓ aspiration)

→ Tubes

- RYLE'S TUBE
- LAVACUATOR (BEST)
- EWALD/ BOA'S TUBE (commonly used)
 - 1.5 meters in length
 - Made up of rubber
 - Mouth end has funnel
 - Bulb helps in suction



→ **FLUIDS**

→ Tap water (normal saline)

→ **1:5000 KMnO₄**

→ Calcium lactate

→ Tannic Acid

→ Gastric lavage is used for following poisoning case where route is **not oral**

- Poisons undergoing biliary secretion
- Opium
- Barbiturates
- Glutathione

CONTRAINDICATIONS OF GASTRIC LAVAGE (C³V²)**ABSOLUTE C/I**

1. **C**orrosives except carbolic Acid (↑ mucus thickening – **leathery mucosa**)

RELATIVE C/I

1. **C**onvulsants
2. **C**omatose
3. **V**arices
4. **V**olatile (kerosene)

EMESIS

→ Advocated in the absence of gastric lavage tube

→ attempted only in conscious person

→ **IPECAC syrup**

- Only the best emetic
- **30 ml** → CTZ → emesis

CATHARSIS

→ ↑ purgation

→ **D – sorbitol** is used

3. REMOVAL OF POISONS IN THE BLOOD

1. Dialysis

2. Diuresis

DIURESIS

→ Acidic drugs → urine alkaline

- Barbiturates Forced alkaline diuresis
- Salicylates

→ Alkaline drugs → Urine should be acidic

- Quinine Forced acidic diuresis

HEMODIALYSIS

Do

Barbiturates

Lithium

Alcohol

Salicylate

Thiocyanate/ Theophylline

Don't

Don → Digitalis

Is → Insecticide

B → Benzodiazepine

A → Amphetamine

C → Corrosives

K → Kerosene

4. NEUTRALIZATION WITH ANTIDOTE

MECHANISMS

1. Inert complex formation → chelating agents

(P) + CA → (P) - CA

Toxic

Non toxic

Water insoluble

water soluble

2. REDUCED TOXIC METABOLITE

Alcohol dehydrogenase

Methanol

Formic Acid

FOMEPIZOLE

3. ↑ DETOXIFICATION

Cyanide

Thio sulphate ↓

Thiocyanate (Non toxic) (urine)

4. RECEPTOR BLOCKADE

CHELATING AGENTS

1. BAL (DIMERCAPROL)

→ Has - 2 SH groups

→ Attracts metals

→ Given by deep im

→ **CONTRA INDICATIONS**

- Fe & Cadmium (complex itself is toxic)
- G6PD deficiency
- Liver disease

2. DMSA (SUCCIMER)

→ Can be given orally

→ can be given in G6PD deficiency

→ Used for

Mercury poisoning

Lead poisoning

Arsenic poisoning

3. CA EDTA (VERSENATE)

→ 1st line drugs for lead

→ ↑ urinary excretion of metals

→ Contra indicated in

- Renal failure
- Mercury (nephrotoxic) poisoning

4. PENICILLAMINE

→ Used in

Mercury poisoning

Lead poisoning

Copper poisoning

5. DESFERRIOXAMINE

→ used in iron overload

PHYSICAL ANTIDOTE/ MECHANICAL ANTIDOTE

→ ACTIVATED CHARCOAL

- Acts by adsorption
- Dose → 1 gm/kg
- C/I

Corrosives

Hydrocarbons

Iron

Metal

Petroleum products

Salicylates

UNIVERSAL ANTIDOTE (2:1:1)

2 → Activated charcoal → Absorbs the poison

1 → Tannic acid → Oxidise poisons

1 → Magnesium oxide → neutralized acid

Corrosives

Corrosives gives maximum tissue destruction

Acids

Causes coagulative necrosis

Forms a crust around

To prevent further damage

Spread will be limited

Acids

H_2SO_4

HNO_3

↓

Local action only

1. Sulphuric acid (aka oil of vitriol)

H_2SO_4 → teeth → stomach

↓

Chalky white

↓

Black necrotic mucosa
blotting paper stomach
gastric perforation.

- Since it causes thinning of stomach mucosa (blotting paper stomach) we don't give gastric lavage

Rx:-

1. Magnesium oxide
2. Gastric lavage is avoided
3. Pain killer
4. Steroids

Alkalis (More dangerous)

Liquefactive necrosis

spread is more

Carbolic acid

Oxalic Acid

↓

Local action + systemic action



Vitriolage

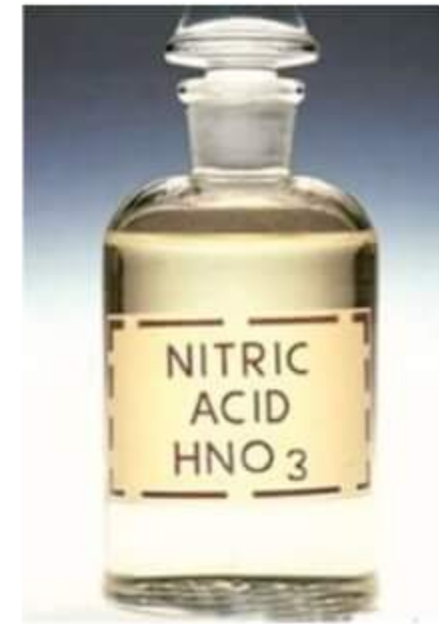
- Throwing acid

IPC - 326 A → throwing acid

326 B → attempt to throw acid

2. HNO₃ (nitric acid)

- Aka aqua fortis
- HNO₃ + tissue - picric acid (yellowish staining)



This reaction is called Xanthoproteic Reaction

- Yellow teeth
- Yellow staining over skin
- Yellowish / brown stomach mucosa

3. Carbolic acid

- Aka phenol
- Used as disinfectant
- Phenol + tissue - leathery consistency



Acute poisoning - carbolism

Chronic poisoning - phenolic marasmus

Carbolism

Phenol - stomach absorbed - liver - pyrocatechol, Hydroquinone QQ

↓

[Brown leathery stomach mucosa]

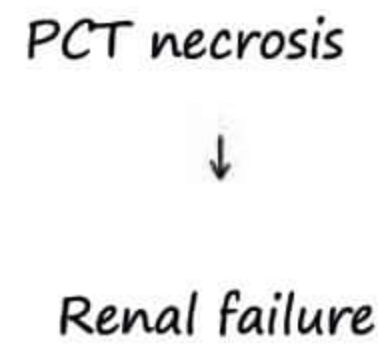
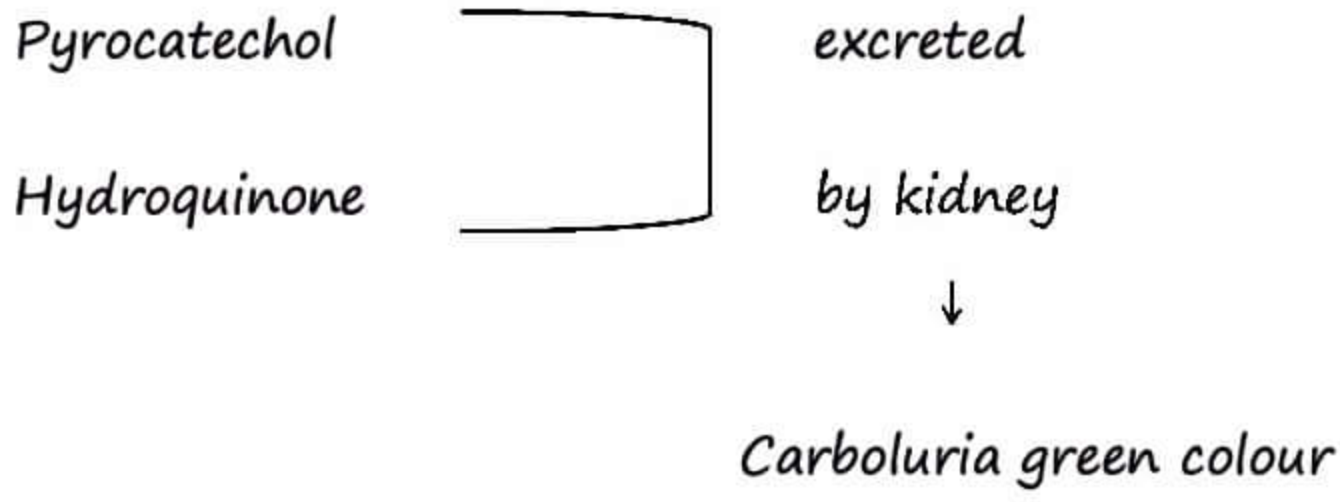
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Toxic metabolite formed by the liver and is responsible for all the systemic activity it can get deposited in cartilage, joints, ligaments

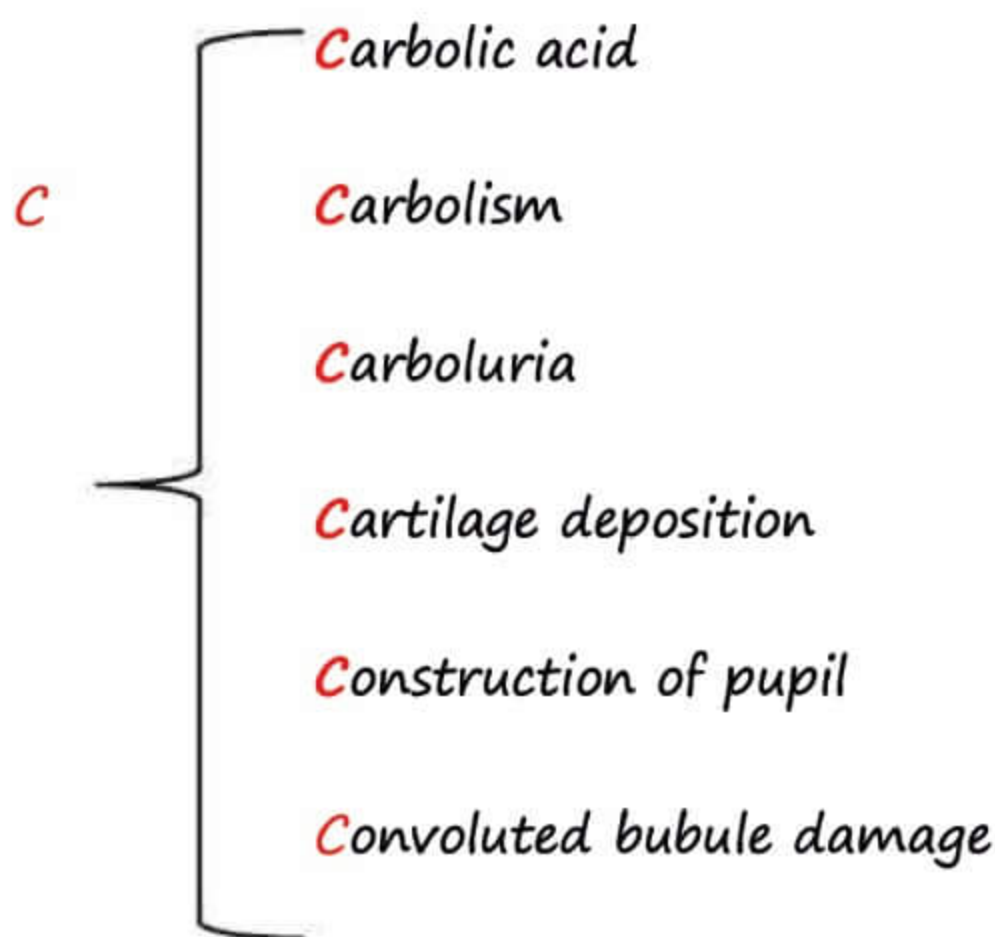
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Black color discoloration (ochronosis)

Constriction of pupil

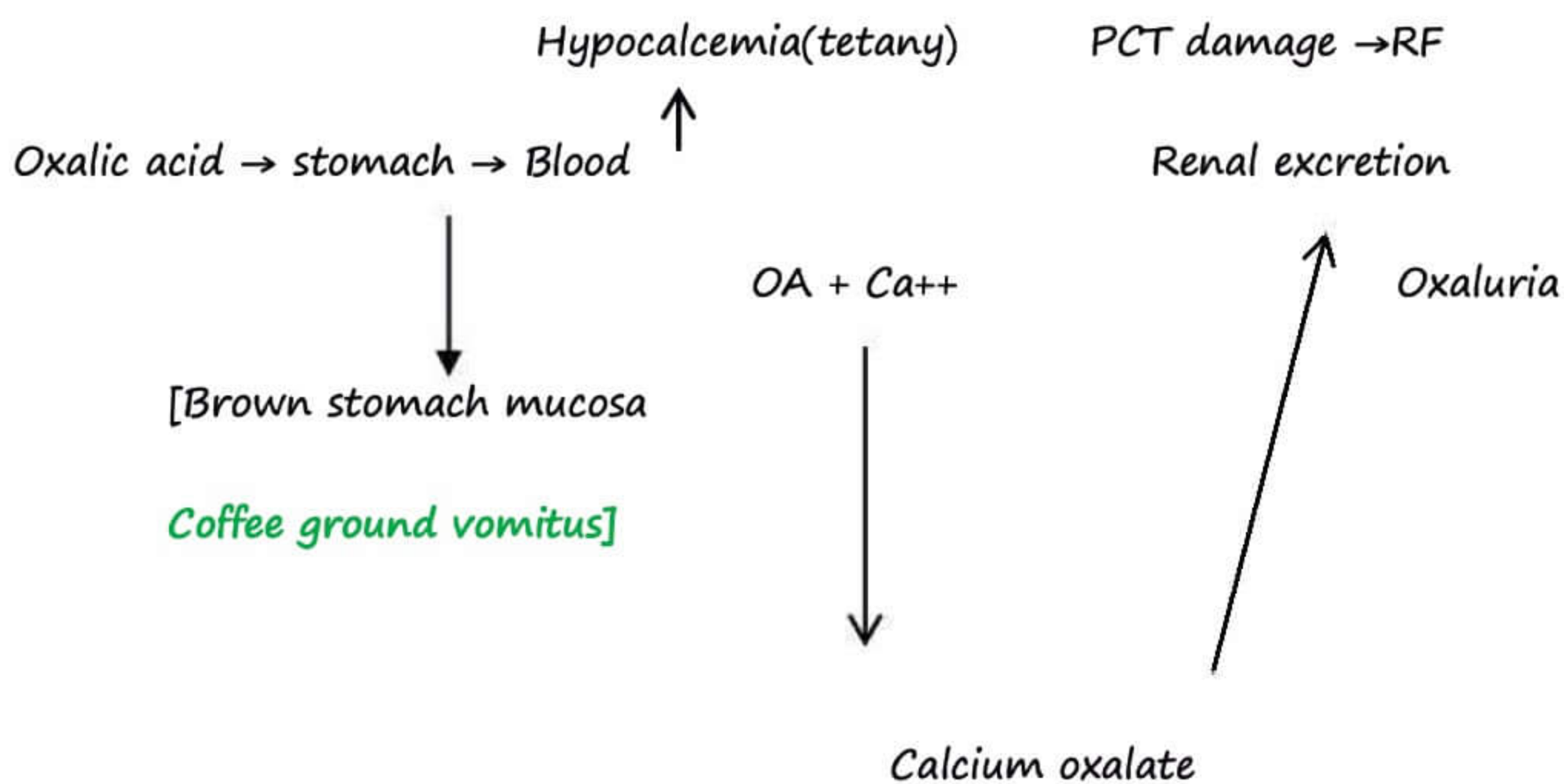


- Phenol inhibits putrefaction
- Gastric lavage is Indicated



4. Oxalic acid

- Used as Ink removal solution
- Used in forging signature



Rx: oxalic acid

1. Gastric lavage with calcium gluconate
2. Oral calcium gluconate

3. IV calcium gluconate (Hypocalcemia)
4. Hemolysis

Boric acid

- Desquamation of the skin (in fingers & toes)

↓

Boiled Lobsters syndrome

Metallic Poisons

* Mercury / Quicksilver/ Hydrargyrum

Types

1. Organic mercury → most toxic (methyl mercury)
2. Inorganic mercury

Features

Mercury

Tongue	→	Stomach	→	Colon	→	Kidney
↓		↓		↓		↓
Strawberry Tongue		Slate grey mucosa		diphtheria like colitis		PCT necrosis

Occupational association

1. Hat industries
2. Glass blowing occupation

Chronic mercuric poisoning / Hydrargyrism

S → Strawberry tongue

L → Mercuria lentis

A → Acrodynia

T → Tremor

E → Erythism (mad hatters)

Grey → Glass blower's shakes

Mucosa → Minamata disease

Mercuria lentis

- d/t mercurial vapour
- Mercury deposits in anterior lens capsule
- Malt brown reflex seen

Acrodynia

- Seen in children
- Peeling of skin
- Pluffy painful peripheries – Pink disease

Tremor

- Coarse tremors
- Hatter's shakes
- Glass blower's shake

All manifestations are d/t inorganic mercury except Minamata disease

Minamata disease

- dt/ organic mercury
- d/t consumption of fish

Treatment

1. Sodium formaldehyde sulphoxylate solution for gastric lavage.
2. BAL. penicillamine (EDTA not used)

*** LEAD/ plumbum**

Toxic salts

1. Lead acetate (M/C)
2. Lead sulphide (least toxic)
3. Lead tetroxide (most toxic)
4. Tetra ethyl lead → causes lead encephalopathy

Plumbism / saturnism

- A** – Anemia
- B** – Basophilic stippling, Burtonian line
- C** – Colic, constipation
- D** – Drops (Wrist drop, foot drop)
- E** – Encephalopathy
- F** – Facial pallor (D/t vasospasm)
- G** – Govt. (Saturnine gout)

Microcytic hypochromic anemia

→ /t inhibition of ALA dehydratase ferro Chelates → Hb synthesis inhibit

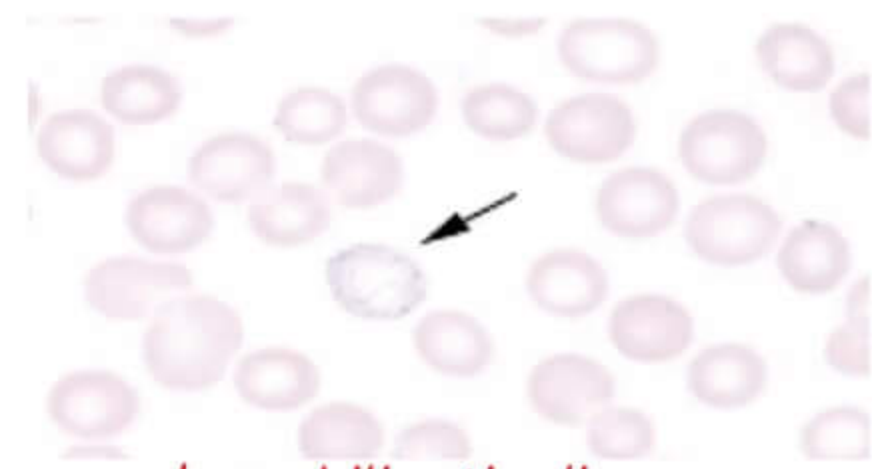
↑ALA

↑ CPU

↑ Protoporphyrinogen

Basophilic stippling

- Seen with RBC
- Aggregated ribosome (Blue dots)
- d/t inhibition of 5 pyrimidine nucleotidase



basophilic stippling

Burtonian lines

- Blue deposits over the gum's d/t lead sulphide

Colics + constipation

- Dry belly ache

Encephalopathy (85%)

- Seen with children
- Irreversible
- Learning difficulties

Facial pallor

- Most consistent sign
- Earliest sign

**Diagnosis**

Based on ↑CPU ↑ALA ↑ Protoporphyrinogen ↑ lead levels	PLUMBISM
---	----------

Lead line → Thick radio opaque band in the metaphyseal region of long bone x – ray of child

Treatment

1. DMSA
2. EDTA
3. Lead encephalopathy → EDTA + BAL

*** Arsenic**

- Garlic odor
- Toxic salts
 1. Arsenic trioxide / Somalkhar / Sankhya → Most toxic
 2. Copper arsenite / Scheele's green
 3. Copper aceto arsenite / Pari's Green
- Fetal dose – 100-200 mg

Fulminant poisoning

- 3gms single dose
- Dies within 3 hrs by cardiovascular collapse

Acute poisoning

- Gastro enteritis → Mimics cholera

Arsenic sequence	Cholera sequence
Throat pain	Purging
Vomiting	Vomiting
Purging	Throat pain
Tenesmus ⊕	(-)

*** Chronic arsenic poisoning (Arsenicosis)****Skin**

- Raindrop pigmentation (fading measles rash) B/L hyperkeratosis of palms / soles
- Neoplasm

Nail

- Aldrich mees line → transverse white line

Hair

- Alopecia
- Golden hair (also seen with copper)

Bone

- BM depression
- Pancytopenia

Nerves

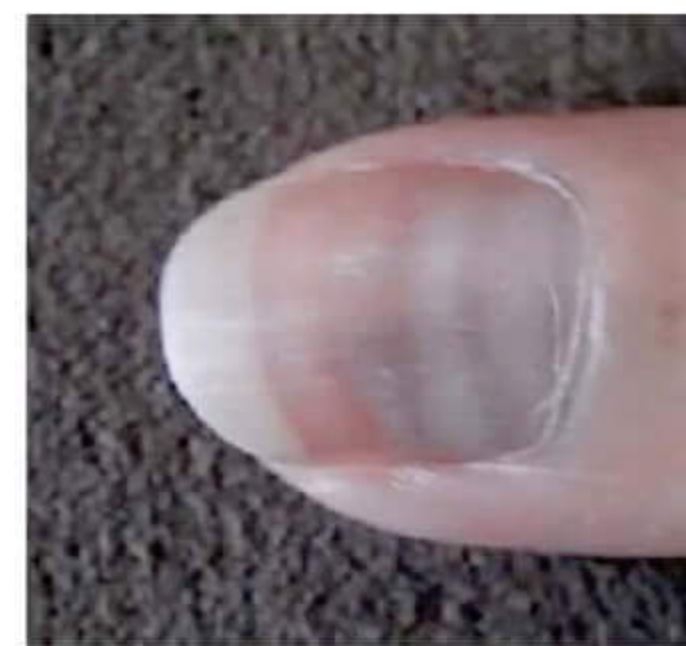
- Predominantly affects sensory nerves
- Symmetrical sensory neuropathy
 - Tingling & numbness in glove & stocking distribution
 - Tactile hallucinations

Blood vessels

- Thrombosis

↓

Gangrene (peripheral)
(Black foot disease)

*** Diagnosis****Samples**

Acute – Blood & liver

Chronic – Bone, hair and nail

Tests

1. **Marsh test / Reinsch test/ Gutzeit test** → Not used now
 2. NAA (Neutron activation analysis)
 3. AAS (Atomic absorption spectrometry)
- } Presently used

* disadvantages of using arsenic as homicidal poisoning

1. Decomposed body
 2. Skeletal remains
 3. Charred parts / ashes
- } arsenic can be recovered

* PM findings

1. Red velvety stomach mucosa
2. Sub endocardial hemorrhages

* Treatment

1. Ferrous hydroxide
2. BAL
3. DMSA

* Arsenic toxicity signs & Symptoms

- A** – Anemia / Aldrich mees line / Arsenophagist (tolerate upto 300 mg)
- R** – Rain drop pigmentation / Reinsch test / Red velvety mucosa
- S** – Sub endocardial hemorrhages / Sensory neuropathy
- E** – Eruptions
- N** – NAA
- I** – Imbibition of arsenic (Arsenic imbibed from surrounding soils after death)
- C** – Cumulative poison / cholera like symptoms / chelation for Rx.

* Thallium

- Ideal homicidal poison
- Symptoms
- A** – Alopecia → Pathognomic sign
- N** – Neuropathy : - Peripheral – mixed neuropathy
- D** – Diarrhoea sensory : - Parasthesia burning feet syndrome motor: muscle weakness
- Abdominal pain (M/C symptom)
- This poison resembles GBS
(Arsenic > Thallium)

* Cadmium poisoning

- Cadmium replaces the calcium from bone
- Signs & Symptoms

- Yellow teeth (cadmium ring)
 - Anosmia
 - Bone softening (Osteomalacia)
 - ↓
 - Bony deformities
 - Brittle bones (intense bone pain)
 - ↓
 - Pathological #
 - Nephrotoxic → PCT necrosis
- } Itai Itai disease ouch ouch disease

Disease form metals

* Hunter Russel Syndrome

- Due to the exposure of methyl mercury
- Symptoms → speech differences → visual defects → ataxia

* Pa – Ping disease

- Due to barium exposure
- Children suffer M/Cly
- Symptoms → Muscle weakness & paralysis.

NON-METALLIC IRRITANTS

PHOSPHOROUS

White phosphorous	Red phosphorous
Garlic odour	No garlic odour
Toxic	Non toxic
Luminescent	Non luminescent
Always kept under water	No need to kept under water
Produce smoke	No smoke produced

ACUTE PHOSPHOROUS POISONING

1. GASTROINTESTINAL PHASE

- Luminescent vomiting
- Luminescent stools → **SMOKEY STOOL SYNDROME**

2. Asymptomatic phase

- 3. **Liver cell failure** → Resembles yellow atrophy of liver

TREATMENT

1. Gastric lavage

→ KMnO_4

→ 0.2% CuSO_4 → caution to be taken

2. Injection vit k (in case of liver cell failure)

CHRONIC PHOSPHOROUS POISONING/ PHOSSY JAW/ LUCIFER'S JAW

→ Exposure to vapours of phosphorous for long time lead to

Tooth pain → Osteomyelitis → Sinuses with pus → Osteonecrosis of mandible

→ Phosphorous is 4 'P' poison

- Protoplasmic poison
- Phossy jaw
- Photo Luminescent
- Purpura

IODINE

→ Protoplasmic poison


→ CHRONIC IODINE POISONING (IODISM)

- Iododerma → skin patches
- Iodine mumps → painful parotid enlargement

Animal Irritants

Snakes

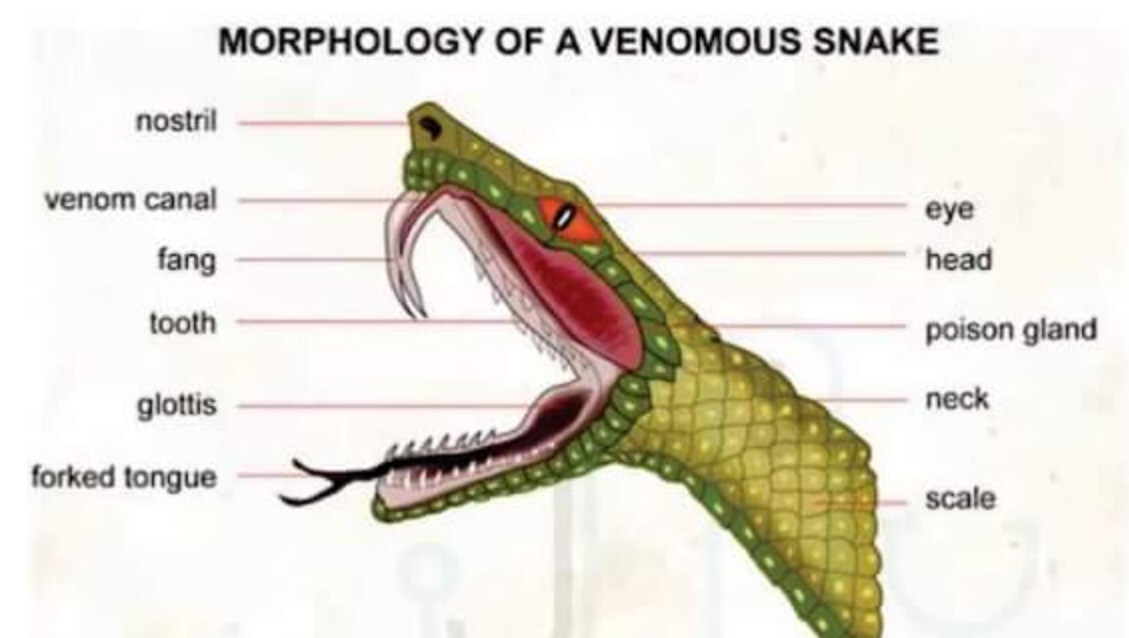
- Study of snakes is call ophiology
- Most of snakes are non-venomous
- Difference between Venomous & nonvenomous snake

	Venomous	Non-Venomous
Head Scales	<p style="text-align: center;">Small</p> <p>Exception →</p> <ol style="list-style-type: none"> 1. Cobra (3rd Supralabial scale largest)  <ol style="list-style-type: none"> 2. Krait (4th Infralabial scale largest) 3. Pit Viper (they have pits) 	<p>Large</p>
Belly Scales	Large	Small
Tail	Compressed Flat (Sea Snake)	Non compressed
Mouth	2 Fangs	Small teeth
Bite	• • 2 punctate marks Multiple teeth bite marks
Habit	Nocturnal	

- **Morphology of a venomous snake**

IMAGE

- Study of snake venom → Venomics
- In snake venom we have lot of enzymes (proteins)



Family →

<i>Elapidae</i>	<i>Viperidae</i>	<i>Hydrophidae</i>
- Neurotoxic	- hemotoxic Vasculotoxic	- Myotoxic
- King Cobra Common cobra Krait	- Eg: Russels Viper's Saw scaled Viper Hump nosed viper	- Eg:- Sea Snake

Anti Snake Venom:-

- It is effective against	- Commonly cobra - Krait - Russel Viper - Saw Scaled Viper
---------------------------	---

King Cobra:-

- Largest venomous snake
- It can grow upto 4mts.
- Particularly seen in the western ghats.



king cobra

Common Cobra: -

- It can grow upto 1 mts.
- You can see a spectate mark (binocelate)
- 3rd Supralabial scale is the largest



King cobra

Krait: -

- Dark black
- On dorsum of the body you can see hexagonal scales
- 4th Infralabial scale is largest



Common Krait

Russels Viper: -

- Markings on the body (spectate Shape)



russels viper

Saw Scale Viper: -

- There is presence of arrow mark on the head



saw scale viper

Fatal dose of venom: -

- Krait → 6 mg
- King cobra → 12-15 mg

- Snake bite envenomation is called as **ophitoxemia**
- If the person bitten by snake desist develop any symptoms it is called as dry bite (venom is not injected)
- C/F:-
 1. M/C symptom → Frights (anxiety abdominal pain)
 2. Local symptoms → Fang marks
(Not seen in krait bite)
(no/minimal local symptoms in krait bite)
- Local pain
- Local bleeding node enlargement
- Blistering, Necrosis, injection, gangrene

[Local Symptoms are ↑ by viper bite]

3. **Neurotoxic features** → More with Elapid bites
 - Ptosis
 - Diplopia
 - Flaccid descending paralysis
 - Respiratory failure (more with viper bites)
4. **Vasculotoxic features** → More with viper bites
 - DIC
 - Cardiotoxic features (Shock, hypotension, arrhythmia)
5. **Myotoxic features** → Seen with sea snake

- Pain, muscle tenderness
- Swelling
- Myonecrosis/lysis
- Renal failure

Management of Snake bite :-

1. 20 mins whole blood clotting test (20 WBCT)

- Imp/ bedside test

Dry test tube with blood → we see clots
after 2 mins

C/F no blood clot then it is viper bites

NOTE:- Always Correlate with clinical assessment.

Rx:-

First Aid Approach

“CARRY NO RIGHT”

Carry → Do not allow pt. to walk

No → No incision / suction
No tourniquet/ligature
No Caustery
No electrotherapy
No coffee/alcohol

Right →

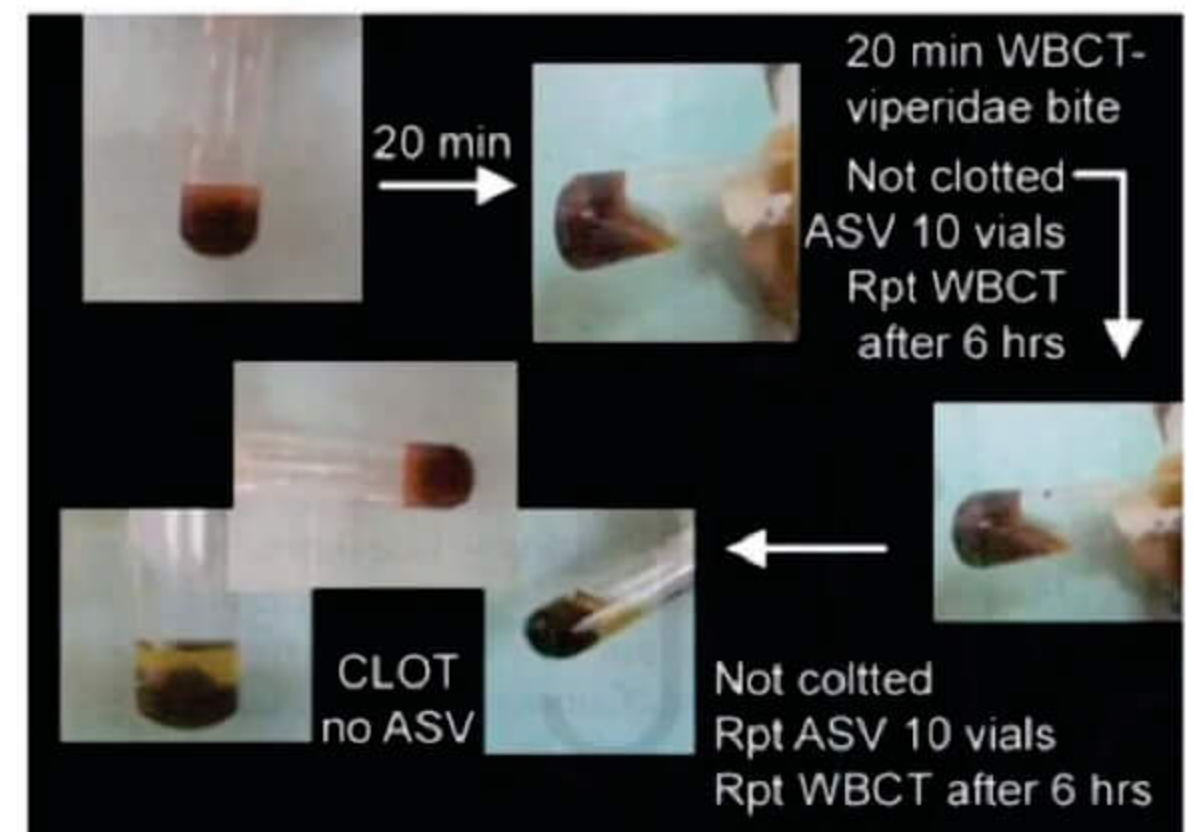
R → Reassurance

I → Immobilization (Sutherland's Wrap)

G → } get to hospital

H → }

T → Tell the doctor of systemic toxic signs



- Rx: - 1. ASV (Antisnake venom)
 - Developed by Albert Calmette

Source: Horse serum (It gives allergic symptoms)

Effective against :-

- Common cobra
- Krait
- Russell Viper
- Saw Scaled Viper

Route → IV
 Dose → 8-10 Vials

Indication:-

- a. Severe local envenomation Eg: rapidly progressive swelling
- b. Severe Systemic envenomation Eg: Cardiotoxic bleeding tendencies Neuroparalysis

2. IV neostigmine

- It will reverse the neuroparalysis
- ↓
- Only for cobra bite

Snake Venom Ophthalmia:-

- Pain
- Watering of eye
- Conductivities

Scorpion sting

- More than > 10 Species are present
- Indian red scorpion is highly venomous
- Scientific name → *Mesobulthes tumulus*
- Nature of venom → resembles snake venom

But fatality is less as the amount is less.

Action:

- Scorpion venom acts on Na⁺ & K⁺ Channels
- ↓
- It Stimulates Sympathetic & Parasympathetic system
- ↓
- Uncontrolled release of Catecholamines into the circulation

(Autonomic Storm)

1. Pain → the tap sign
 2. Paresthesia
 3. Systemic Symptoms → Vomiting, Sweating, Salivation, chest pain, anxiety, cardiac arrhythmias
- } Local Symptoms

M/important Complication of scorpion sting



Pulmonary edema

Rx:-

1. Immobilise
2. Pain relief
3. Prazosin
4. Scorpion antivenom (If available)

PLANT IRRITANTS

ORGANIC IRRITANTS

1. Plant irritants
2. Animal irritant

PLANT IRRITANTS

ABRUS PRECATORIUS

SEEDS

→ GUNCHI SEEDS/ RATI SEEDS/ ROSARY BEEDS

→ each seed weighs 108 mg

SUI NEEDLES

→ Needle prepared from crushed abrus seeds

→ Used as arrow poison

→ Ideal cattle poison (animal/ poison)

→ Resembles viperine snake venom



ACTIVE

→ Abrine (most potent)

PRINCIPLES

→ Abrine

→ Abralin

CROTON TIGLIUM**COMMON NAMES**

1. JEMAL GOTA
2. JEMAL BEAN
3. NEPALA

ACTIVE PRINCIPLES

1. Crotin (most potent)
 2. Crotonoside
- causes intense purgation

RICINUS COMMUNIS/ CASTOR PLANT/ ARANDI**ACTIVE PRINCIPLES**

Castor seeds → castor oil

↓

Residue (RICIN)

↓

Toxic

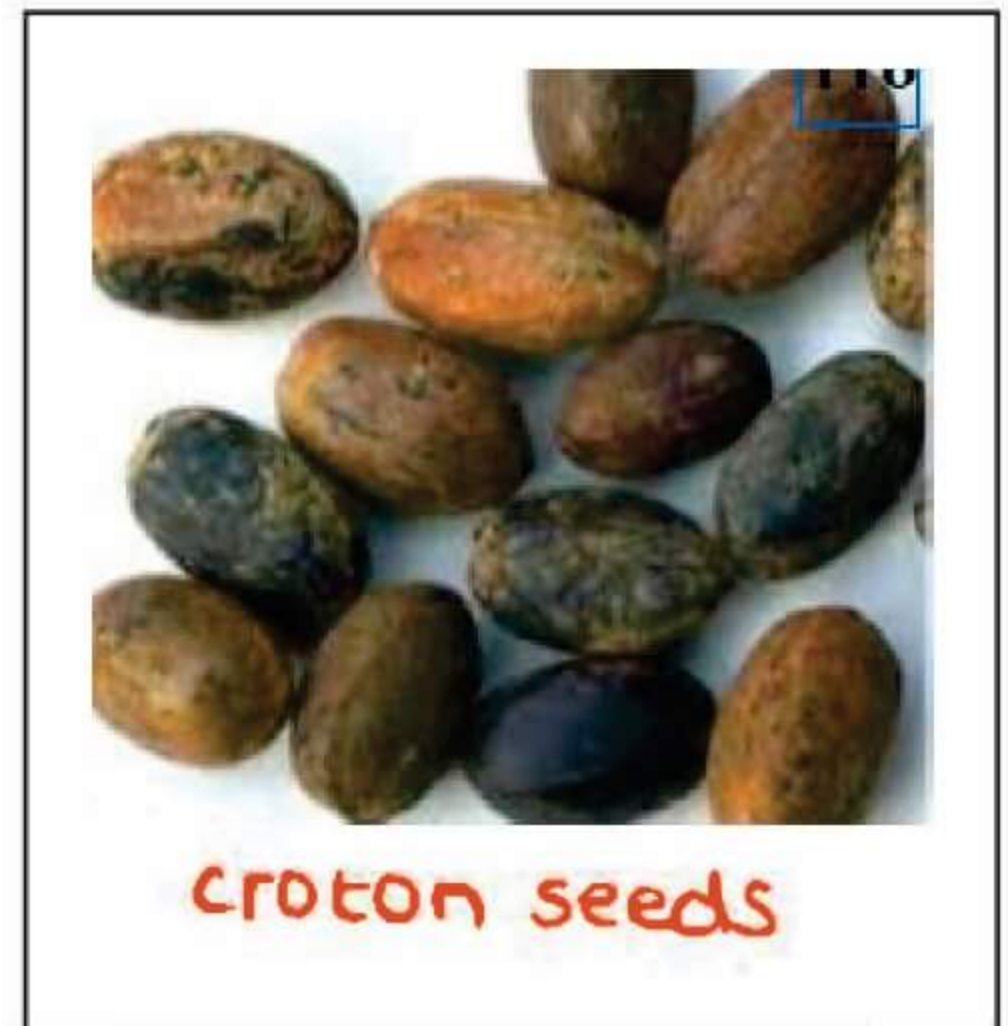
RICIN → causes bloody diarrhoea

MECHANISM OF ACTION

Ricin + 60 s Ribosome → RNA polymerase → Protein synthesis

↓

Inflammation ← Necrosis ← Cell death



TOXALBUMINS (PHYTOTOXINS)

→ Causes RBC agglutination

→ Toxalbumins

Crotin

Abrin

Ricin

SEMICARPUS ANACARDIUM/ BHILAWA SEEDS**Seeds**

→ Bhilawa seeds

→ Black colour juice obtained from seeds

- Used to mark on cloths
- Pro inflammatory
- Contact with skin causes blisters
- Artificial Bruise can be produced
- Also causes intense diarrhoea

ACTIVE PRINCIPLE → Semi carpol

→ Bhilawanol



SEMECARPUS



BHILAWA SEEDS

SPANISH FLY/ BLISTER BATTLE/ CANTHARIDES

ACTIVE PRINCIPLE → CANTHARIDIN

→ 1 beetle contain 2.9% cantharidin

→ Dry powder of cantharidin is APHORODISTAC (↑ libido)



Spanish Fly

→ Skin contact causes blisters

→ Other features

→ Loin pain (nephrotoxic)

→ Hematuria

→ Renal failure

CAPSICUM ANUM/ CHILLI/ MIRCH

Active principles → Capsaicin

→ Capsaicin

HUNAN'S HAND/ CHILLI BURN

→ Chronic exposure to Chilli powder causes contact dermatitis

Chilli seeds resemble Datura seeds

Embryo inside the Chilli seeds → Curved inward ('6')

Embryo inside the datura seeds → Open outwards



CALOTROPIS / MADAR/ AKDO

ACTIVE PRINCIPLES

→ Calotropin

→ Calotoxin

→ Usharin

Used as

→ Abortion stick

→ Infanticide

→ Artificial bruise producer

→ Cattle poison



FATAL DOSE	
1. Abrus	1 seed
2. Croton	5 seeds
3. Ricinus communis	10 seeds
4. Semi carpus anacardium	5-10 grams

Cerebral Poisons

Somniferous Poisons (Sleep inducing)

1. Opium / Afim / Madak / Chandu

- Extracted from juice of unripe capsule of opium (poppy) plant
- If we make cuts in the capsule

↓
Milky juice comes out

↓
Later becomes brown exudate

↓
This is called crude opium.

- Crude opium is the source of alkaloids
- Capsule contains seeds
- Seeds → KHAS KHAS → non toxic



Fetal dose

Opium → 2gm

Morphine → 0.2 gm

Morphine

- Derived from opium

Effects

- M** → Miosis, Marquis test
- O** → Orthostatic hypotension
- R** → Respiratory depression
- P** → Physical dependence (hard drug)
- H** → Histamine release
- I** → ↑ ICP
- N** - Nausea
- E** → Euphoria

→ Triad of morphine poisoning

1. Coma
2. Pinpoint pupil
3. Respiratory depression



→ Rx of morphine poisoning

- Naloxone
- Naltrexone (oral, long acting)
- Nalmefene

2. Heroin / Smack / Junk / Dope / Brown Sugar

- Di acetyl morphine
- It is semisynthetic derivative of morphine

- Methods of Abuse

1. Main lining → directly; IV
2. Skin popping → subcutaneous
3. Chasing the dragon → inhalational

Speed ball	→	Heroin	+	Cocaine
Hot shot	→	Heroin	+	Strychnine

- Heroin causes physical dependence Abrupt stoppage of drugs causes withdrawal symptoms (cold turkey)

IV - Mainlining



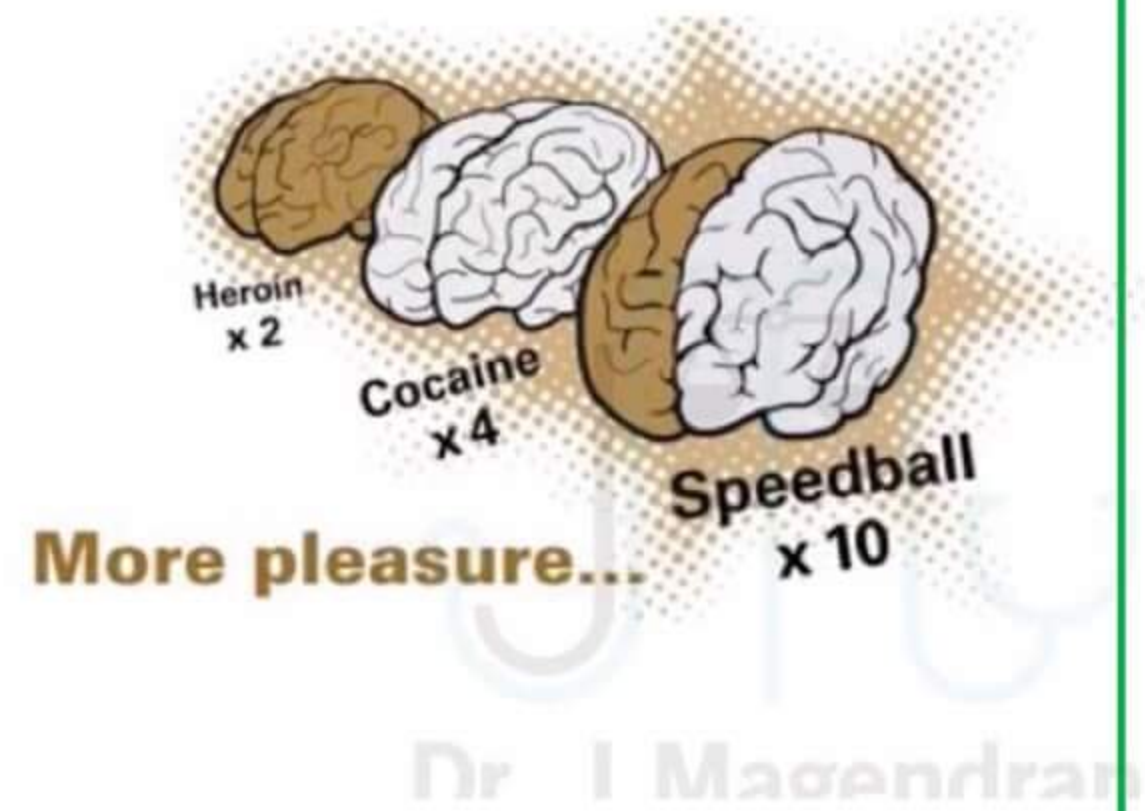
Skin popping



CHASING THE DRAGON



Snorting/insufflation



*** Inebriants Alcohol**

Ethanol	<	methanol	<	Isopropyl alcohol (most toxic)
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*** Ethanol (Ethyl Alcohol)**

- Water soluble
- It has fruity odour
- Produced by fermentation of sugars

Alcohol → Stomach (20% absorption) → Small intestine (80% absorption)

↑ SA ↑ ⊕
Carbonated drinks

- For fixed amount of alcohol, females have more effects d/t lesser H₂O concentration in body.

→ Percentage of alcohol

- Beer → 6-10 %
- Wine → 15-20%

- Whiskey
 - Rum
 - Brandy
- } 45-50%
- Vodka → 50-60%

→

Relationship between blood alcohol & body fluid alcohol ratio

- Blood alcohol - 1
- Urine alcohol - 1.3
- CSF - 1.1
- Vitreous - 1.12
- Alveolar Air - 0.0021 (Helpful in breath analyzer)
(Henry's law is used in breath analyzer)

* Effects of alcohol

- Alcohol is CNS depressant

Stages

1. Stage of excitement (50-150 mg%)
2. Stage of incoordination (150-250 mg%)
 - RTA are more in this stage
3. Stage of coma (> 250mg%)
 - MC Ewan's sign

↓

Differentiates between alcoholic coma & coma d/t morphine

Pupils in different stages

Stage of excitement	Stage of incoordination	Stage of coma
Dilated pupil	Dilated pupil	Constricted pupil

* Recovery

(i) Pathological intoxication

- Small dose with acute intoxication

(2) Alcoholic blackout

- Anterograde amnesia

(3) Alcoholic hangover

- Pt. wakes up after 8 hrs → Nausea, Vomiting, abdominal pain, mood depression.

* Abrupt cessation of alcohol leads to

- Delirium tremors
- 84 IPC → Not responsible for the crime

* Samples

1. Blood
 2. Urine
- } Add sodium fluoride as preservative

3. Decomposed bodies → Vitreous humour
4. Breath analysis (Breath analyzer /alcometer)

- * If blood alcohol is > 30 mg% it is punishable
- * Legal limit of blood alcohol → 30 mg% among drivers in India.
- * Drunk and driving is punishable under 185 motor vehicle act (MVA)

1st offence : 10,000 fine

Repeat offence : 15,000 fine

- Drunk and driving police can arrest
Without warrant → 202 MVA
Breath analysis test → 203 MVA

Lab test can be done in hospital → 204 MVA

* Test for alcohol

Qualitative

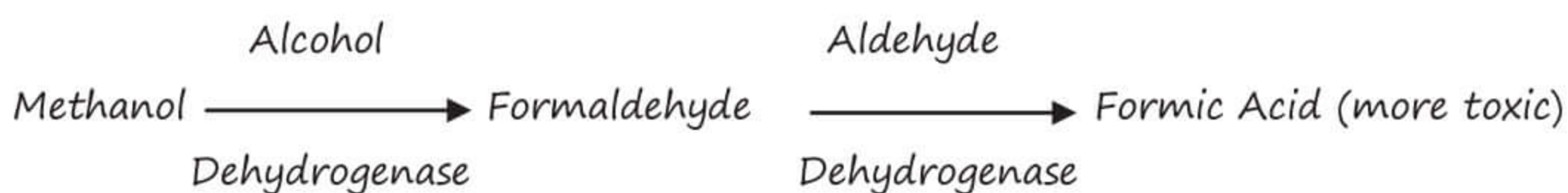
- 1) Kozelka & hine test
- 2) Cavett test

Quantitative

- Gas chromatography

* Methanol / Wood alcohol

- Used as illicit liquor
- Hooch tragedy is associated with methanol
- Metabolism



* Toxic symptoms due to formic acid accumulation

1. Abdominal pain
2. Vomiting
3. Optic neuritis → optic atrophy → blindness
4. Accumulation of formic acid leads to metabolic acidosis
5. Putaminal necrosis

Treatment of methanol poisoning

1. Ethanol (acts by competitive inhibition)
2. Fomepizole (inhibits alcohol dehydrogenase)
3. IV sodium bicarbonate
4. Hemodialysis (Severe cases)

* Ethylene glycol

- Used as antifreeze solution, brake fluid
- It has bitter sweet taste

Fatal dose – 100 ml

Metabolism

Ethylene glycol

After Liver metabolism

Glycolic acid

↓

(Metabolic acidosis)

Oxalic acid

↓

Binds with Ca^{2+}

↓

Calcium oxalate crystals

↓

Kidney excretes

- Oxaluria
- PCT necrosis → Renal failure

Diagnosis

- High anion gap acidosis
- Oxaluria
- Fluorescent urine

Rx

- 1) Decontamination
- 2) Ethanol
- 3) Fomepizole
- 4) IV sodium bicarbonates
- 5) Hemodialysis (in severe cases)

DELIRIANTS

DATURA

D. Stramonium → fruit is called as **THORN APPLE**

D. alba → White Flowers

D. Niger → Black / Purple colored Flowers

Datura- Types

1. *Datura alba* (white datura)



2. *Datura niger* (purple datura)



Street names of *Datura*: -

- Jimson's Weed
- Devil's trumpet
- Angel's trumpet

→ Every Part of plant is toxic

→ Seed - Most toxic

It consists of 0.1 mg of atropine

Active Principle:-

Hyoscine (Most Potent & Major Component)
Atropine } → ANTI CHOLINERGIC

Signs & Symptoms - 8 'D's

- Dry Skin
- Dry Mouth
- Dysarthria
- Dysphagia
- Dilated Pupils
- Drunken gait
- Delirium (Muttering delirium)

↓

- Involuntary movements
 - Threading imaginary needles
 - Pulling imaginary threads

Hallucination
CARPHOLOGIA (or)
Floccillation

→ Death

Fatal Dose → 50 to 100 seeds

Exposure of eye → Pupillary dilatation
to Datura dust ↓

Cornpicker's Pupil (or)
Gardener's Pupil

Test:-

1. Pilocarpine test
2. Mydriatic test
3. Gas chromatography – Mass Spectrometry (GC-MS)

Treatment:

- Decontamination
- Physostigmine (Antidote)
- Supportive → Anticonvulsants, Control Body Temperature

Medical Legal Importance: - (Datura)

1. Stupefying agents for Robbery
 - Railway Poison
 - Roadside Poison
2. Datura seeds resemble chilly seeds

Datura	Capsicum
i. Large	Smaller
ii. Dark brown	Yellow
iii. Double edge	Single edge
iv. Depressions	Smooth
v. Embryo is curved outwards	Curved inwards

3. Crime done by the victim of Datura Poisoning is not punishable.
4. Aphrodisiac (Love philter)

CANNABIS

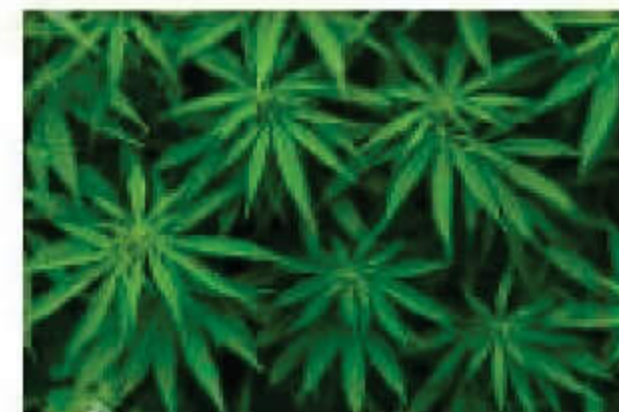
- Most widely used Delirient

Source:-

- Derived from Cannabis sativa Plant (Indian hemp)

Street Names :-

- Weed
- Pot
- Grass
- Rope
- Joint



- Reefer

Active Principles:

- THC (Tetra Hydro Cannabinol) → Very important active principle among 60 other cannabinoids.
- More concentrations seen in Flowers and Stem.
- Less concentrations seen in Seeds and Root.

Preparations: -

1. **Marijuana** - (MI, Mary Jone, Puff)
 - Any part of plant (Psychomimetic effect)
2. **Bhang** - From Dried Leaves / Stem of Cannabis
 - <15 % Active Principle (AP)
 - Majoon** - Sweet made from Bhang.
3. **Ganja:** - From Dried Flowers of the female plant
 - 15 to 25% AP
 - Cigarettes - Joint / Reefer
4. **Hashish / Charas** - From Dried Resin exudate.
 - 25 to 40 % AP (Most Potent)
5. **Sinsemella:-**
 - Seedless Cannabis



Bhang



Reefer

Hashish / charas

Fatal dose:

- Bhang - 10 gm/Kg body weight
- Ganja - 8 gm / kg body weight
- Hashish - 2 gm / kg body weight

Effects:-

On low doses →

1. Euphoria, elated, laughing
2. Temporal / Spatial disorientation
3. Intensification of Sensation

On high doses →

1. Hallucinations, Psychosis
2. Blood shot (congested eyes)
3. Increased duration of coitus (Aphrodisiac)

Effects of chronic Cannabis abuse:-

1. Amotivational syndrome

- Lack of interest
- Social withdrawal

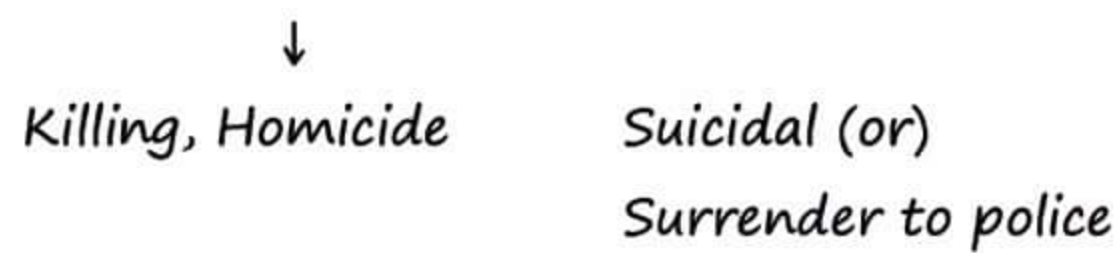
2. Hashish Insanity



- Increased incidence of Mania, Schizophrenia, psychosis is seen.
- RUN AMOK
 - Homicidal impulse
 - Person deliriously runs and killing everyone

Sequence of RUN AMOK:

Depression → Run AMOK → depression



3. Flash Back Phenomenon

- Very commonly noted with LSD, Sometimes seen in cannabis.

4. Cannabis Hyperemesis Syndrome

Vomiting, Abdominal pain are the symptoms of chronic abuse of Cannabis
These symptoms will subside when the person is under hot showers.

Test:-

→ Basically, diagnosed by smell of cannabis (Burnt rope smell)

1. Urine Sample (Best test) → TLC

Treatment:

- No antidote for cannabis
- Decontamination
- Supportive measures

COCAINE

Street names: -

- Snow
- White lady
- Cocaine is an alkaloid obtained from leaves of *Erythroxylum Coca*.



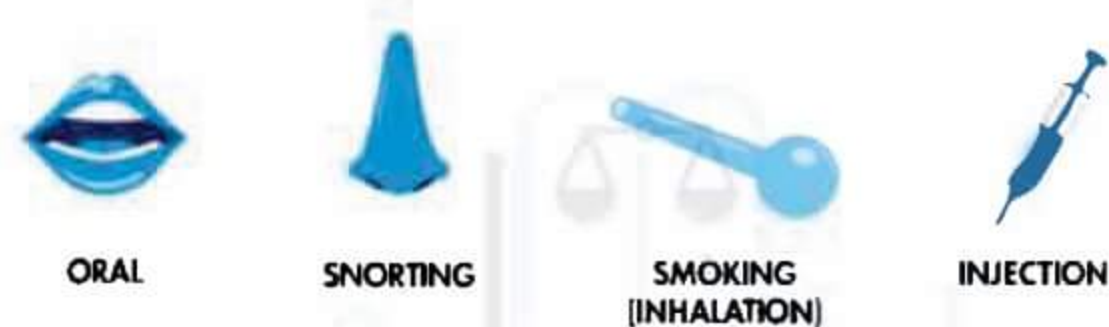
Erythroxylum coca

Forms of Cocaine

1. Cocaine hydrochloride – Injection
2. Crack – (Cocaine + Baking Soda) – Smoke

Methods of Cocaine abuse:

1. Snorting



2. Swallow
3. Injection
4. Inhaled

Effects of Cocaine: -

- Cocaine is *sympathomimetic*, because it blocks the reuptake of Noradrenaline, Serotonin, Dopamine this causes the increased levels of these neurotransmitters at synaptic cleft.
- Cocaine also has *anesthetic effect*, as it blocks the sodium channels.



Snorting

Sympathetic activity after Cocaine intake:

- ↑ HR
- ↑ BP
- Vasoconstriction
- ↑ Sweating
- Mydriasis
- ↑ temperature (Hyperthermia) → Crack Fever
- ↑ CNS excitation
- Involuntary Activities → Crack Dance

Fatal Dose → 1 gram IV

Cocainomania / Cocainism → Irresistible impulse to take cocaine and can tolerate up to 10 grams.

Body Packer Syndrome:-

→ Seen in Acute cocaine Poisoning

- Body Packers (mules) → Swallow cocaine Packets → Smuggle
- If cocaine packet ruptures → Increased Stimulation of sympathetic System

→ Symptoms like,

- ↑ Sed Sweating
- Palpitations
- Chest Pain (Angina)

→ If these symptoms persist, the Person may die of,

- Myocardial Infarction
- Intracerebral Hemorrhage/Stroke

Diagnosis: -

X-ray }
CT-Scan } Multiple Pockets of cocaine are seen in Bowel loop.

Treatment:

1. Monitor the vitals
 - Amyl nitrate – to control Blood Pressure
2. Decontamination

Chronic Cocaine abuse: -

1. Nasal Septum ulceration / Palatal ulceration
2. Black Colour tongue teeth
3. Peripheral Gangrene
4. Agitated delirious syndrome
5. Cocaine Bugs – Tactile hallucination of creeping sensation under the skin.

↓

Scratching

↓

Magnan's Sign/symptom ← Excoriation & Ulcers

CARDIAC POISONS**ACONITE/ MITHA BHUSH/ MITA ZAHER/ MONKS HOOD**

→ Root is most toxic

→ **ACTIVE PRINCIPLES** → Alkaloids

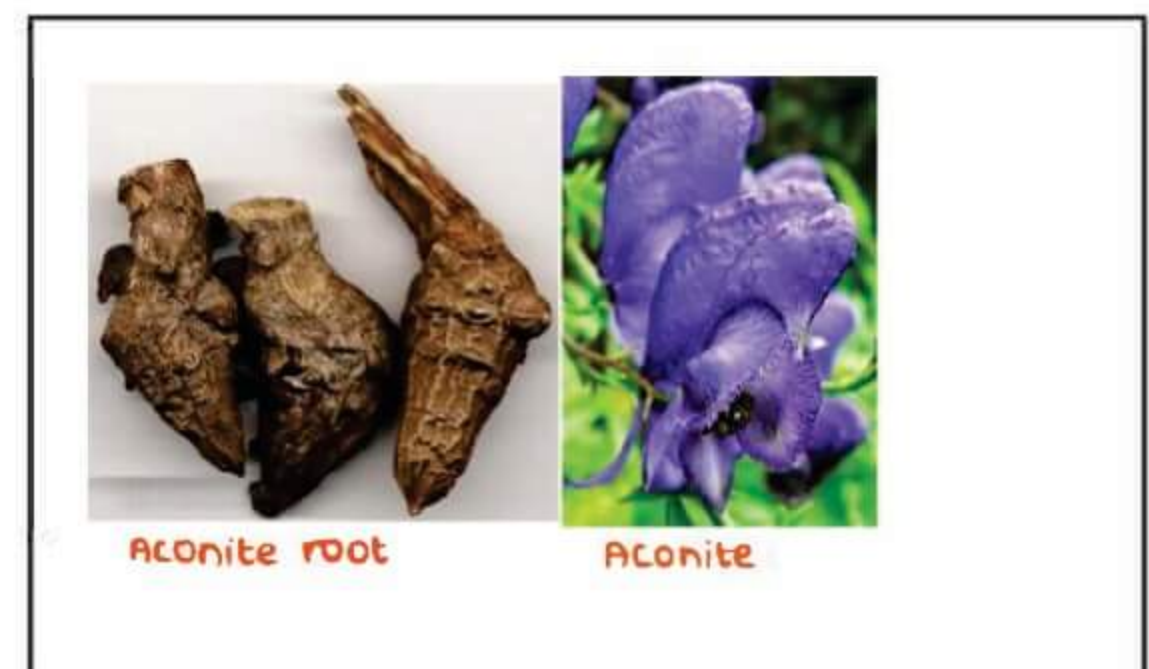
- Aconitine
- Pseudo aconitine
- Indo aconitine

→ **TOXIC EFFECTS**



- Parasthesia in perioral region
- **Hippus** → alternate pupillary constriction & dilatation
- Cardiac arrhythmia → Death

→ **IDEAL HOMICIDAL POISON**

1. Small quantity can be fatal
2. Tasty
3. Destroyed by putrefaction can't be detected. by tests



OLEANDER

PINK OLEANDER / KANER	YELLOW OLEANDER/ PILA KANER
<i>Nerium Odorum</i>	<i>Cerebra thevetia</i>
Active principles *** Nerin Nerifolon	Active principle *** Thevetin Thevetoxin
	<i>Causes hyperkalemia → arrhythmias (cardiac)</i> 

SPINAL POISONS**STRYCHNOS NUX VOMICA/ KUCHILA****Active principle**

- Strychnine (most potent)
- Brucine
- Loganine

SEEDS

- Looks like RBC
- 1 crushed seed is fatal

MECHANISM OF ACTION

- Acts of anterior horn cells of spinal cord
- Inhibits glycine & causes reflex excitation of muscles
- Leads to muscle convulsions
- Resemble tetanus

TONUS

1. **Opisthotonus** → backward bending of spine
2. **Emprosthotonus** → forward flexion of spine
3. **Pleurosthotonus** → Lateral flexion of spine

TREATMENT → Anticonvulsants

SAMPLE FOR THE TEST

→ Urine → 20% of nux vomica is excreted by urine without change

TESTS

- WENZELS TEST → Outdated
- THIN LAYER CHROMATOGRAPHY [TCL] used
- HIGH PRESSURE LIQUID CHROMATOGRAPHY [HPLC] now

ASPHYXIANT

CARBON MONOXIDE INTOXICATION

PROPERTIES OF CO

- Gas
- No smell
- Lighter than air
- 210 times more affinity to Hb than O_2 → **Anemic anoxia**

EFFECTS

0 - 10	→ no symptoms
10-20	→ Mild headache
20-30	→ Emotional instability
30-40	→ ↑ Headache, confusion
50-60	→ Mimics drunkenness
> 70	→ Coma → Death

TEST FOR CO INTOXICATION

1. Spectroscopy (most definitive)
2. Kunkel's test
3. Hoppe seyler's test
4. Gas Chromatography

FEATURES

1. Cherry Red hypostases
2. B/L necrosis of Globus pallidus/ putamen

MANAGEMENT

1. High flow O₂

CYANIDE

- ideal suicidal poison (most rapid when inhaled)
- Oil of bitter almonds smell

COMPOUNDS

1. Hydrogen cyanide

Toxic

2. Hydro cyanide acid

3. Potassium cyanide nontoxic + HCL → Hydrocyanic acid

4. Sodium cyanide Achlorhydria protects from toxic effects

→ Seen in Almonds, apple, peach, linseed plant

→ Cyanide inhibits cytochrome oxidase (ETC) → HISTOTOXIC ANOXIA

MANAGEMENT**1. LILLY'S ANTIDOTE**

→ Contain

Sodium nitrite

Induces meth - Hb → cyano meth Hb

Amyl nitrite

Sodium Thiosulfate + Cyano - Meth Hb → Thyocyanate

- Non toxic

- Water soluble

2. VITAMIN B₁₂**3. DICOBALT EDTA**

→ Bright/ brick red hypostasis seen

→ Bedside test for cyanide → **LEE JONES TEST**

Agricultural Poisons

* Insecticide poisoning

- M/C poisoning method used in rural areas

- Groups :-

- (1) Organophosphorus (OPC)
- (2) Organo carbamates
- (3) Organo chlorines
- (4) Pyrethroids

(1) Organophosphorus (OPC)

- Parathion (follidol)
- Methyl parathion
- Malathion
- HETP, TEPP
- Diazinon (Tik 20)

(2) Organo carbamates

- Aldicarb
- Carbaryl
- Propoxur

(3) Organo chlorines

- DDT
- Lindane

- Endrin (Plant penicillin)

(4) Pyrethroids

- Mosquito repellants

Organophosphorus

- Smell – Kerosene like [due to presence of aromax)
- MOA – Inhibits acetylcholine esterase enzyme

Ache \longrightarrow reversible \longrightarrow irreversible
 Inhibits(ageing)

- If ache is inhibited it gives cholinomimetic actions
- C/F

Muscuranic	Nicotinic
“Sludge BBB”	Monday – Mydriasis
S – Salivation	Tuesday – Tachycardia
L – Lacrimation (Red tears)	Wednesday – Weakness of muscles
U – ↑ urination	Thursday – Hypertension
D – Diarrhea	Friday – Fasciculations
G – GIT upset	
E – Emesis	
B – Bronchospasm	

B – Blurring of vision [constricted pupil]	
B – Bradycardia	

* Diagnosis

(1) Check the cholinesterase enzymes level

True cholinesterase (RBC)	Pseudocholinesterase (Plasma)
- Correlates with clinical features	- Sensitive

(2) Paranitrophenol test

- Done for parathion poisoning

*Rx

1) Decontamination

2) Atrophine I.V.

(Blocks the Muscarinic effects)

3) Oximes

(Acetyl cholinesterase enzyme reactivator)

Pralidoxime

4) supportive Rx

OPC	Carbamates	OC
- Atropine - Oximes	- Atropine	Symptomatic Rx. Cholestyramine

Intermediate syndrome	Delayed syndrome
- Occurs in 1-4 days D/t	- Occurs in 1-4 wks
- Inadequate Rx in acute episode	- D/t nerve demyelination & axonal degeneration
- Weakness of muscles ↓ (1) Proximal group muscles (2) Flexors neck	- Weakness of muscles ↓ (1) Distal group muscles (2) Pt. has Paraesthesia
- Rx is supportive measures	- Rx is supportive measures

MISCELLANEOUS

HALLUCINOGENS

LSD

Common names

- Acid
- Blotter
- Golden dragon
- Purple heart

Features

- Person will have trip (good or bad)
- Synesthesia → One sense is observed by another sense
- Flash back phenomenon → even without drug effects are nt
- Does not cause physical dependence (soft drug)
-



RAVE DRUGS/ CLUB DRUGS

G hb

Amphetamine → Liquid gold (40% of drug excreted unchanged in urine)

LSD

Ecstasy (MDMA/MOLLY)

DATE RAPE DRUGS

Alcohol

Barbiturates

Chloral hydrate → Mickey's Finn/ Knock out drops

Rohypnol

METAL FUME FEVER/ ZN FUME FEVER

→ d/t inhalation of Zn vapours

→ Resembles malaria

ANGEL DUST → Phencyclidine

BARBITURATES

- Cause hypothermia
- Skin blister are seen
- Rx by forced alkaline diuresis
- Automatism → accidental poisoning with barbiturates
- Golden urine d/t colour

ERGOT

- Derived from fungus → *Claviceps purpura*
- Grows on wheat, rye, barley
- Active principle (Alkaloids)
 - Ergotoxine
 - Ergotamine
 - Ergotamine
- Cause vasoconstriction, stimulation of smooth muscles

CHRONIC ERGOT POISONING (ERGOTISM)

- Causes gangrene (d/t vasoconstriction)
- Resemble Raynaud's disease
- Causes Paresthesia
- Rx by nitrates

CHINESE RESTAURANT SYNDROME → d/t MSG

LOVE PHILTERS

Cantharides

Opium

Canabis

Alcohol

Datura

FORENSIC PSYCHIATRY

PSYCHIATRY → Branch of medical science that deal with study, diagnosis & treatment of mental illness

FORENSIC PSYCHIATRY → Deals with the application of psychiatry in the administration of justice

COMMON SYMPTOMS

1. Delusion
2. Hallucination
3. Illusion
4. Impulse

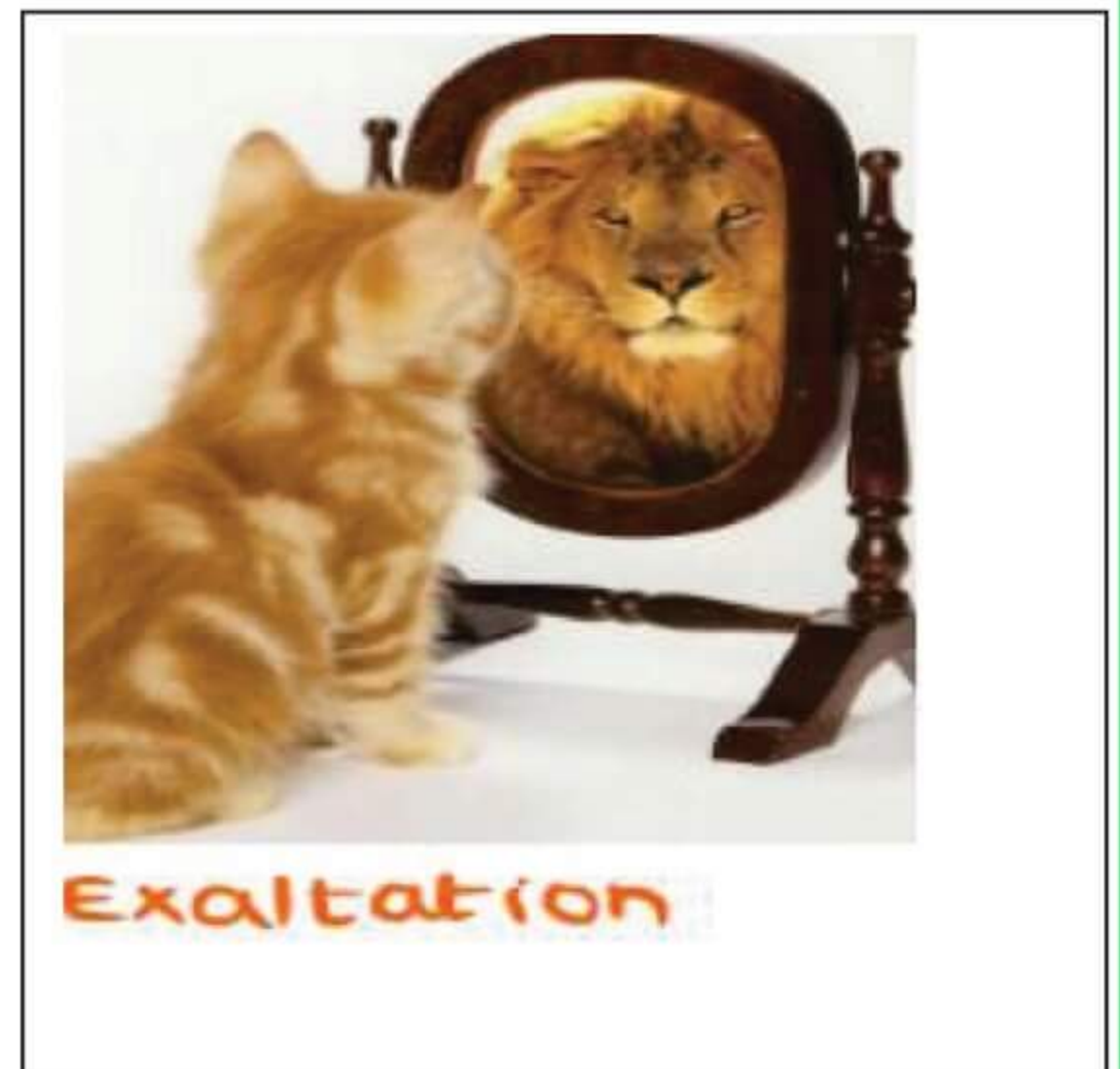
DELUSION

- False belief in something
- Which is not a fact,
- Which persists even after its' falsity has been clearly demonstrated
- One of the symptoms of various mental illnesses

TYPES

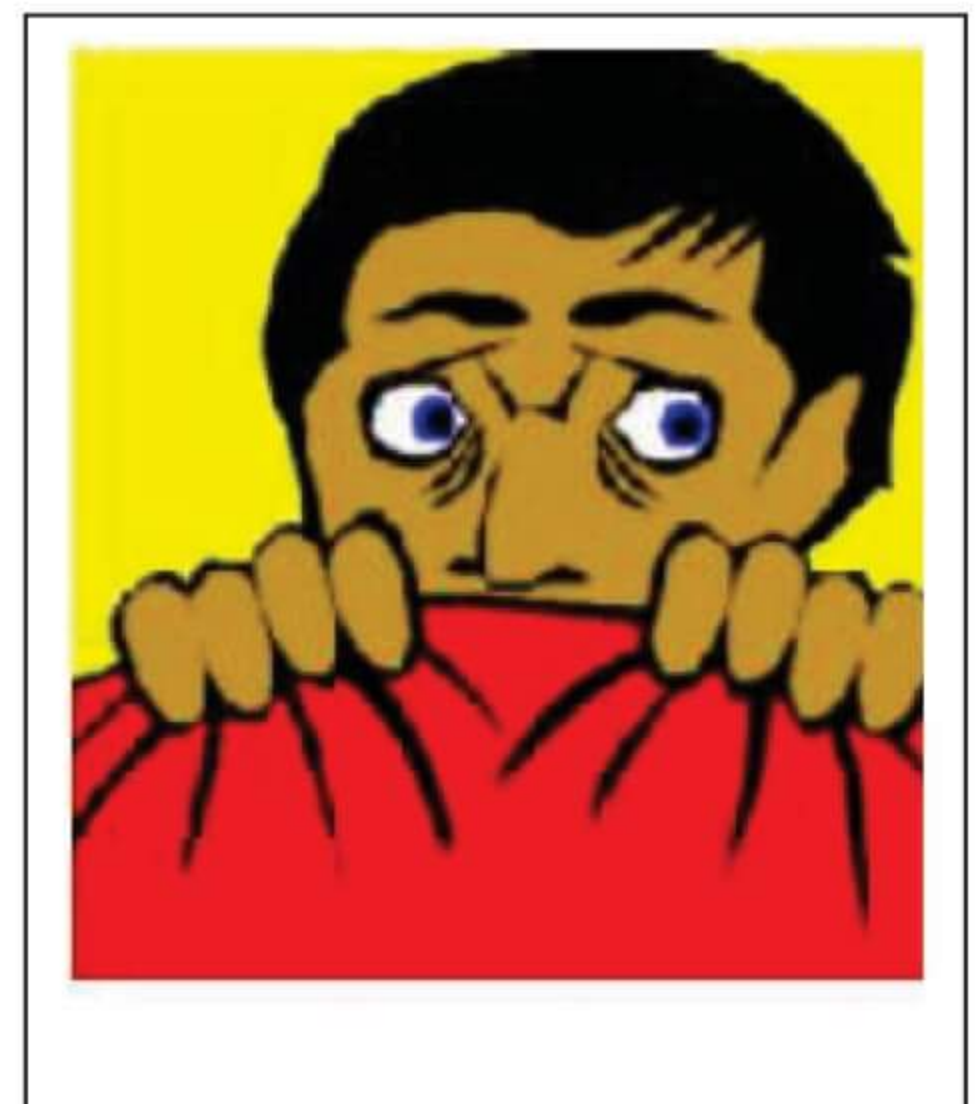
1. DELUSION OF GRANDEUR OR EXALTATION

- Person imagines that he is rich, powerful while in reality he may be a pauper
- Seen in mania
- a/w delusion of persecution



2. DELUSION OF PERSECUTION/ PARANOID

- The person imagines that people are after him and may kill him, poison him (wife, son or parents) or harm him
- The person remains suspicious & depressed & may commit some crime
 - He may commit suicide or kill innocent person thinking them to be his enemy



3. DELUSION OF REFERENCE

→ The person believes that everybody is thinking about him only & being referred by all agencies, media and persons around him in all matters (usually of negative nature)



4. DELUSION OF INFLUENCE/ CONTROL

→ Patient complains that his thought process & actions are being influenced & controlled by some external power like radio, hypnotism or telepathy

→ On the basis of imaginary 'command' he may commit a crime

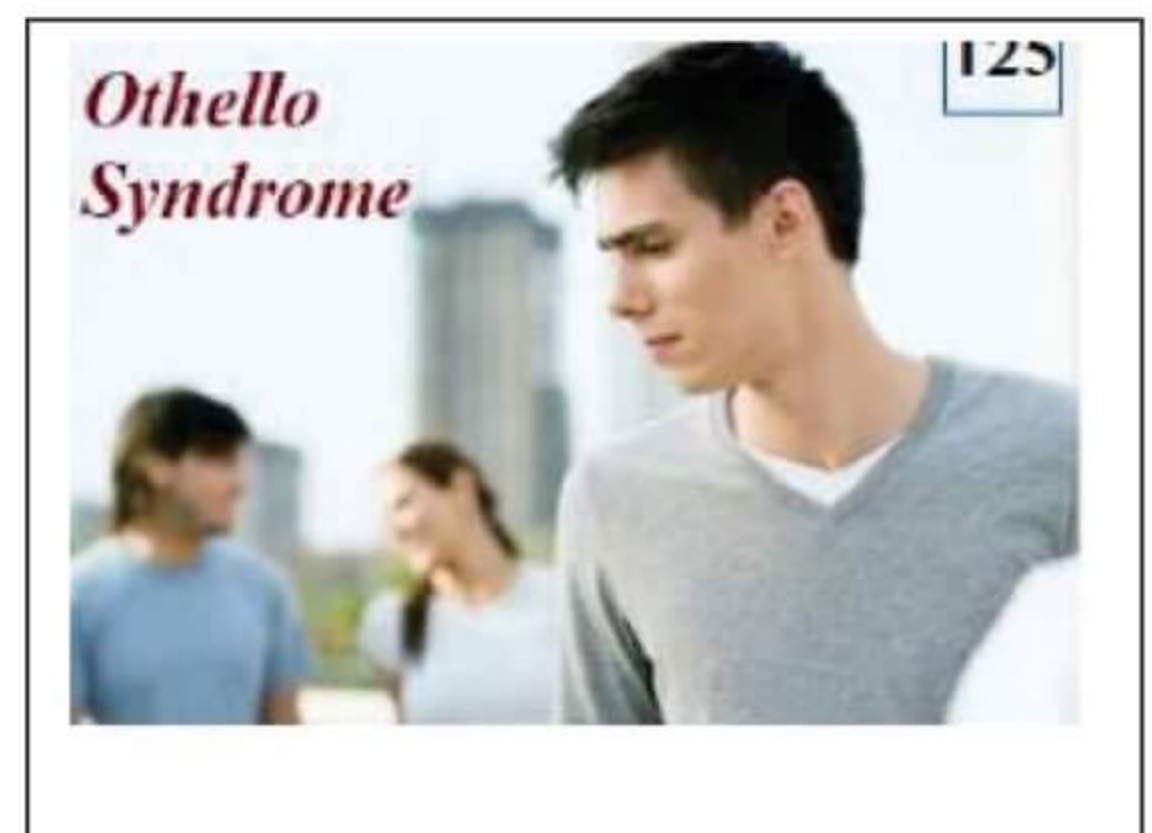


5. DELUSION OF INFIDILITY/ JEALOUSY/ OTHELLO SYNDROME

→ The person thinks that his/ her spouse is not loyal to him/her

→ common in males

→ Person may commit crime



6. NIHILISTIC DELUSION

→ Person does not believe in his existence or that the world exists

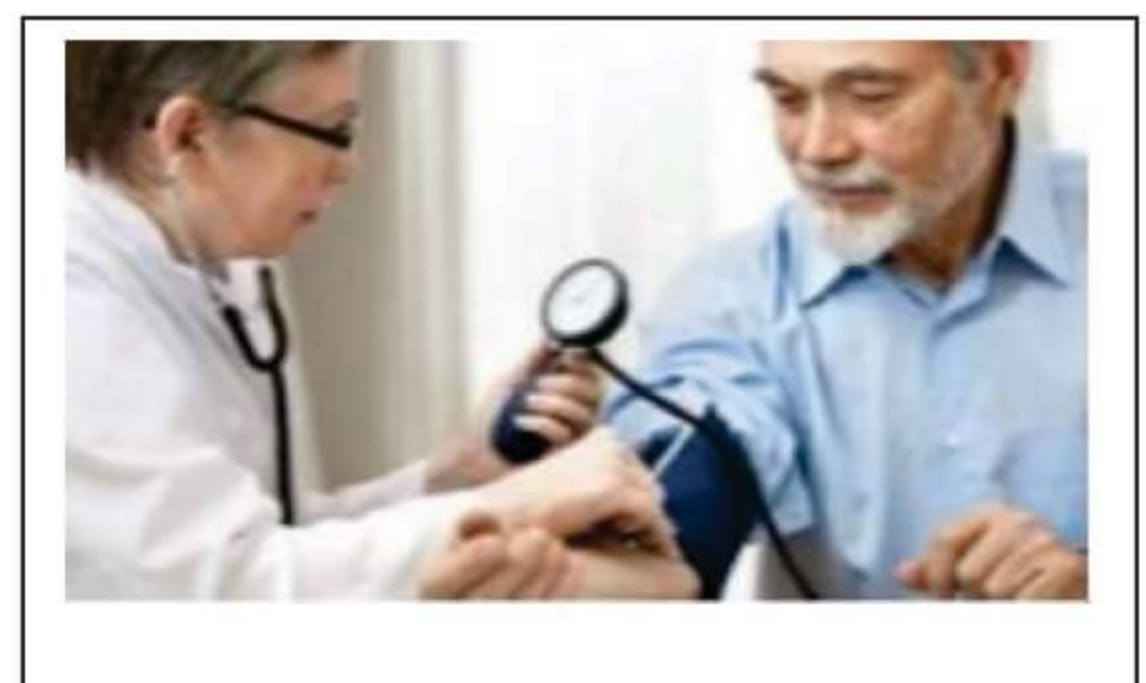
→ They may commit suicide or kill others

→ Seen in depression

7. HYPOCHONDRIAL DELUSION

→ Person thinks he is ill always, while medically he may be completely fit

→ He keeps on visiting doctors & usually gives vague abdominal complaints



8. EROTOMANIA – DE CLERAMBAULT SYNDROME

- In this, a woman thinks that a particular person, especially superior, is in deeply love with her
- Develops an obsession for the person & starts believing that the other person is reciprocating
- She tries to get in close to the person through telephone calls, emails, letters, gifts & visits
- More common in women

9. FREGOLI'S DELUSION

- The person believes that the same person is coming in different disguises

10. CAPGRAS DELUSION

- The person feels one of his family members or any person close to him is replaced by someone else who is identically looking

DISORDER OF PERCEPTION

1. HALLUCINATION
2. ILLUSION

HALLUCINATION

- False sense of perception without any external object or stimulus to produce it
- Purely imaginary & may affect any or all the special senses
- Causes

Part of mental disorders

High fever, drug addiction, or in head injuries

TYPES OF HALLUCINATIONS

1. VISUAL HALLUCINATION (mc in organic mental disorder)
2. AUDITORY HALLUCINATION (mc)
3. OLFACTORY HALLUCINATION



Seen in temporal lobe epilepsy

4. GUSTATORY HALLUCINATION
5. TACTILE HALLUCINATION

→ seen in cocaine abuse (magnan's symptom)

ILLUSION

- It is false interpretation by the sense of an external object or stimulus which has real existence
- Optical illusions are common in deserts (water may be seen at places)
- Rope may be seen as snake at night

IMPULSE

- Sudden, irresistible force which compels a person to do an action without motive or forethought
- A normal person always tries to analyze his actions whether they are consistent with law or not act accordingly
- But in impulse, a person is not able to control himself

TYPES OF IMPULSE

- | | |
|-----------------------------|--|
| 1. KLEPTOMANIA | → impulse to steal things usually of low value |
| 2. PYROMANIA | → Impulse to set things on fire |
| 3. MULTILOMANIA | → Impulse to maim animals |
| 4. DIPSOMANIA | → Impulse to drink at periodic intervals |
| 5. HOMICIDAL IMPULSE | → Impulse to kill someone |
| 6. TRICHOTILLOMANIA | → Impulse to pull one's own hair |
| 7. ONIOMANIA | → Impulse to buy things |
| 8. SUICIDAL IMPULSE | → Impulse to commit suicide |
| | → Seen in depression, schizophrenia, mania etc |

LUCID INTERVAL

- Period of normality in between period of symptoms of mental illness
- In this period the symptoms of mental illness may completely absent

→ **MEDICO LEGAL IMPORTANCE**

1. Enjoys all civil rights
2. Criminally responsible for unlawful acts

MENTAL HEALTH CARE ACT 2017

- came into effect in **April 2017**
- divided into **16 chapters**

ADVANCE DIRECTIVE FEATURES

- It empowers the patient to choose his/her & appoint a representative to take decision on behalf of the patient
- It is the duty of every psychiatrist to plan Rx, keeping advance directive in mind
- Not applicable at the time of emergency
- If anyone from psychiatrist or care giver are unsatisfied can approach to the concerned board

VARIOUS RIGHT OF MENTALLY ILL PERSON

- The government should make provisions of mental health instructions on every district
- No restraint shall be used as a form of punishment. If used patient should be kept on supervision
- Right of confidentiality
- Professionals conducting research should take sign in informed consent of mentally ill person & consent from board

ADMISSION, TREATMENT & DISCHARGE

- Independent patients or independent admission should be done as far as possible. Treatment done after informed consent
- The nominated representative or attendant shall stay with the minor for the entire duration of admission
- Mentally ill person who requires Rx beyond **30 days** should be reviewed by **two psychiatrist**

→ EMERGENCY TREATMENT

- Any registered medical practitioner can initiate emergency Rx to any person with mental illness if there is threat to self, other, objects or property (section 94. 1)

DEALS WITH PENALTY & PUNISHMENT

- Unauthorized institutions will be punished **500-50000** for 1st time, **upto 2 lakh** for 2nd time
- Any person who do the work against act, are liable to give **upto 10,000** or **six months** of jail or both

→ OTHER SALIENT FEATURES

- No pmi (Person with mental illness) in an MHE (Mental Health establishment) shall be subjected to compulsory tonsuring (20.2.i)
- A PMI shall not be forced to wear uniform provided by the MHE (section 20.2.j)

→ ECT (Electroconvulsive therapy) shall not be performed without the use of muscle relaxants & anesthesia (section 95.1.a)

→ ECT shall not be performed on minors. In exceptions cases it may be done after prior permission of the board (section 95.1.b and 95.2)

→ Sterilization of men or women, intended as a Rx for mental illness, shall not be done

→ Psycho Sx shall not be performed as a Rx for mental illness without obtaining the informed consent of the patient and approval from the board

→ Physical restraints shall be only when absolutely needed, & are deemed as the least restrictive method (section 97.1)

→ Seclusion & solitary confinement is totally banned (section 97.1)

SUICIDE

→ Attempt to suicide → not punishable

→ 309 IPC decriminalised

DIFFERENCE B/W TRUE & FEIGNED INSANITY

TRAIT	TRUE INSANITY	FEIGNED INSANITY
Onset	Gradual	Sudden
Motive	Absent	Always present
Predisposing factor	Always present	Absent
Signs & symptoms	Uniform & points towards a particular mental illness	Irregular & Exaggerated
Facial appearance	Vacant look	Voluntary exaggeration
On exertion	Can with stand exertion without any sign of fatigue	Cannot with stand
Habits	Dirty & Filthy	Clean
Appetite & food	Can resist days together	Fails to do so
Frequent examination	Does not mind at all	Resents frequent examination for the fear of detection
Sleep	Suffer insomnia night together	With difficulties for 1-2 days

CIVIL RESPONSIBILITIES OF INSANE PERSON

TESTAMENTARY CAPACITY

- A will is a document detailing the disposition of property owned by a person.
- Person who makes the will is referred to as the testator
- Testamentary capacity refers to the capacity of a person to make a valid will

SALIENT FEATURES OF A VALID WILL

- Should be executed by a testator
- Should be a major
- Should have sound disposing mind
- Should be fully conscious about his acts & its implication
- will after execution should be signed by the testator in the presence of at least 2 witnesses

HOLOGRAPH WILL → A will written by a testator himself in his own handwriting

MANAGEMENT OF PROPERTY

- When a relative of a mentally ill person applies to the district court, that because of mental illness, a person is incapable to manage his properties & he is not violent & dangerous
- The court may hold a judicial inquisition
- If the medical examination states the mental illness of the person, then
- The court appoints a manager granting him necessary power to take care of property & prepare its amounts
- On cessation of the mental illness after second examination the person can take charge of his property himself

INSANITY & MARRIAGE CONTRACT

- The marriage will be considered null & void,
- If it is proved that either of the partner at the time of his/ her marriage was of unsound mind
- Mental illness after marriage *cannot be ground for divorce*

→ But at times divorce can be demanded provided that the insanity seen in incurable, even after continuous, even after continuous Rx for a period over 3 years

INSANITY & BUSINESS CONTRACT

→ Contract made by a mentally ill who does not understand the nature & quality of contract will be considered invalid

→ Contract made during lucid interval will be held valid

INSANITY OF CONSENT

→ A mentally ill person cannot give a valid consent (sec 90 IPC)

INSANITY & WITNESS

→ Vide sec 118 IEA

→ A mentally ill person cannot be considered as competent to give evidence in the court of the law, if he does not understand the questions and answer rationally.

→ He can be regarded as competent during lucid interval

INSANITY AND CRIMINAL RESPONSIBILITY

In India, sec 84 IPC discusses about the criminal responsibility of Insane persons

MC NAUGHTEN RULE/ RIGHT OR WRONG TEST/ LEGAL TEST (1843)

→ At the time of committing the act, the accused was suffering

→ a defect of reason, from disease of mind,

→ as not to know the nature & quality of the act he was doing;

→ or he did not know he was doing what was wrong

→ 84 IPC is on the basis of MC Naughten rule & reads as

- Nothing is an offence, which done by a person,

who at the time of doing it,

by reason of unsoundness of mind, is capable of knowing the nature of the act or that, what he is doing is either wrong or contrary to the law.



DURHAM'S RULE (1954)

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

CURRENS' RULE (1961)

- An accused person is not criminally responsible,
- if he did not have the capacity to regulated his conduct to the requirements of the law, as a result of his mental disease or defect

THE IRRESISTIBLE IMPULSE ACT (NEW HAMPSHIRE DOCTRINE)

- An accused person is criminally not responsible
- Even if he knows the nature & quality of his act,
- If he incapable of restraining himself from committing the acts,
- Because the free agency of his will has been destroyed by the mental illness

THE AMERICAN LAW INSTITUTE TEST [ALI] 197

- A person is not responsible for his criminal acts,
- As result of mental disease or defect
- He lacks adequate capacity to appreciate the criminality of his conduct or
- To adjust his conduct to the requirement of the law.

SOMNAMBULISM

- Walking during sleep
- He is not asleep but in a state of dissociated consciousness, unrelated to the immediate environment
- The crime is not willful or premediated
- There is no recollection of the event
- Such a person is criminally not responsible for his acts

STARVATION DEATHS

Definition

→ Actual withholding of food or food & water by an individual necessary for the maintenance of the body

TYPES

1. ACUTE/ COMPLETE

→ When food is withheld suddenly & completely for a continuous period

2. CHRONIC/ PARTIAL/ MALNUTRITION

→ When food intake is deficient, either quantitatively or qualitatively for a continuous period

CAUSES

1. Famine
2. Being trapped in pits, landslides, mines
3. Neglect on the part of parents or guardians; Ex: child abuse
4. Willful withholding of food; Ex – elderly
5. Willful refusal to take food; Ex – Religious rituals (Fasting)

hunger strikes

IN STARVATION

→ There is severe reduction in

- Vitamins
- Minerals
- Energy intake

→ *mc form of malnutrition*

FATAL PERIOD

→ *Food & H₂O stopped*, death occurs in *10-12 days*

→ *Food alone* is stopped, death occurs in *6-8 weeks*

→ Loss of *40%* of *body weight* is fatal

→ Loss of *70%* *fat* is fatal

→ Loss of *20%* *protein* is fatal

CAUSE OF DEATH

1. Cardiovascular failure
2. Infections
3. Dehydration
4. Occasionally d/t failure of other vital functions of the body

PM FINDINGS

→ Emaciation with loss of body weight & organ weight (main finding)

- Complete loss of fat in the subcutaneous & dep fat depots
- Complete disappearance of body fat with pronounced rib cage

→ Severe atrophy of skeletal muscles, lungs, heart, liver, spleen, kidneys, endocrine & reproductive organs (ovaries, testes), except of the brain

→ In Infants, complete atrophy of thymus is pathognomic of starvation

→ Disuse atrophy of the GIT with translucent small intestinal walls (thin paper like)

→ Stomach & small bowel are empty along with presence of dry stools in the colon. Even foreign bodies may be found in the colon

→ Loss of adipose tissue of the mesentery

→ Gall bladder bigger in size & distended with bile

→ Liver → It may show centrilobular necrosis d/t protein deficiency

→ Kidney → It may show atrophy of nephrons

DIAGNOSIS

→ Based on History & PM findings

→ Before opining on starvation as cause of death, **Natural diseases causing cachexia should be ruled out.**

MEDICO LEGAL ASPECTS

SUICIDAL

→ Some starve voluntarily for fulfilment of their grievance

→ Prisoners, mentally ill or hysterical woman

HOMICIDAL → Elderly person or victims of child abuse

ACCIDENTAL

→ Famine, shipwreck, trapped in mines or landslides during earthquakes