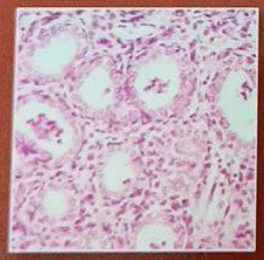
FORENSIC MEDICINE & TOXICOLOGY

PRACTICAL GUIDE

New

Dr. P.C. Ignatius

FOR MBBS PRACTICALS BASED ON THE NEW NMC CURRICULUM



Complimentary Companion to *Textbook of Forensic Medicine & Toxicology* 5th Edition

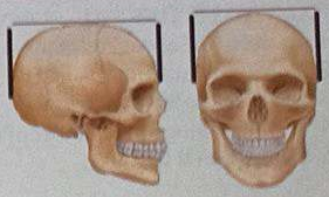
As per the new competency based curriculum

ELSEVIER

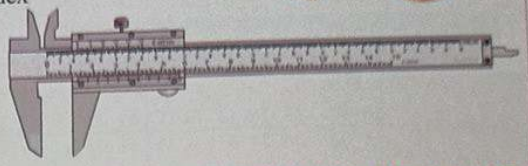
CONTENTS

MEDICOLEGAL CERTIFICATES

1. TO FIND OUT CEPHALIC INDEX



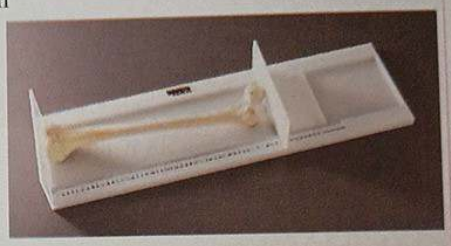
1. Set the skull on the table
2. Take maximum length of the skull by using calliper
3. Take the maximum breadth of the skull
4. Calculate and find the value
5. Write the medicolegal significance of cephalic index



Materials needed
1. Skull
2. Calliper

2. TO FIND OUT THE STATURE FROM LONG BONE BY USING OSTEOMETRIC BOARD

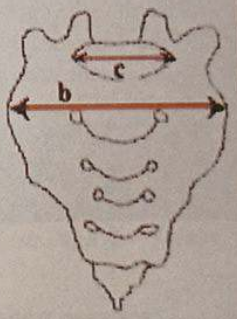
1. Set the osteometric board in the correct position
2. Place femur in the osteometric board in the correct position
3. Appose the wooden block correctly
4. Find out the oblique length of femur
5. Calculate the stature using Karl Pearson's chart



Materials needed
1. Femur
2. Osteometric board
3. Karl Pearson's chart

3. FIND THE CORPORO-BASAL INDEX and SEX FROM SACRUM

1. Measure the corpus width using calliper
2. Measure the basal width using the calliper
3. Calculate the sacral index
4. Note the other features of sex on the sacrum
5. Find out the sex

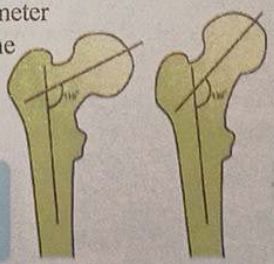


Corporo-basal index $\frac{c}{b}$

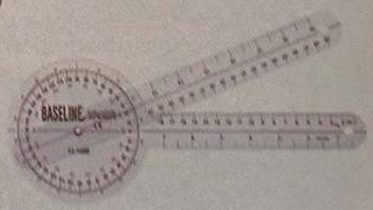
Materials needed
1. Calliper
2. Sacrum

4. FIND OUT FEMORAL ANGLE and SEX FROM FEMUR

1. Place the femur on the table correctly
2. Measure the femoral angle using a goniometer
3. Look for other features of sex on the bone
4. Find out the sex of the individual
5. State 4 differentiating features of sex



Femoral angle



Goniometer

Materials needed
1. Femur
2. Goniometer

5. TO WRITE DENTAL FORMULA

1. Examine the upper jaw of the skull
2. Note the names of teeth and their numbers
3. Examine the lower jaw
4. Note the names and number of teeth
5. Write the FDI formula

1	2
3	4

Materials needed
1. Skull with mandible

Modified FDI

18	17	-	15	14	13	12	11	21	22	23	24	25	26	27	28
38	37	-	35	34	33	32	31	41	42	43	44	45	46	47	48

6. FINGER PRINT EXAMINATION

1. Press one finger correctly on the seal pad
2. Press that finger correctly on a piece of paper
3. Write the type of finger print
4. Find out **4 reference points** and mark

Materials needed
1. Seal pad
2. Paper
3. Hand lens

Arch

Loop

7. FIND OUT THE IDENTICAL FINGERPRINTS

1. Examine the three photographs of finger prints
2. Take 4 identical reference points
3. Find out the ones which are identical

Materials needed
1. Enlarged photographs of fingerprints- 3 numbers

Whorl

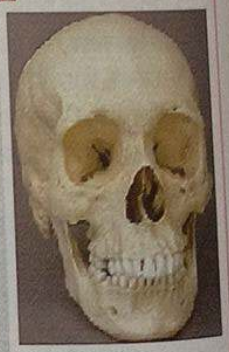
Composite

8. DEMONSTRATE THE METHOD OF SUPERIMPOSITION TECHNIQUE

1. Place the life size photograph of skull on the table correctly
2. Place the transparent life size photograph of the face over the photo correctly
3. Find out whether superimposing or not stating at least **4 points** of correspondence of anatomical and anthropological landmarks.

Materials needed
1. Life size transparent photograph of face
2. Life size photograph of the skull

1



2

9. EXAMINATION OF IDENTIFICATION MARK

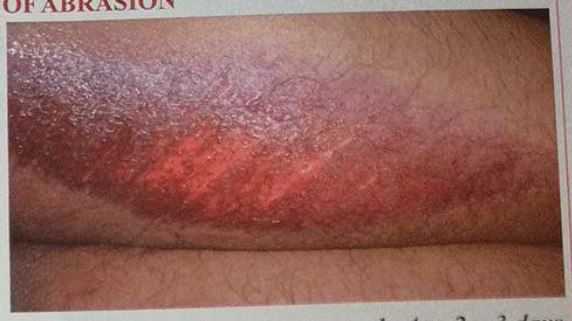
1. Identify it as an identification mark
2. Examine the type of mark
3. Examine the location of the mark with two land marks

Materials needed
1. Dummy
2. Scale /measuring tape

10. MEASUREMENT AND DESCRIPTION OF ABRASION

1. Identify the type of injury
2. Examine the type of abrasion
3. Measure the length and width
4. Measure the distance from two landmarks
5. Note down the age changes in the abrasion

Materials needed
1. Photograph/dummy
2. Scale/measuring tape
3. Hand lens

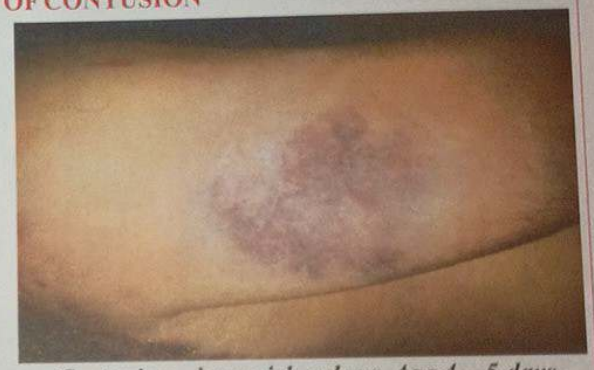


Abrasion with reddish brown scab. Age 2 – 3 days

11. MEASUREMENT AND DESCRIPTION OF CONTUSION

1. Identify the type of injury
2. Examine the pattern of contusion if any
3. Measure the length, width and depth
4. Measure the distance from two landmarks.
5. Note the age changes in the contusion

Materials needed
1. Photograph/Dummy
2. Scale / measuring tape



Contusion - brownish colour. Age 4 – 5 days

12. MEASUREMENT AND DESCRIPTION OF LACERATION

1. Identify the type of injury
2. Write the type of lacerated wound
3. Measure the length, width and depth of lacerated wound.
4. Measure the distance from two landmarks.
5. Examine for any bridging, crushing of hair, foreign bodies etc.

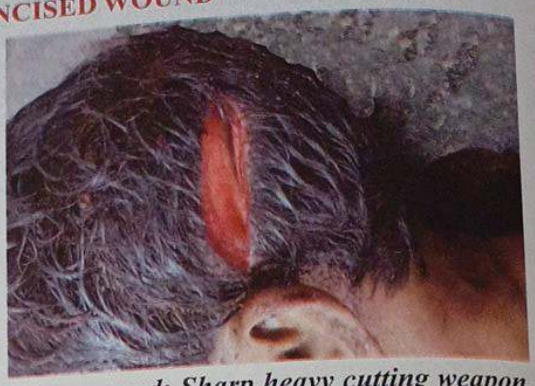
Materials needed
1. Photograph/dummy
2. Scale/measuring tape
3. Hand lens

Lacerated wound showing tissue bridging

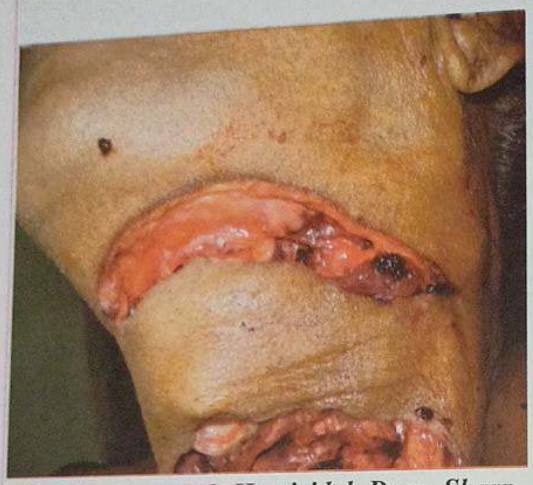
13. MEASUREMENT AND DESCRIPTION OF INCISED WOUND

1. Examine the type of injury
2. Examine the margins
3. Examine any tailing
4. Measurement of length, width and depth
5. Measure the distance from two landmarks

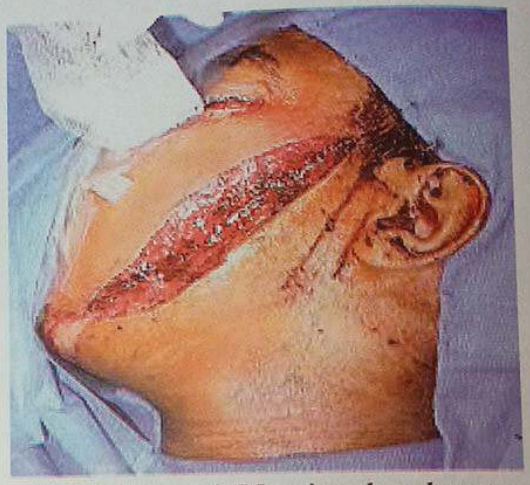
Materials needed
1. Photograph/Dummy
2. Scale/measuring tape
3. Hand lens



Chop wound: Sharp heavy cutting weapon. Bone is also cut



Cut throat wound: Homicidal, Deep, Sharp cutting weapon.

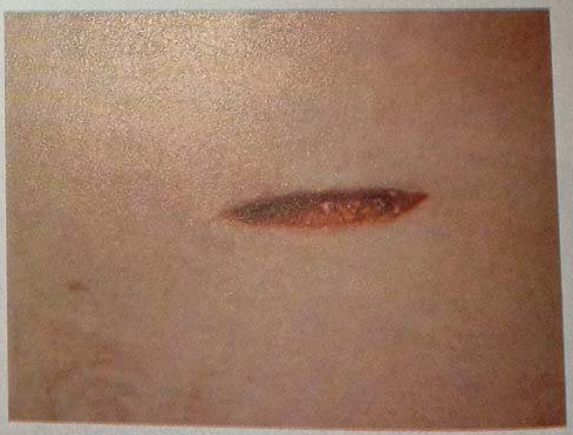


Incised wound: Margins sharply cut, length more than depth and width, sharp and light cutting weapon like a knife.

14. MEASUREMENT AND DESCRIPTION OF STAB WOUND

1. Identify the type of wound
2. Examine the margins, ends and shape of the wound
3. Measure the length, width and depth of the wound
4. Measure the distance from two landmarks
5. Examine the direction of the wound by tracking through the wound

Materials needed
1. Photograph/dummy
2. Scale /measuring tape
3. Hand lens

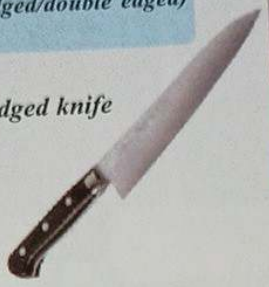


Stab with double edged knife. Hilt mark present. Depth more than length and width.

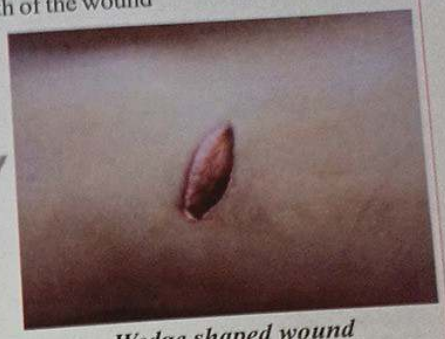
15. CORRELATING THE STAB WOUND WITH THE WEAPON

1. Examine the edges of the wound (single edged or double edged)
2. Mark the point on the weapon at a distance equal to the depth of the wound
3. Measure the width of the weapon at that point

Materials needed
1. Dummy
2. Light cutting weapon (single edged/double edged)
3. Scale/measuring tape



Single edged knife



Wedge shaped wound

16. EXAMINATION OF RIGOR MORTIS

1. Lift the eyelids
2. Lower the chin
3. Flex the neck
4. Movements of the other joints like shoulder, elbow and wrist
5. Movements of the other joints like hip, knee and ankle

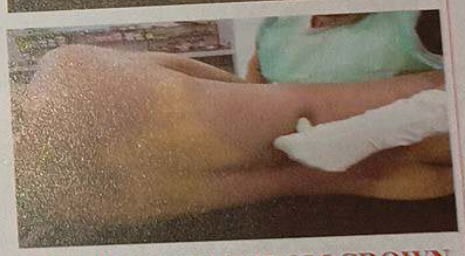
Note:
RM fully established by 4 – 6 hrs
Begins to pass of by 18 hrs
Fully passed of by 24 – 36 hrs

Material needed
1. Dummy

17. DEMONSTRATION OF FIXATION OF POSTMORTEM STAINING

1. Identify the area of postmortem staining
2. Press over the PMS with thumb for 30 – 45 seconds
3. Look for blanching

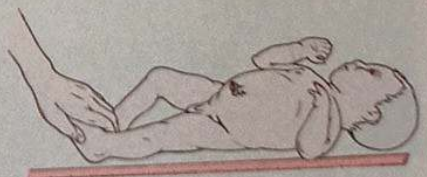
Material needed
1. Dummy



18. DETERMINATION OF THE INTRAUTERINE AGE OF THE FETUS FROM CROWN-HEEL LENGTH

1. Place the dummy in correct position
2. Measure the crown heel length
3. Apply Haase's Rule to find the intrauterine age

Materials needed
1. Dummy
2. Measuring tape

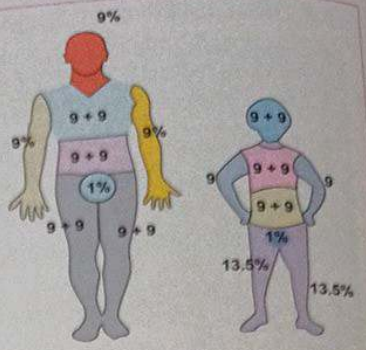


Measuring crown-heel length

19. CALCULATION OF PERCENTAGE OF BURNS

1. Examine the area of burns on each part of the body like upper and lower limbs, front and back of trunk, head, neck and genitals.
2. Calculate the total area by using Wallace rule of nine in adults and Lund and Browder chart in children

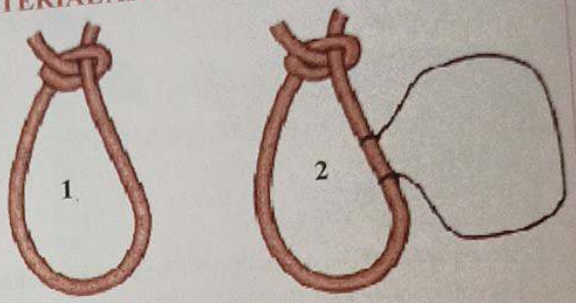
Materials needed
1. Dummy / Photograph
2. Scale / Measuring tape



20. MEASUREMENT OF THE LIGATURE MATERIAL AROUND THE NECK

1. Examine the material (it's type, texture etc)
2. Measure the loop around the neck.
3. Measure the long free end
4. Measure the short free end
5. Any other relevant description as needed

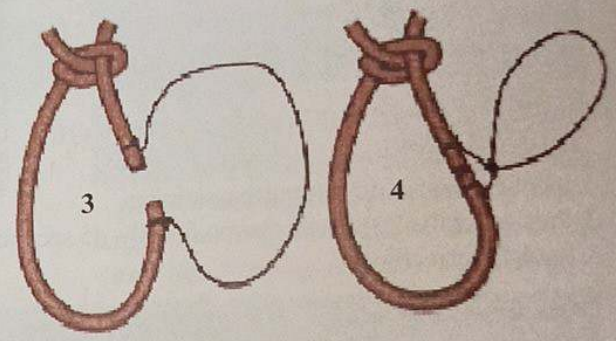
Materials needed
1. Ligature material with knot
2. Scale / measuring tape



21. PRESERVATION OF LIGATURE MATERIAL AROUND THE NECK

1. Cut opposite to the knot
2. Tie the ends of the knot using the twine
3. Examine the type of knot
4. Tie across the knot to preserve it
5. Label it

Materials needed
1. Ligature material with knot
2. Scale / Measuring tape

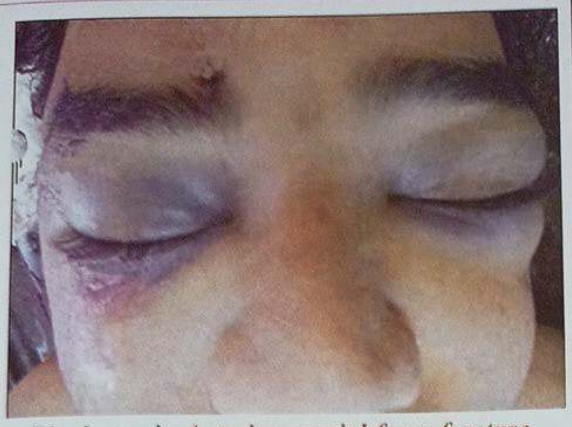


Cutting and preservation of ligature material

22. LABELLING AND PACKING OF MATERIALS FOR CHEMICAL ANALYSIS

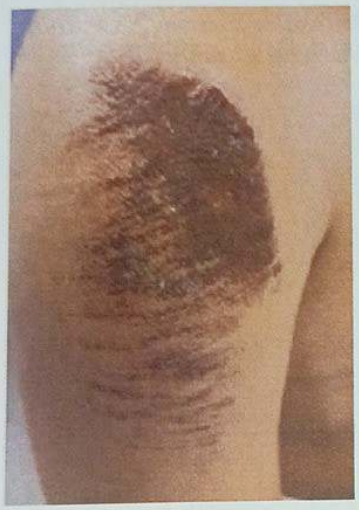
1. Fill up the label with the given details
2. Affix the label on the bottle
3. Cover it with a plane paper
4. Write the reference no: on the paper
5. Tie it with a twine in three different directions
6. Affix the seal on the knot and on the cross over area of twine

Materials needed
1. Plastic bottle
2. Label
3. Plane paper for covering
4. Twine
5. Seal and arak (sealing wax), spirit lamp

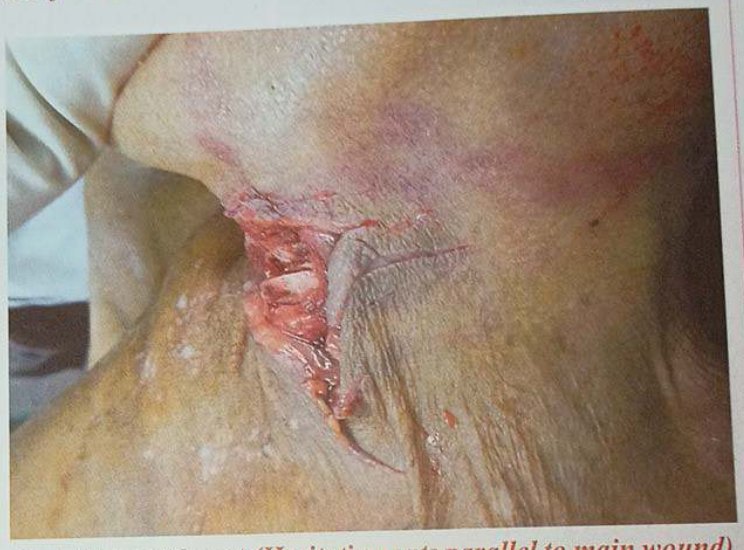


Black eye *in Anterior cranial fossa fracture*

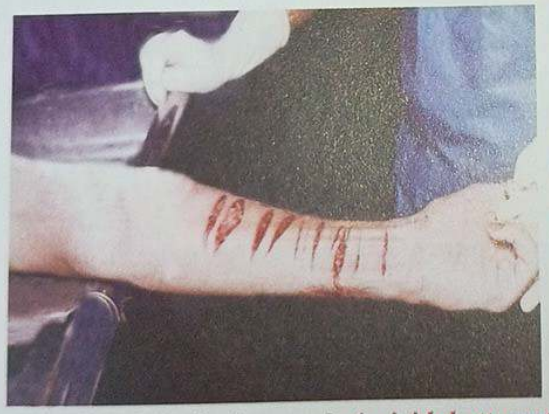
Battle's sign *in Middle cranial fossa fracture*



Abrasion *with dark brown scab.*
Age of injury: 4 – 5 days.



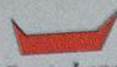
Suicidal cut throat *(Hesitation cuts parallel to main wound)*



Self inflicted incised wounds *(suicidal attempt)*

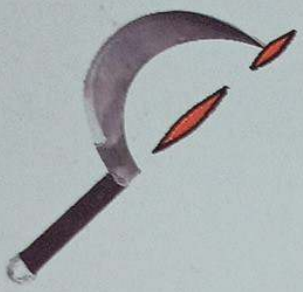
Defence wounds

WEAPONS AND INJURIES

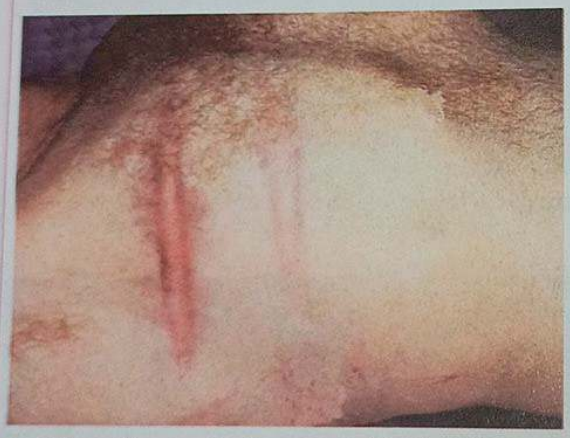


Boat shaped *Rubber tapper's knife*

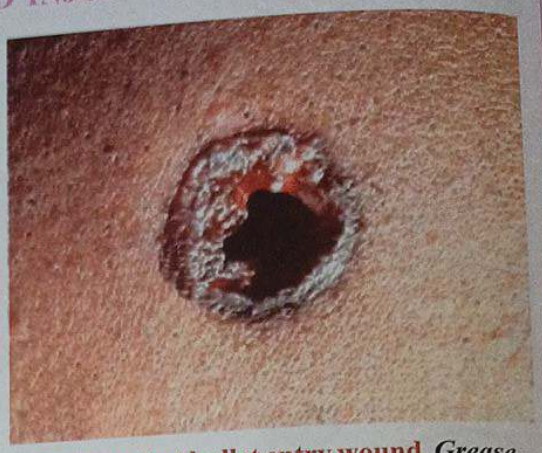
Spindle shaped *Double edged knife*



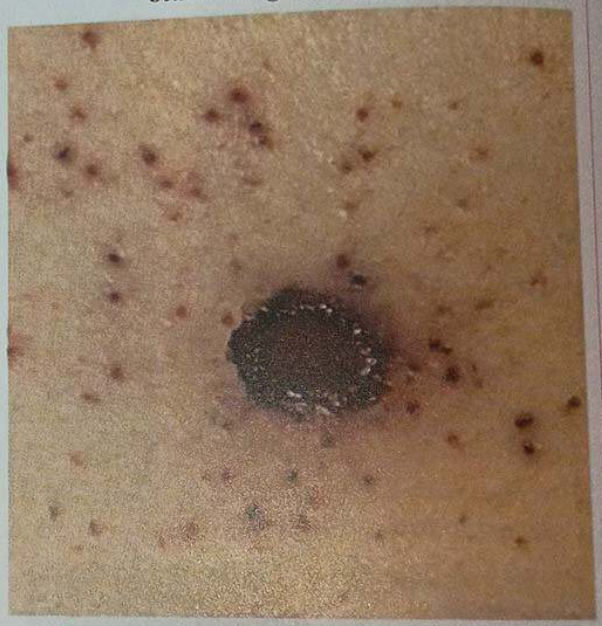
Sickle *Stab and incised wounds in a line*



Tramline contusion caused by Lathi



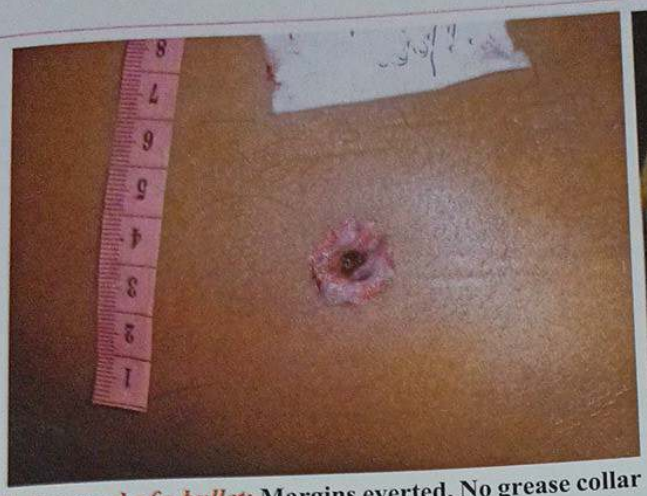
Distant shot bullet entry wound. *Grease collar, abrasion collar present. No burning, blackening or tattooing.*



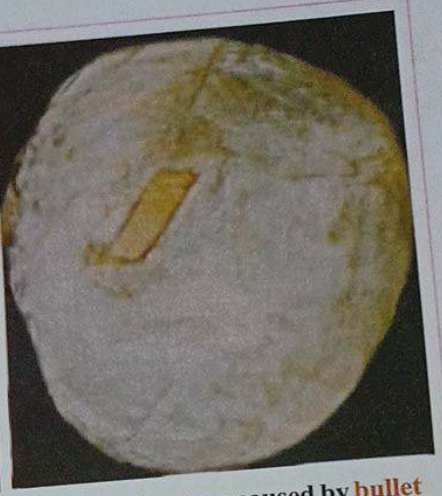
Intermediate shot bullet entry *wound. Tattooing, grease collar and abrasion collar present. Range 15 – 60 cm*

Note:

Grease collar, abrasion collar & Burning	–	up to 8 cm
Grease collar, abrasion collar & Blackening	–	up to 15 cm
Grease collar, abrasion collar & Tattooing	–	upto 60 cm
Only grease collar abrasion collar	–	> 60 cm

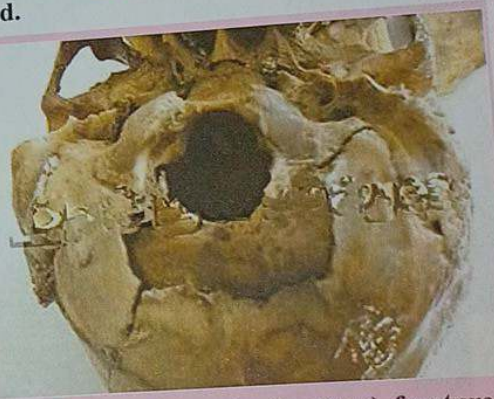


Exit wound *of a bullet:* Margins everted. No grease collar & abrasion collar. Will be larger than the entry wound.



Gutter fracture caused by bullet

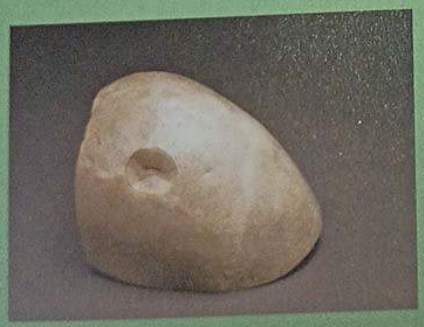
Entrance wound on skull: Penetrating fracture. *No bevelling on outer table.*



Ring fracture (annular fracture), fracture around the foramen magnum.

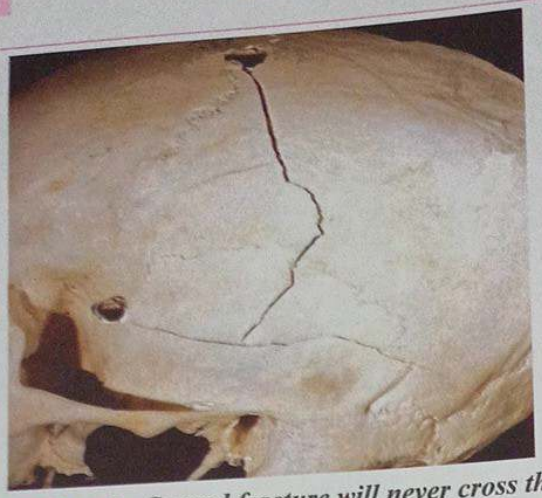
Causes

- Fall from height on buttock or feet
- Heavy blow on top of head
- In RTA an impact on front of chin



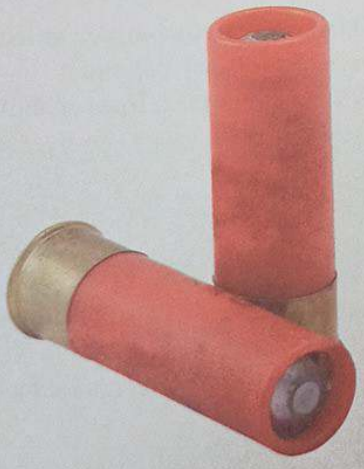
Signature fracture caused by Hammer

- It is a depressed comminuted fracture caused by object with small striking surface. (Eg. hammer)
- Surface area of the fracture will be equal to the surface area of the striking surface



Puppe's rule:* Second fracture will never cross the first fracture. So *lower one* is the *first shot.

Bullet exit hole on skull ***(bevelling on outer table)***



Shot gun cartridge

Bullet with cartridge

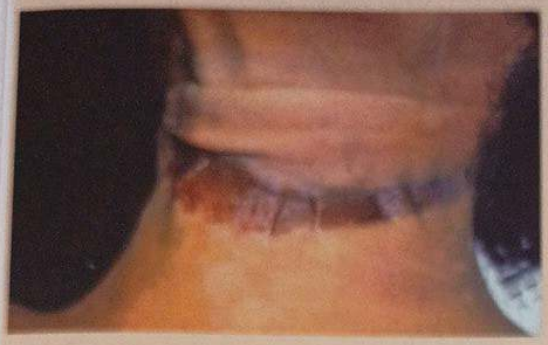
OTHER SPECIMENS: WET SPECIMENS / MODELS / PHOTOS

1. Contact shots
2. Cardiomyopathies
3. Myocardial infarction
4. Metallic poisons
5. Oesophageal varices
6. Bumper fracture in RTA
7. Coup and contre- coup injuries
8. Curling's ulcers in burns
9. Battle's sign
10. Cullen's sign
11. Stab wound
12. Gun shot wounds at different ranges
13. Atypical hanging
14. Ligature mark of strangulation
15. Nail marks of throttling
16. Human bite mark
17. Café coronary
18. Cadaveric spasm in drowning
19. Lacerations on liver due to blunt trauma
20. Typical hanging
21. Laceration spleen
22. Brain laceration
23. Criminal abortion, injury to uterus
24. Infant knee shows ossification centres
25. Injuries in battered baby
26. Foetuses at different IU ages
27. Explosion injuries
28. Weapons heavy cutting
29. Axe
30. Chopper
31. Temporary teeth
32. Postmortem artifacts
33. Ant erosions
34. Genital injuries in sexual assault

TOXICOLOGY SPECIMENS

35. Gloriosa superba
36. Cleistanthus Collinus
37. Alphos
38. Alcohol bottle
39. Phosphorus
40. Gastric lavage tube
41. Sedatives and Hypnotics
42. Spanish fly
43. Snake bite marks

Ligature mark of hanging



- Dry and parchment like
- Oblique
- Noncontinuous
- At or above the thyroid cartilage
- Subcutaneous tissue pale and dry

Neck dissection findings

- Bloodless flap dissection of neck
- All neck structures will be intact
- Adduction or abduction fracture of superior horn of thyroid cartilage or greater horn of hyoid bone

Definite Antemortem features of hanging

- Salivary trickle mark
- Le facie sympathique

Abduction fracture of Hyoid bone
Anteroposterior compression
Causes

- Hanging
- Strangulation (rarely fractured)

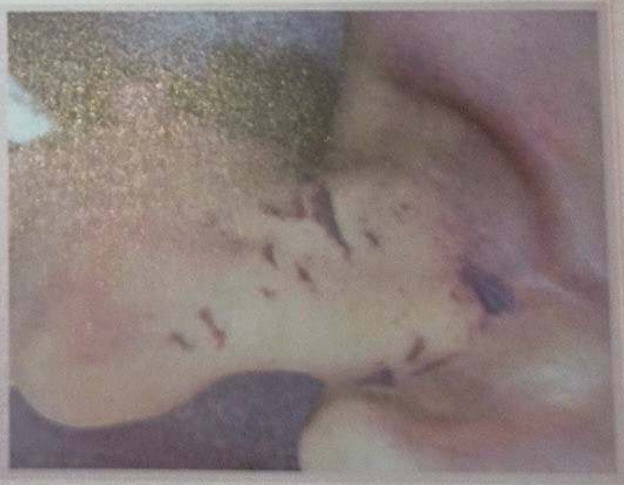
Adduction fracture of Hyoid bone
Inward compression fracture
Cause - Throttling

Throttling (Manual strangulation)

- Crescentic marks on either side of neck due to nail
- Finger contusions
- Linear abrasions also due to nail

Neck dissection findings

- Bloodless flap dissection of neck
- Severe contusions of soft tissues of neck under the external marks
- Inward compression fracture of hyoid bone



Semicarpus anacardium
(Marking nut)

Toxic principles
- Semicarpol
- Bhilawanol

Criminal uses
- Juice is used for vitriolage
- Abortifacient
- Artificial bruise
- Poured on genitals due to sexual jealousy

Calotropis gigantea

Toxic principles
- Calotropin
- Calotoxin
- Calactin
- Gigantin

Criminal uses
- Abortifacient (abortion stick)
- Infanticide
- To produce artificial bruise (madar juice)
- Cattle poison

Aconite roots

Aconite

Toxic principles
- Aconitine
- Aconine
- Pseudoaconitine
- Mesoaconitine

Action – opens tetradoxin sensitive sodium channels to increase sodium influx and delays repolarisation.

Criminal uses
- Ideal homicidal poison
- Suicidal poison
- Abortifacient
- Arrow poison

Signs and symptoms
- Sweet, bitter, burning taste
- Tingling, numbness, anaesthesia.
- Ventricular tachycardia
- Impairment of vision
- Hippus – alternate contraction and dilation of pupils

1. Cerbera Thevetia *(Yellow oleander)*

2. Cerbera Odollam **(Mango like appearance)**

3. Nerium Odorum *(Pink oleander)*

Yellow oleander seeds

Cardiac poisons

1. Cerbera Thevetia

Toxic principles

- **Cerberine**
- **Thevetin**
- **Thevotoxin**
- **Nerifolin**

2. Cerbera Odollam

Toxic principles

- **Cerberine**
- **Odollin**
- **Odolotoxin**

3. Nerium Odorum

Toxic principles

- **Nerin**
- **Odorin**
- **Oleandrin**

Signs and symptoms *(same for all)*

- Arrhythmias
- Atrial tachycardia
- A -V block
- S – A block
- E.C.G. changes
- Cardiac failure

Treatment *(same for all)*

- Stomach wash with potassium permanganate
- Atropine
- Adrenaline
- Nor-adrenaline
- Anti-arrhythmic drugs
- Activated charcoal
- Correction of hyperkalemia
- Digoxin Immune Fab is the specific antidote

Datura plant & fruit (Thorn apple)

Datura seeds

Datura

Active principles
1. Atropine
2. Hyoscine
3. Hyoscyamine

Symptoms
- Dryness of mouth
- Hot and dry skin
- Rise of temperature
- Dilation of pupil
- Drunken gait or ataxia
- Delirium

M/L significance
- Stupefying agent
- Road poison, Railway poison

Strychnos nux vomica plant fruit and seeds

Strychnos nux-vomica

Active principles
1. Strychnine
2. Brucine
3. Loganin

Action – **Inhibits Glycine in the post-synaptic receptors in the anterior horn cells of spinal cord.**

Signs & symptoms
- Muscular spasm
- Risus sardonicus
- Opisthotonus
- Emprosthotonus
- Pleurothotonus
- Convulsions

Between convulsions, muscles are completely relaxed.

Differential diagnosis

- ***Tetanus:*** Acts on presynaptic membrane, no relaxation between convulsions

Abrus Precatorius

Toxic principles

- Abrin – toxalbumin
- Abrine – an amino acid
- Abraline

Action

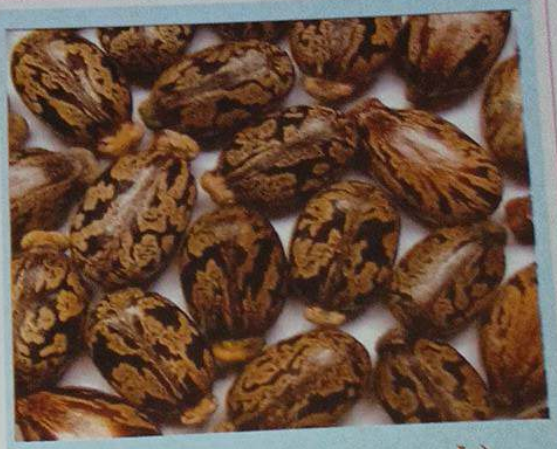
- Inhibits protein synthesis in Ribosomes

Signs and symptoms

- GIT - Diarrhea, vomiting, rectal bleeding
- CVS - Circulatory collapse, cardiac failure Hemolysis, agglutination of red cells, haemorrhage
- CNS - Cerebral haemorrhage, convulsions
- Hepato-renal failure
- Local injection causes viper bite like symptoms and signs.

M/L significance / Criminal uses

- Suicidal poison
- Homicidal
- Accidental
- Animal poison *(sui)*
- Abortifacient
- Arrow poison



Ricinus communis (castor seeds)

Toxic principles

- Ricin - Toxalbumin.

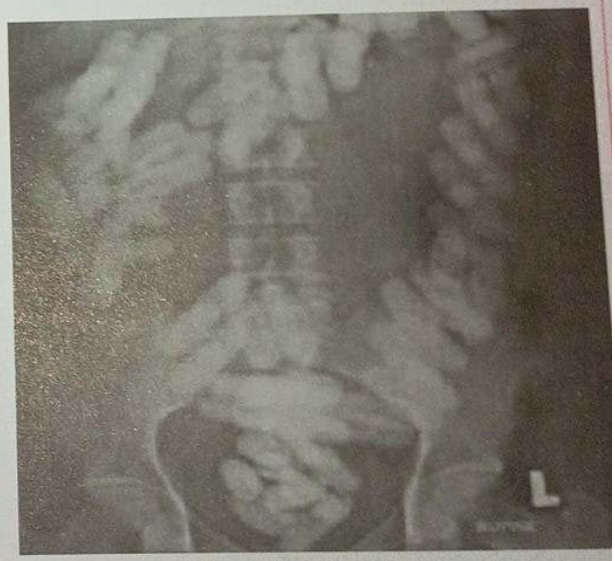
Action

- Toxin inhibits protein synthesis in the ribosomes

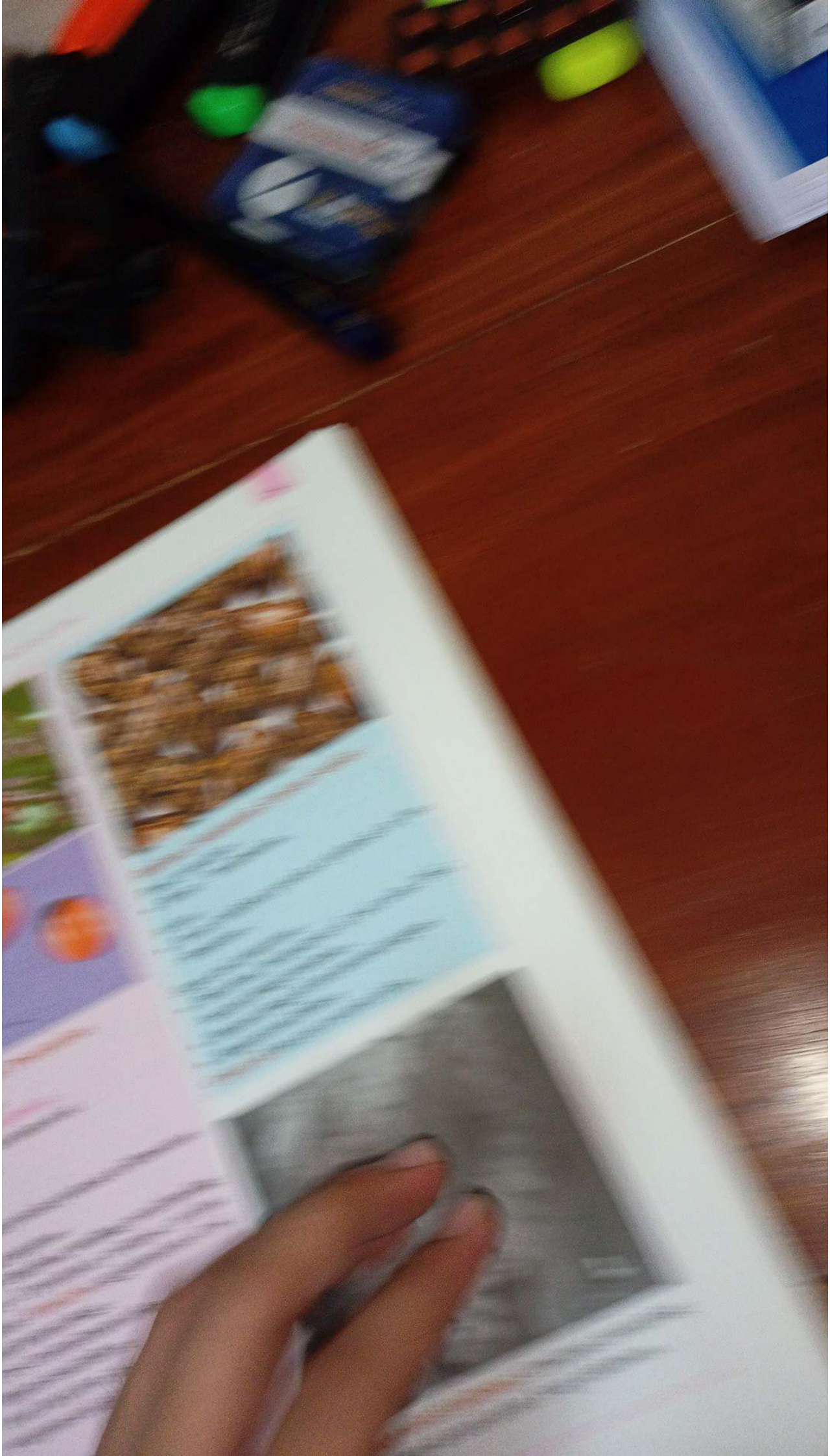
Signs and symptoms

- Diarrhea, haemolysis of red cells, DIC, haemorrhagic tendency.
- Haemorrhage in the internal organs
- Hepatorenal failure

Castor oil does not contain ricin.



Body packer syndrome: *Condoms containin drugs as seen in the X-ray abdomen.*



Organophosphate poison

Action

- Acetyl choline esterase inhibition, accumulation of acetyl choline in the neuromuscular junctions

Signs and symptoms

Muscarinic action

- Salivation
- Lacrimation
- Urination
- Defecation
- Gastrointestinal disturbance
- Emesis

Nicotinic action

- Fasciculations
- Cramps
- Twitching

CNS action

- Headache
- Drowsiness
- Convulsions
- Coma
- Respiratory depression
- Intermediate syndrome

Treatment

- Stomach wash
- Atropine
- Oximes (DAM, PAM, Protopan)

Cannabis Sativa or Indica

Toxic principles

- Cannabinol
- Cannabidiol
- Tetrahydrocannabinol
- Tetrahydrocannabinol isomers

Signs and symptoms

Stage of excitement – Euphoria, visual, auditory and psychomotor hallucinations, uncontrolled laughing

Stage of narcosis – giddiness, drowsiness, sleep

Chronic use causes *Run amok (Hashish insanity)*

SCORPION

Venom contains

- Neurotoxins
- Haemo toxins

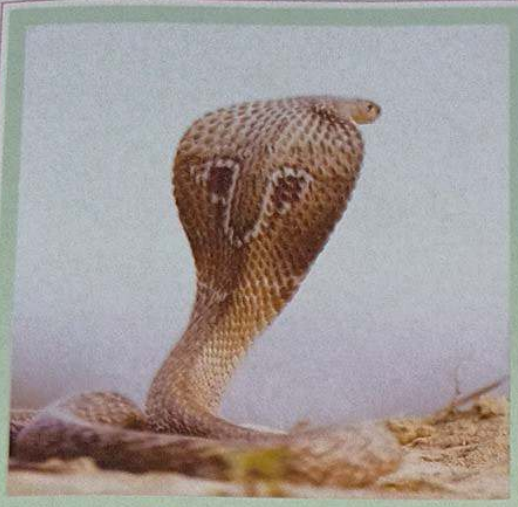
Signs & symptoms

Neurotoxic

- Paresthesia
- Paralysis
- Muscular spasm
- Convulsions
- Coma
- Respiratory paralysis

Haemotoxic

- Swelling
- Hemolysis
- DIC
- Hematuria
- Renal failure



Common Cobra

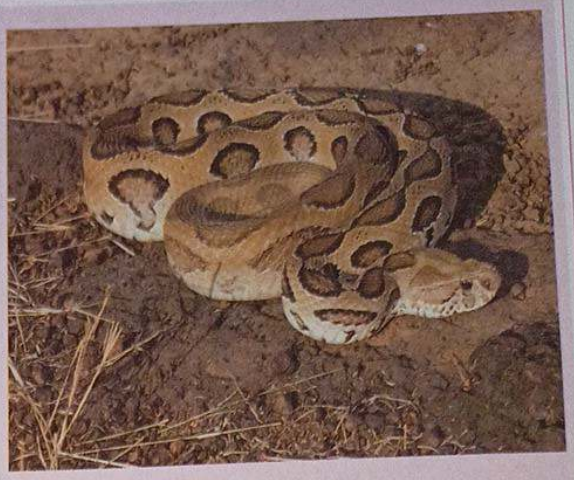
Identifying features

- Hood
- Spectacle mark
- 3rd supra-labial shield touches the eye and the nasal shield
- Belly scales - single up to genital pore, double thereafter.

Signs & symptoms

Neurotoxic

- Ptosis
- Weakness of muscles
- Spastic paralysis
- Muscular incoordination
- Convulsions
- Respiratory paralysis



Russell's Viper

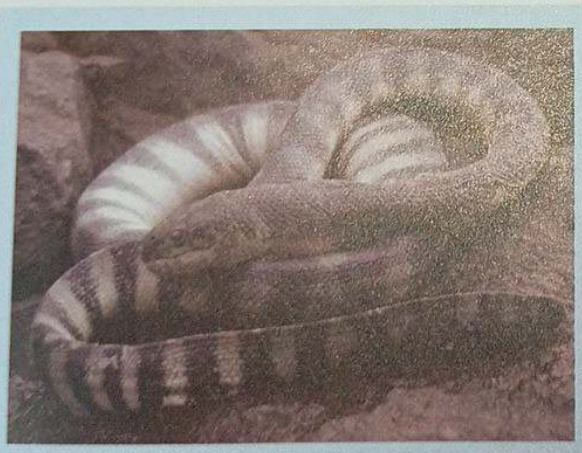
Identifying features

- Flat triangular head with distinct 'V' mark
- On the dorsum three rows of brown diamond shaped marks
- Single row of scales up to genital pore and divided thereafter

Signs and symptoms

Haemotoxic

- Tender and painful swelling at site of bite
- Later necrosis at the site
- Haemolysis, DIC, haemorrhagic shock
- Circulatory collapse
- Renal failure



Sea snake

Sea snake

Identifying features

- Prominent nostrils on the top of head
- Paddle shaped flat tail
- Bands

Signs and symptoms

Myotoxic and neurotoxic

- Rhabdomyolysis
- Polymyositis
- Site of bite is painless and no local reaction
- Myoglobinuria and brown urine

Saw-scaled Viper

Identifying features

- Small scales
- Bird foot mark on head
- Single row of scales on the belly and tail

Signs and symptoms

Haemotoxic

- Tender and painful swelling at site of bite
- Later - necrosis at the site
- Haemolysis, DIC, haemorrhagic shock
- Circulatory collapse
- Renal failure

Common Krait

Identifying features

- White bands
- 4th infra-labial larger
- Belly and caudal shields are not divided

Signs and symptoms

Neurotoxic

- Ptosis
- Weakness of muscles
- Spastic paralysis
- Muscular incoordination
- Convulsions
- Respiratory paralysis

First aid for snake bite

(Same for all snake bites)

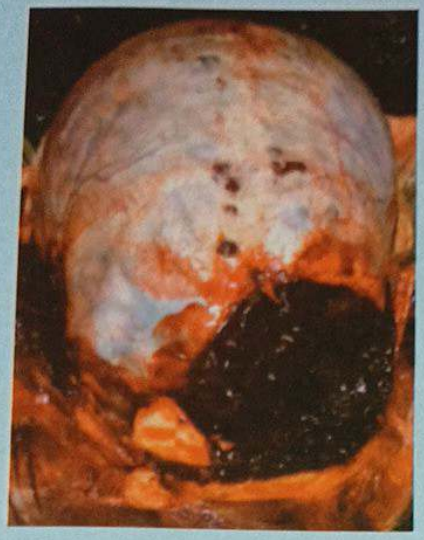
- Assure the patient
- Avoid exertion
- Keep the limb below the level of heart
- Let the wound ooze
- Bandage applied over the wound - one finger loose (Sutherland wrap)

Do nots

- Do not incise
- Do not suck
- Do not apply tourniquet
- Do not apply ice
- No cryotherapy
- Do not wash

Treatment for snake bite

- ***Polyvalent anti-snake venom***
- Effective against *Cobra, Krait, Russell's viper, Saw-scaled viper*
- Lyophilized ASV (one ampule in 10 ml distilled water) is dissolved in 200 to 500 ml isotonic solution given as i.v. infusion and repeated every 6 hrs.
- Look for bleeding time, clotting time
- Hypersensitivity reactions are managed with adrenaline, antihistaminics and steroids.
- Ventilatory support
- Haemodialysis
- Tetanus toxoid
- Antibiotics



Extradural haemorrhage

***Source of bleeding* by rupture**
- Middle meningeal artery
- Anterior meningeal artery
- Posterior meningeal artery

Associated with *fracture of skull*
Always *traumatic*

Signs and symptoms
- Lucid interval
- Unconsciousness
- Ipsilateral mydriasis

100 ml bleed may cause death

CT – biconvex opacity
***Treatment* – emergency craniotomy**

M/L Significance
- Lucid interval
- Death may occur at home after discharge
- Death may occur in police custody

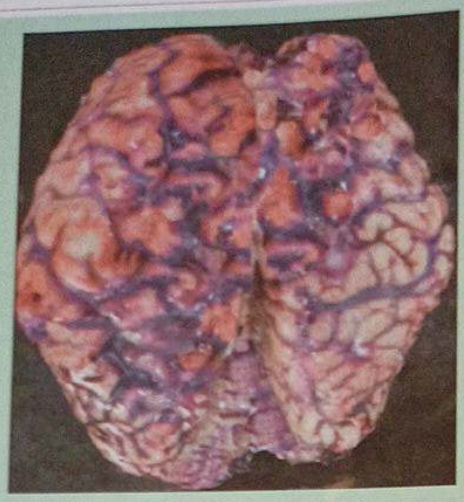
Subdural haemorrhage

Source of bleeding
- Parasagittal bridging veins
- Cortical bridging veins

Causes
- Traumatic (95%) : Traffic accidents, fall from height, assault, shaken baby syndrome
- Non-traumatic: Blood dyscrasias, anticoagulant therapy

Clinical features
- Acute
- Subacute
- Chronic

CT – concavo-convex opacity
***Treatment* – burr hole or emergency craniotomy**



Subarachnoid haemorrhage

Subarachnoid haemorrhage

Causes

Traumatic

- Traffic accidents, fall, assault
- Associated with lacerations and contusions of brain
- Asphyxial deaths
- Injury to vertebral artery by trauma to neck

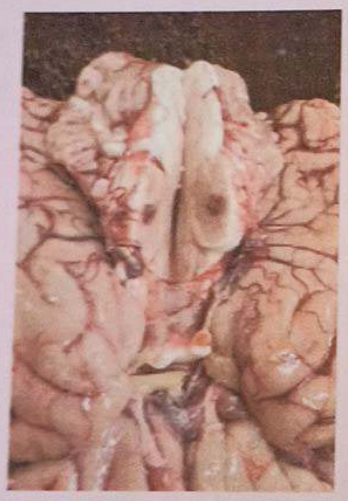
Natural causes

- Berry aneurysm rupture
- Arteriovenous malformations

Clinical features

- Thunderclap headache
- Nausea, vomiting
- Neck stiffness
- Kernig's sign

Diagnosis – **CT, lumbar puncture**



Pontine haemorrhage

Causes

- Natural – hypertension
- Traumatic – along with other intracranial haemorrhages

Clinical features **(3 Ps)**

- Pinpoint pupil
- Pyrexia
- Paralysis of lateral gaze

Tattoo mark

Faded tattoo can be detected by *ultraviolet light* or *infra red photography* and from *regional lymph nodes*

Methods of erasure

- By applying caustic substances like papain in glycerine or zinc chloride etc
- Over tattooing with tannic acid
- Carbon dioxide snow
- Electrolysis
- Laser beam
- Burns
- Skin grafting

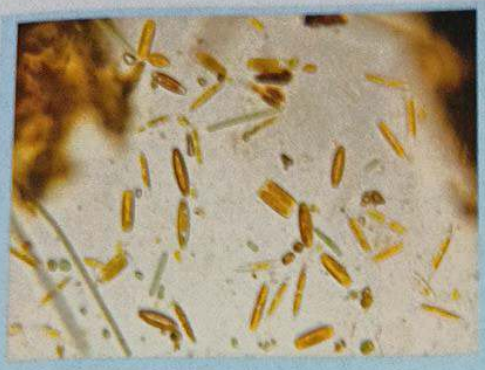
Complications

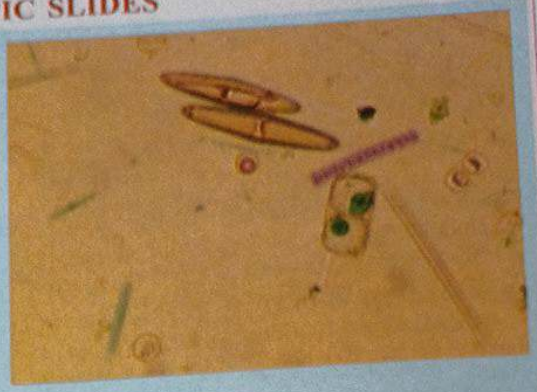
- Septic infection
- Syphilis
- HIV
- Leprosy
- Hepatitis
- Lupus vulgaris

M/L significance

- Identity
- Race and nation
- Language
- Religion
- God of worship
- Personal interests

MICROSCOPIC SLIDES





Diatoms

Diatoms

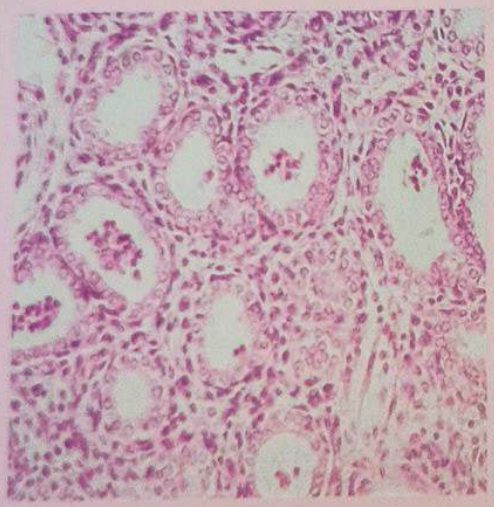
- They are unicellular algae with silica cell wall
- Enters lung and blood stream along with water
- Demonstrated in bone marrow and water sample

Method of doing

- Bone marrow + Con. Nitric acid
- Boil for 10 – 15 minutes
- Centrifuge
- Sediment examined under microscope

M/L significance

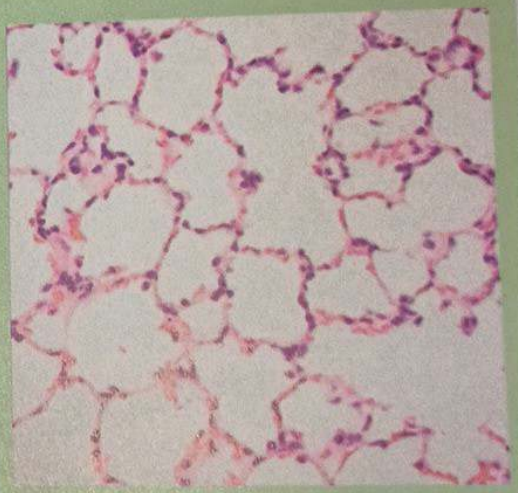
- Corroborative evidence of drowning



Unrespired lung (Still born baby)

Unrespired lung

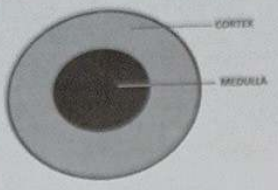
- Alveoli not expanded
- Glandular epithelium lining of alveoli
- Vessels not filled with blood
- *M/L significance* - still birth



Respired lung (Live born baby)

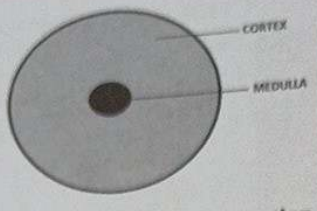
Respired lung

- Alveoli expanded
- Flattened epithelial cells lining alveoli
- Vessels are dilated and filled with blood
- *M/L significance* - live born baby

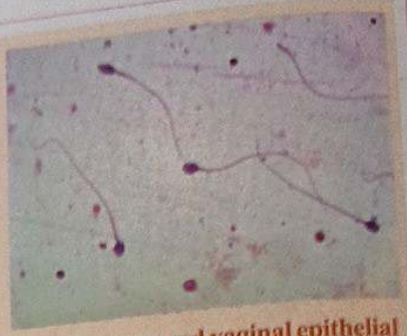


Animal hair cross section
- Thick medulla
- Thin cortex
- Medullary index > 0. 5
- M/L significance: Bestiality

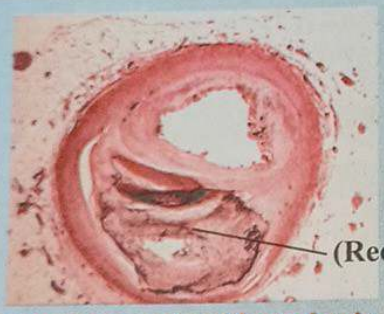
Medullary index
Diameter of the medulla / Diameter of hair



Human hair cross section
- Thin medulla
- Thick cortex
- Medullary index < 0. 3
- M/L significance
  - Identity
  - Poisoning
  - Sexual offences
  - Murder

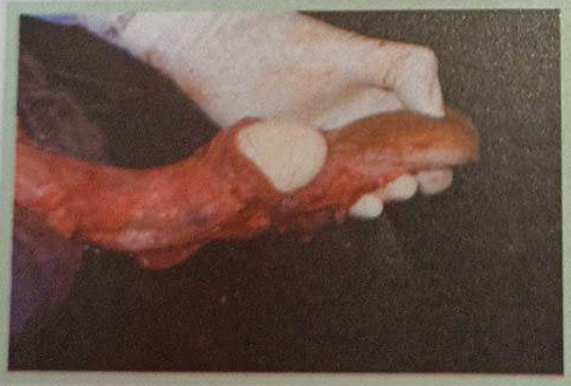


Spermatozoa and vaginal epithelial cells
- Intact spermatozoa
- M/L significance
  - Recent sexual intercourse
  - Rape



Coronary artery thrombosis
- Organised thrombus
- Re-canalisation of thrombus
- *M/L significance*
  - Old ischaemic attacks

Coronary thrombosis
- 90% occlusion of the coronary artery
- Fresh thrombus
- *M/L significance*
  - Myocardial infarction
  - Sudden death



Café coronary

Accidental blockage of air passage by food

Causes of death
- Asphyxia
- Laryngeal spasm
- Vagal inhibition

Management
- Heimlich's manoeuvre
- Needle cricothyrotomy
- Emergency tracheotomy

WET SPECIMENS

Puppe's rule: Second fracture will not cross the first fracture

Kidney laceration

- Blunt trauma
- Kicking
- Traffic accidents

Causes of death

- Retroperitoneal bleeding
- Haemorrhagic shock

Joule burn

- Electric burn at the point of entry on the skin
- Shallow carter with ridge of skin around

Histopathology

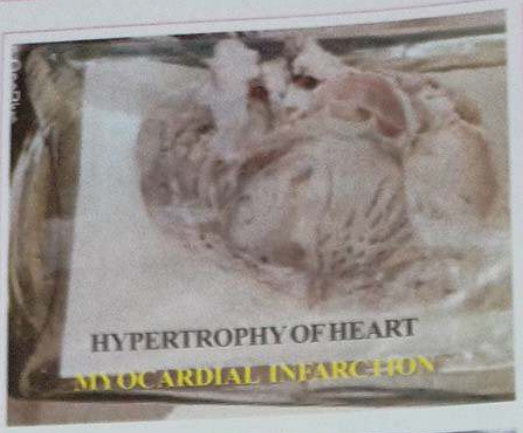
- Elongated epidermal cells called *Swiss cheese appearance*
- *Nuclear palisading*

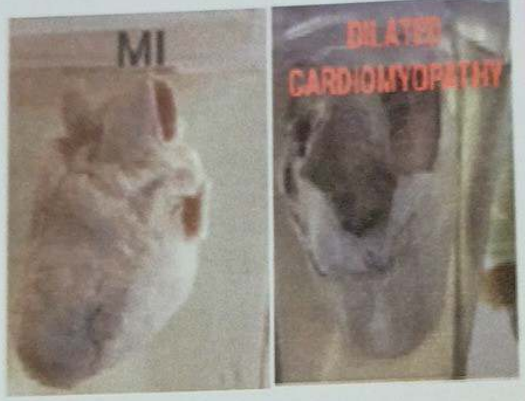
Multiple rib fractures

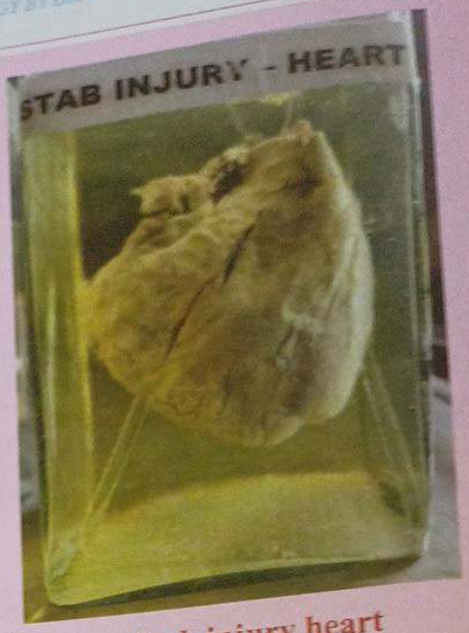
Causes of injury

- Blunt force violence
- Traffic accidents
- Fall from height
- Building collapse
- Stampede

Flail chest **or** ***stove in the chest*** **is paradoxical respiration when more than 2 ribs are fractured at multiple sites**







Stab injury heart

Causes of death

- Haemorrhagic shock
- Cardiac tamponade

Rapid collection of 150 ml of blood is sufficient to cause cardiac tamponade

Signs of cardiac tamponade **(Buck's triad)**

- Low BP
- Raised JVP
- Muffled (distant) heart sounds

Splenic laceration

Causes

- Blunt trauma
- Violence to abdomen
- Traffic accident
- Fall from height

Causes of death

- Peritoneal bleeding
- Hypovolemic shock

Corrosive acid poisoning

Nitric acid poisoning: Oesophagus
Xanthoproteic reaction

Action

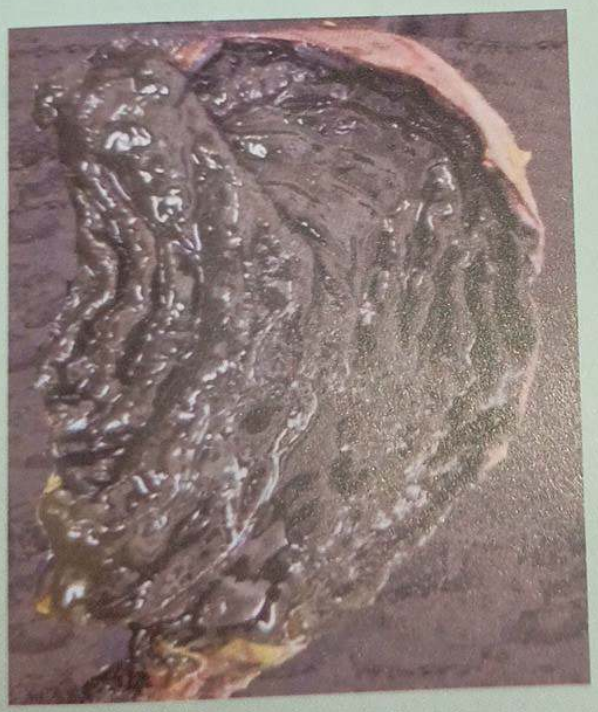
- Coagulation necrosis

Complications

- Vasovagal shock
- Glottic edema
- Circulatory collapse
- Perforation
- Chemical peritonitis
- Septic peritonitis
- Septicaemia

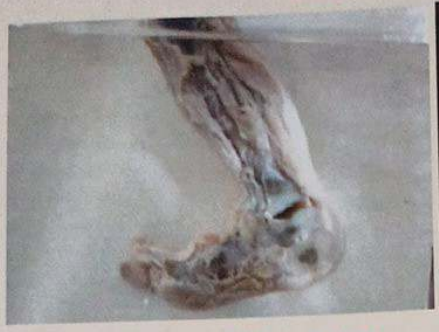
Vitriolage is acid throwing

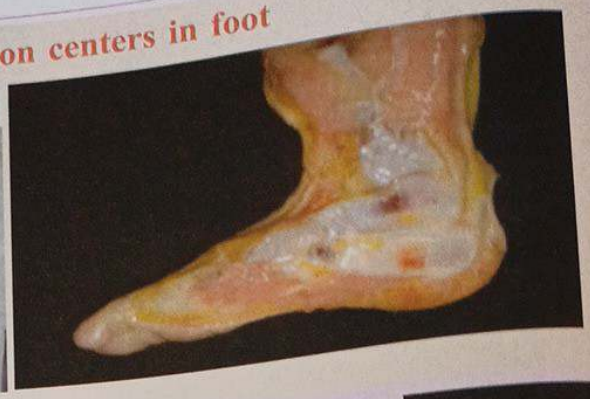
Charred stomach in corrosive acid poisoning



Charring of stomach mucosa in corrosive acid poisoning

Ossification centers in foot





Cut section of foetal foot

Showing ossification centres for

- Calcaneum (*5 months IUL*)
- Talus *(7 months IUL)*
- Cuboid *(9 months IUL)*

M/L significance

- More than 9 months
- Viable
- Cause of death to be found out

Cut section of foetal sternum

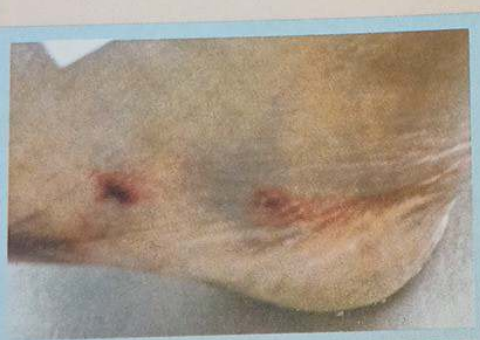
Ossification centres appeared for

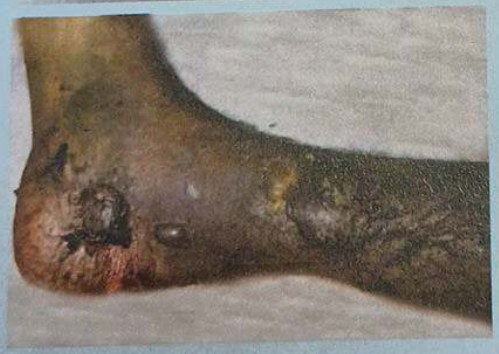
- Manubrium
- Upper 4 pieces of the body

***Intra-uterine age is* 9 months**

M/L significance

- Full term
- Viable
- Cause of death to be found out





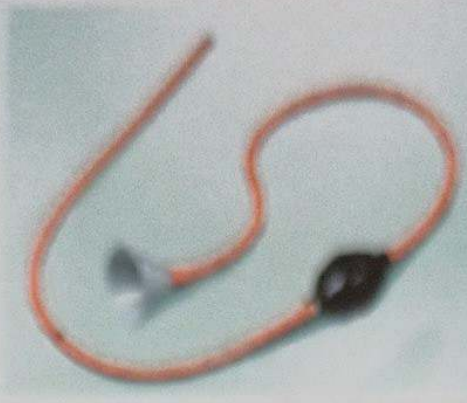
Viper bite
Swelling, Blisters, Necrosis

Intrauterine age of the foetus can be calculated from the crown-heel length of the foetus (Haase's rule)

Up to 25 cm $\sqrt{\text{length}}$

More than 25 cm $\frac{\text{length}}{5}$

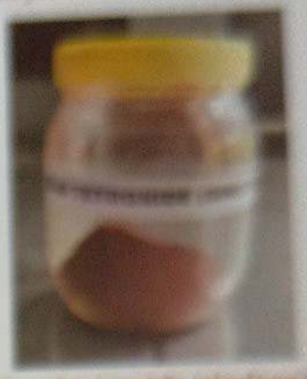
Tattoo



Stomach wash tube (Ewald's tube or Rose tube)

Strychnos nux vomica

Abrus precatorius



Lead tetroxide (outdoor)

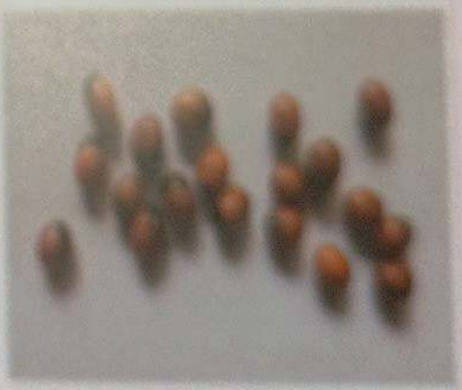
Copper sulphate

Ricinus communis (castor seeds)

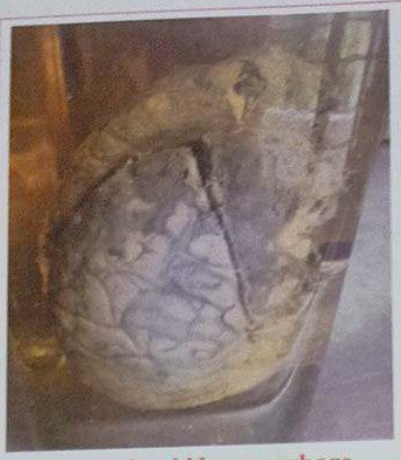
Strychnos nux vomica

Semicarpus anacardium (Marking nut)

Datura

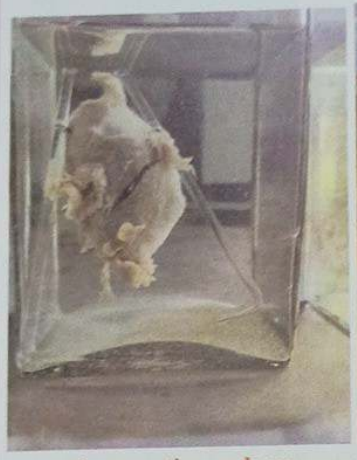


Abrus precatorius

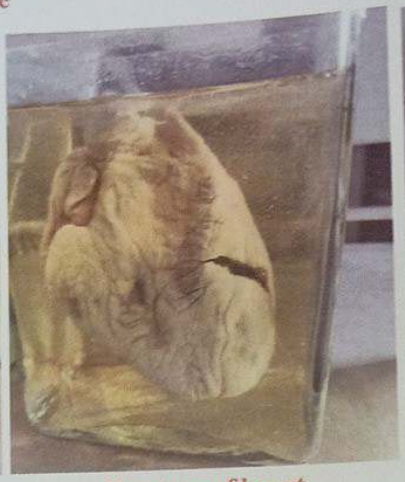


Subarachnoid haemorrhage

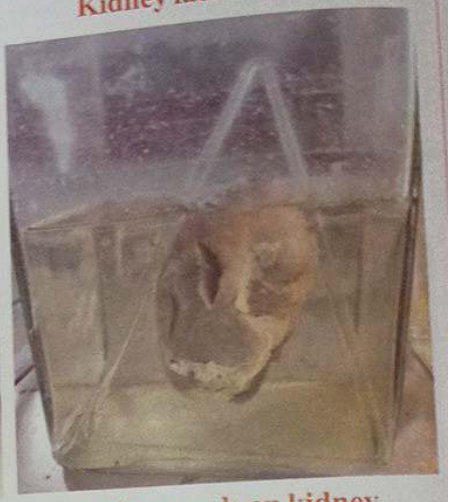
Kidney laceration



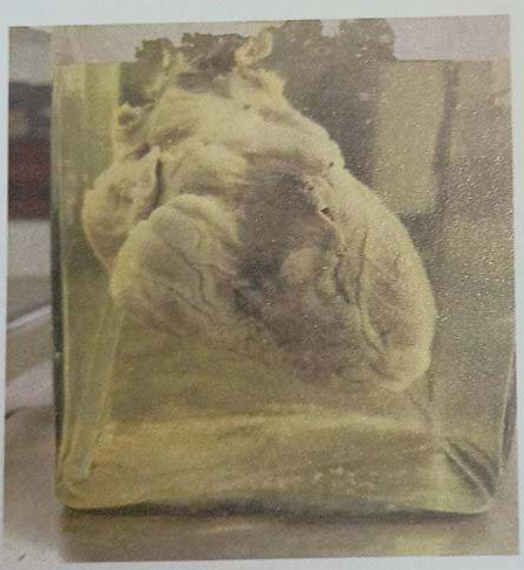
Laceration spleen



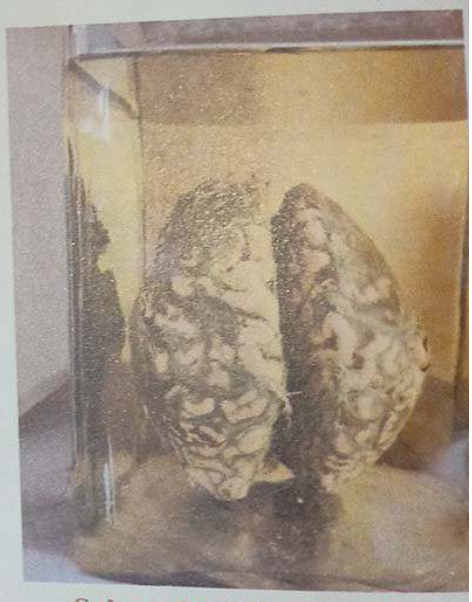
Rupture of heart



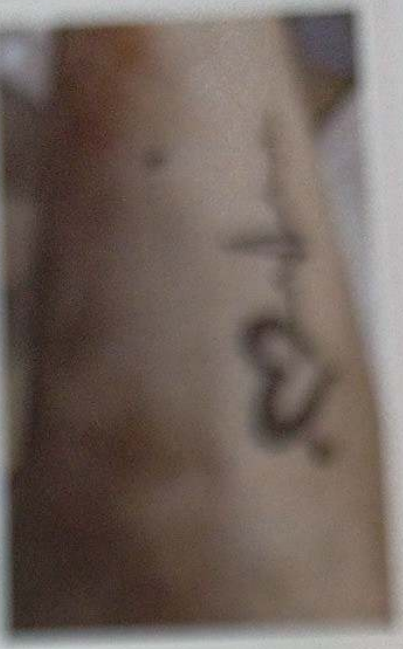
Stab wounds on kidney



Myocardial infarction with heart rupture

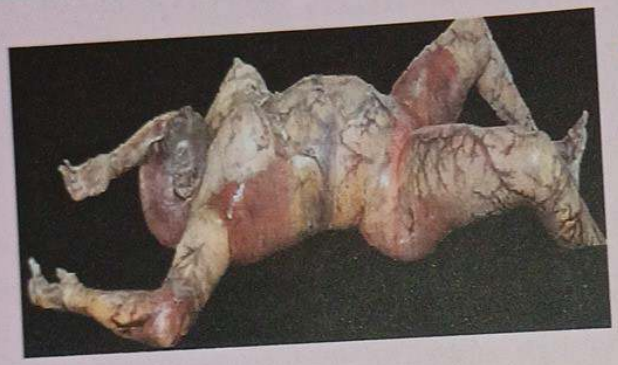


Subarachnoid haemorrhage



Greenish discolouration of the right iliac fossa.

- It is the first decomposition change that is seen externally.
- It is seen usually by 18 hrs after death



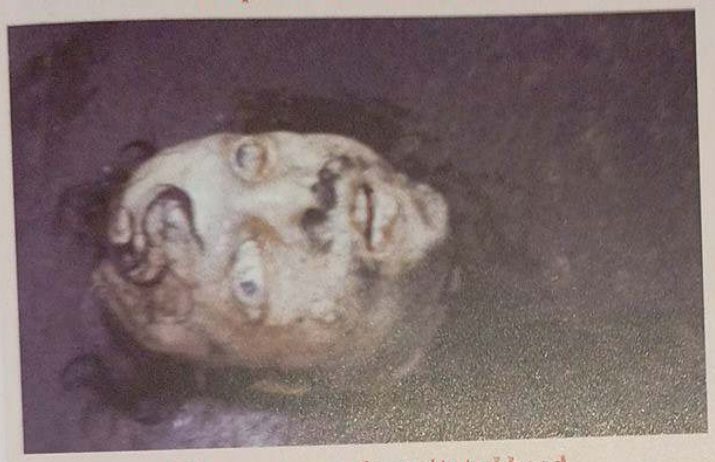
Marbling

- Greenish discolouration of the superficial blood vessels
- Haemoglobin will be converted to methemoglobin after death
- Bacteria produce H_2S which will combine with methemoglobin forming Sulphmethemoglobin.

Decomposition changes on the body

- **Discolouration** – greenish brownish and later blackish due to formation of ferric sulphide
- **Distension** – of abdomen, breasts, penis, scrotum and face. Eyes bulged out from sockets, gas rigidity, crepitus felt on soft tissues.
- **Discharges** – purging, faecal discharge, postmortem delivery of foetus
- **Detachment** – peeling of skin, loosening of hair, other tissues
- **Degloving** – of hands and feet
- **Degradation** – anatomic integrity of tissues lost
- **Dissolution** – last process, liquefaction of soft tissues

Adipocere on whole body



Adipocere on a decapitated head

Adipocere

- It is the arrest and modification of decomposition
- Hydrolysis and hydrogenation of fat occurs due to the presence of lecithinase produced by Clostridium and fat is converted to fatty acids
- These fatty acids solidify and form adipocere

Properties

- Adipocere is having rancid butter like smell and appearance

Favourable conditions are

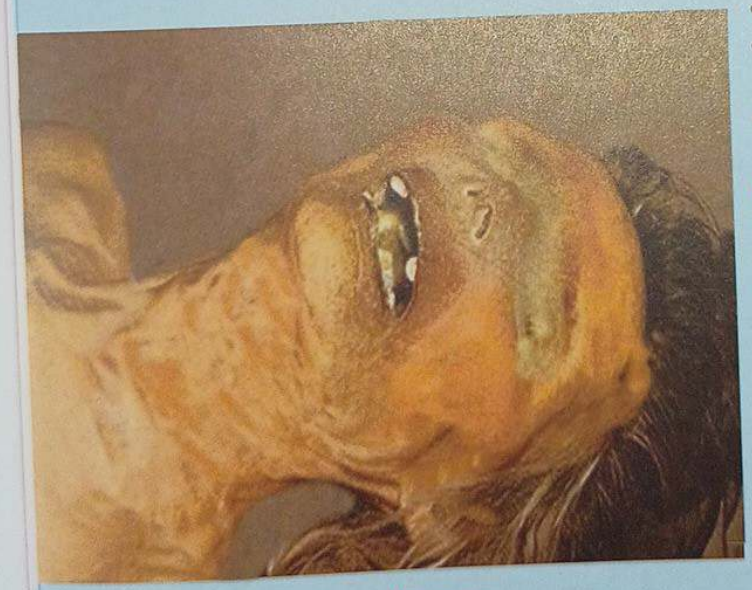
- Warm and humid atmosphere
- Clayey soil
- Stagnant air or water
- Presence of fat on the body

Time for adipocere to form

- 3 weeks to 3 months

M/L significance

- Identification possible
- Injuries preserved
- Time of death may be assessed
- Place of disposal of body
- Sure sign of death



Mummification

Mummification

- Arrest of decomposition
- Dehydration or drying and shrivelling of the body
- Mummification on any part of the body or whole body

Favourable conditions

- Hot and dry atmosphere
- Free wind

Time required for mummification

- 3 to 6 months

M/L significance

- Sure sign of death
- Identity
- Injuries preserved
- Time of death
- Place of disposal of body
- Finger prints can be taken

Burns

- Area is measured using Wallace rule of 9
- More than 40% of burns are fatal

Complications

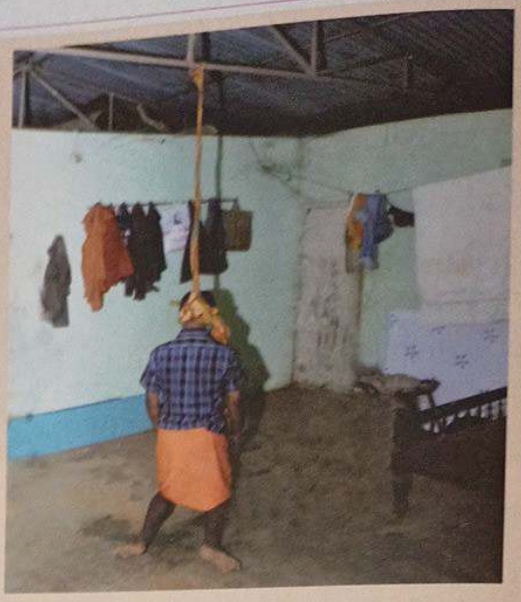
- Neurogenic shock
- Laryngeal spasm
- Hypovolemic shock
- Sepsis
- Renal failure
- Hepatic failure
- Haemorrhage from Curling's ulcer
- Tetanus

Macerated baby (Dead born child)

- Baby is already dead in utero
- Maceration is aseptic autolysis

Signs of maceration

- Slippage of skin
- Body is soft, flaccid and flat
- Skin purplish
- Umbilical cord is red and soft
- Overriding of skull bones (Spalding's sign) on X-ray
- Gas shadows in the heart and aorta on X-ray (Robert's sign)



Partial Hanging

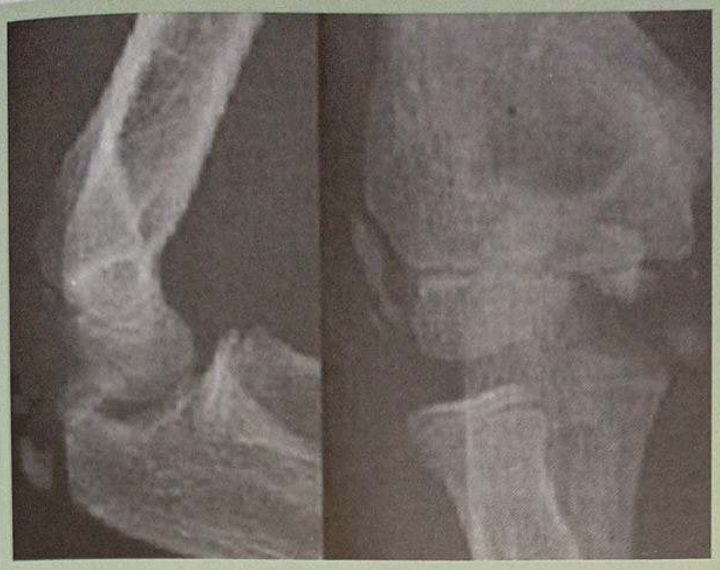
- Lower part of the body is touching the ground
- Full weight of the body is not acting for the constriction of neck
- In this type of hanging the person can not raise his hands to untie the knot or stand up due to loss of power
- Face may be congested and petechial haemorrhages seen
- Ligature mark may be less oblique or even horizontal

M/L significance

- Partial hangings common arouse suspicious

Pugilistic attitude

Lower limbs are flexed at the hips and knees, upper limbs abducted at the shoulders, flexed at the elbows and wrist.



X-ray Elbow

The centers for **capitulum, trochlea and lateral epicondyle** *appeared but* **composite epiphysis** *is not formed.*

Age is above 12 and below 14 years.

M/L significance of this age group

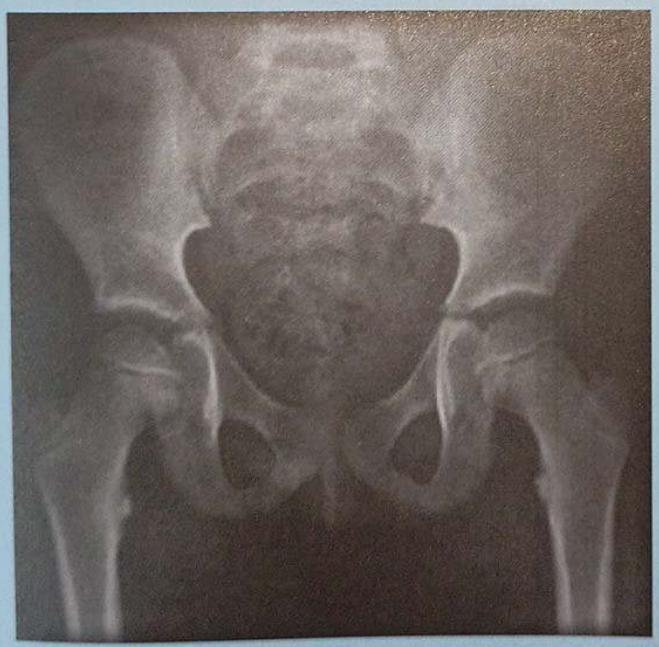
- **Definitely responsible of crimes**
- **Take oath as witness**
- **Consent for physical examination**
- **Cannot be employed in a factory**
- **Cannot give consent for surgery**

For reference, Ossification centres appear for

Upper end of radius - 6 y
Upper end of ulna - 10 y

Capitulum - 2 years
Trochlea - 11 years
Lateral epicondyle - 12 years

Composite epiphysis - 14 y
Medial epicondyle - 5 y

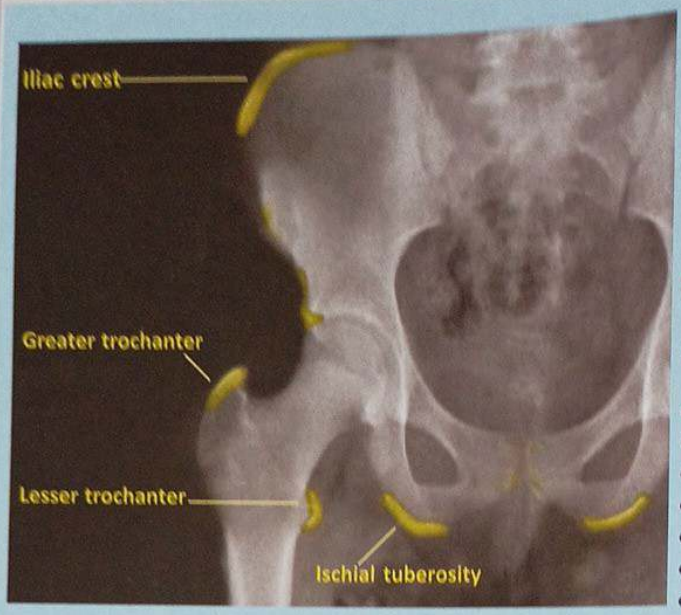


X-Ray Pelvis

- **Triradiate cartilage** *is not obliterated.*
- *Centres for* **lesser trochanter** *has appeared.*
- *Centre for* **iliac crest** *has not appeared.*
- *The age is above 11 and below 14 years.*

M/L significance of this age group

- Definitely responsible of crimes
- Can take oath as witness
- Consent for physical examination
- Cannot be employed in a factory
- Cannot give consent for surgery

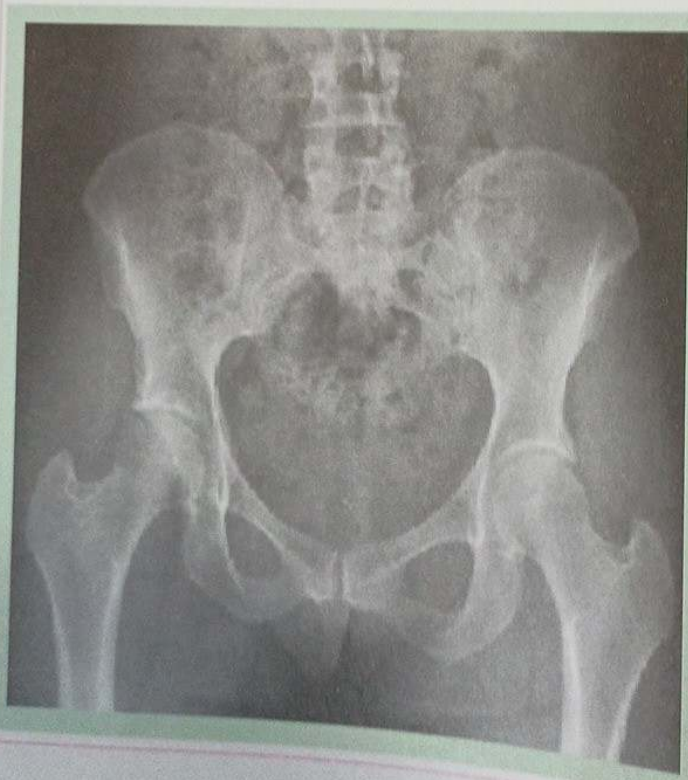


X-ray Pelvis

- *Centres for* **Iliac crest** *and* **ischial tuberosity** *have appeared but not fused*
- *The age is above 16 and below 18. Centres are highlighted for better view.*

M/L significance of this age group

- Cannot give consent for sexual intercourse
- Statutory rape
- POCSO
- Minor, cannot vote
- Cannot marry
- Cannot make transactions
- Cannot buy or sell liquor
- Cannot give consent for surgery



X-ray Pelvis

All the centres have fused. Age is above 18 years.

M/L significance

- Major

- All rights

Note:

Ossification centres appear for

Head of femur - 1 year

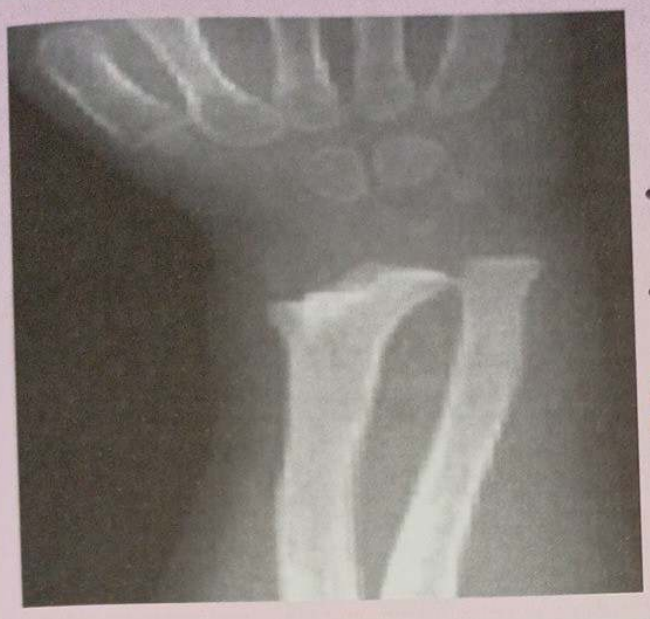
Greater trochanter - 4 y

Lesser trochanter - 11 y

Triradiate cartilage fusion - 14 years

Iliac crest - 14 years

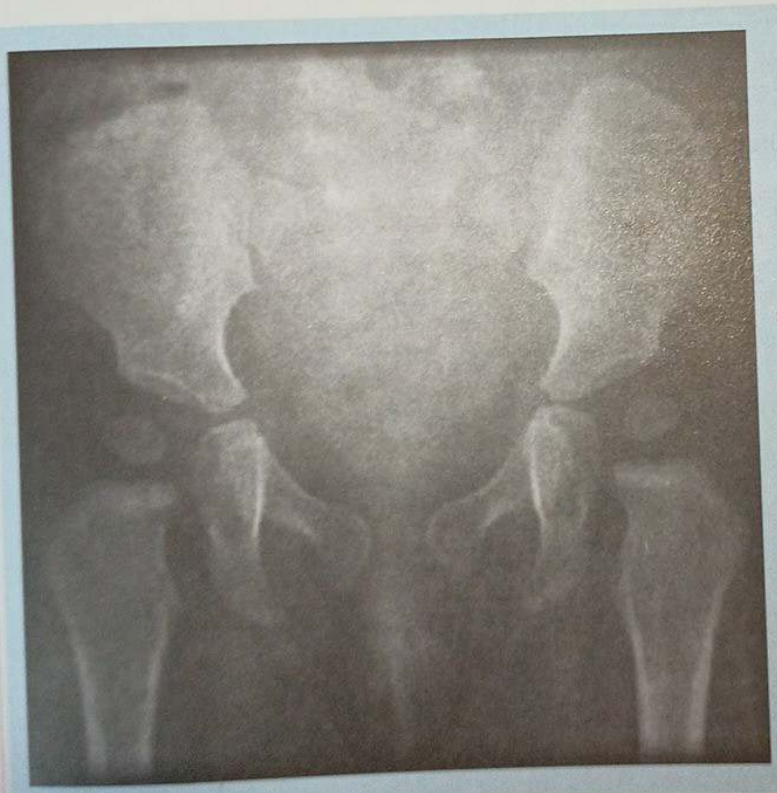
Ischial tuberosity - 16 y



X-ray of Wrist

- *Age can be calculated by* **counting the number of carpal bones** *appeared.*
- *From the above X-ray, age is* ***4 years.***

Number of carpal bones seen gives the age.



X-ray Pelvis of a Child.

- *Ossification centre for* **head** *alone has appeared*
- *Greater trochanter has not appeared.*
- *Thus, the child is* ***above 1 year and below 4 years.***

DEATH REPORT

Ward .....No.....Muncipality.....Taluk.....

Panchayat.....District.....Corporation

Full name of the deceased.....

Sex: Male / Female

Age at death .....years .....months.....days

Nationality and caste .....

Occupation of the deceased .....

Marital status .....

Normal residence .....

Place of death .....Door No.....

Street ..... Ward No: .....

Cause of death (if death certificate is issued) .....

Date of death .....

Name of father / husband .....

Name of burial or burning ground .....

Informant's name ..... Relationship .....

Designation and address .....

Name of the medical officer .....

Date .....

Signature of the Medical Officer

ACCIDENT REGISTER CUM WOUND CERTIFICATE

Ref. no: _____

1. Date time and Place of examination

2. Name _____

3. Age _____ 4.Sex _____

5. Address _____
_____

6. Marks of identification
a. _____
b. _____ _____

7. Brought by whom _____

8. History and alleged cause of injury (as stated by)
_____

9. Clinical features: Whether conscious or not, others (specify)
_____
_____

10. Details of injuries
a. _____
b. _____
c. _____
d. _____

11. Number of additional sheets if any:

12. Whether dying declaration was required:

13. If yes, whether police/Magistrate informed

14. Investigation results, if any _____

15. Date of admission as IP and IP No., if admitted:

16. Date of discharge (if discharged):

17. Condition on discharge:

18. **Opinion as to the cause of injury**
(Specific to each injury) Cause of injury, nature and identity of the weapon, age of injury, simple or grievous, other relevent information

_____
_____
_____
_____
_____

Seal

Signature of Medical Officer

Name
Designation
Address
Reg. No

Place :
Date :

Issued to C . I . / S.I. of police _____ Police Station as per requisition letter No. _____ dated _____ through _____

Signature of the issuing Authority with date

Ref. No _____

AGE CERTIFICATE

Requisition for determination of age was received from the _____

_____

vide his letter no _____ dated _____ through PC No _____ involved in Crime No _____ of _____ Police Station.

1. Name and Adress of the Subject:

_____

_____

2. Sex _____

3. Age stated by the subject _____

4. Accompanied by _____

5. Date and time of examination _____

_____

6. Consent

_____

_____

7. Marks of identification

a. _____

_____

b. _____

_____

8. General Development

a) Adam's apple : Prominent /Not prominent b) Height _____ c) Weight _____

9. Hair a) Moustache and beard b) Axillary c) Pubic

10. External genetalia a) Penis b) Scrotum c) Labia majora

11. Breast

12. Menstruation/Ejaculation: Commenced /Not commenced _____ years ago

13. Dentition:
Total No. _____ Permanent _____ Temporary _____

14. Radiological Examination
No _____ Date

a) Shoulder

b) Elbow

c) Wrist

d) Pelvis

e) Jaws

Opinion:

Based on the Physical, Dental, and Radiological findings the above person is aged above _____ _____ and below _____ years.

Seal

Signature of the Medical Officer

Name
Designation and Reg.No

EXAMINATION OF POTENCY

Ref. No

Requisition received from the _____ vide his letter no. _____ dated _____ through P C. No. _____ for examination of potency of _____ aged _____ years involved in crime No. _____ of _____ police station.

1. Name and Address of the Subject
_____
_____

2. Age _____

3. Occupation _____

4. Accompanied by _____

5. Date and time of examination
_____

6. Consent
_____
_____
_____

7. Marks of identification
1. _____
_____
_____
_____

2. _____
_____

8. Clinical History: Diabetes/Drug addiction/Trauma/Exposure to veneral disease/ Others if any

9. History and sexual development:
Masturbation/Night emissions/Homosexual practice/Sexual intercourse

10. Physical Examination

A. General

a) Height _____ b) Weight _____ c) Build: Good/ Moderate / Poor

d) Adam's apple _____ e) Hair: Pubic/Axillary/Facial/Chest

B. Local

1. Penis: a) Present/Absent b) Length _____ (in flaccid state)
   c) Circumference _____ (in flaccid state)
   d) Disease if any _____
   e) Deformity (if any) _____
   f) Injury (if any) _____
   g) Sensations over glans penis _____
   Bulbocavernous reflex _____
   h) Fore skin Retractable/non-retractable

2. Scrotum: Pendulous/Non-pendulous; sensation cremasteric reflex _____

3. Testes: Right testicle: Present/Absent Left testicle: Present/Absent

Development of testes: Small/medium/Adult size

Sensations: Present/absent
Disease, deformity, injury:
Epididymus and cord

C.Systemic Examination

CVS GIS

CNS RS

11.Special examination (if relevant)

12. Opinion:

1.There is nothing to suggest that the above person is incapable of performing sexual intercourse

2. The above person is incapable of performing sexual intercourse because of

_____

Seal

Signature of Medical Officer
Name
Designation

MEDICAL EXAMINATION REPORT OF VICTIM OF SEXUAL ASSAULT

Ref No. **Name of the hospital** **Dated**

1. Name ..... D/o, S/o .....

2. Address .....

3. Age..... Sex .....

4. Brought by .....

5. MLC No ..... Police station .....

6. Date and Time of examination .....

7. Informed Consent.....
.....

Witness/Accompanying person

Signature of Parent or Guardian in the case of minor

8. Marks of identification

(1) Thumb impression (Right in female and Left in male)

(2) Any scar/mole/deformity .....

9. History

Brief description of the incident .....
.....
.....

10. General physical examination

i. Whether oriented in time and space .....

ii. Pulse ..... B.P. .....Temp .....Resp. rate ..... Pupils.....

iii. Clothing ..... fresh, torn, stains of blood/semen/mud etc.

iv. Whether the victim has washed her genitalia/mouth/anal canal or changed her cloths after the incident

11. Examination of injuries
(Look for Bruises, Systemic physical torture injuries, nail marks, teeth bite marks, cuts, lacerations, head injury, any other injury)

Injury	site	size	color	swelling	simple/grievous
1.					
2.					
3.					
4.					

12. Local examination of genital parts

A. Pubic hair combing

B. External Genitalia

1. Labia majora	any swelling, tears, edematous, bruises or abrasions
2. Labia minora	bruises, abrasions, fingernail marks infection etc
3. Fourchette	bruises tear, bleeding
4. Vulva	injury, bleeding, discharge
5. Perineum	injury, bleeding
C. Hymen	intact / torn ..... Injury fresh, position, tenderness, edema, age change in tear etc

D. Vagina & Cervix (Any bleeding, tear, discharge, edema, tenderness etc.)*
.....
.....
.....
.....
P/V examination only if medically indicated *

E. Anus (Bleeding, tear, discharge, edema, tenderness etc.) .....
.....

13. Samples collection for Hospital Laboratory/ Clinical Laboratory

(Samples can be taken according to the requirements of the case, presentation and signs e.g. Pregnancy, HIV, Drug addiction, Substance abuse, Pus culture etc.)

a) Blood
b) Vaginal swab
c) Culture specimen
d) Urine

14. Specimens for Central/state Forensic science Lab

A. Collection of Forensic samples

a) Blood ..... grouping, drug intoxication
b) Urine .....pregnancy, drug testing
c) Seminal stain .....grouping, DNA etc.
d) Nail scrubbing .....
e) Pubic hair .....seminal stain, foreign hair
f) Vaginal swab .....
g) Vulval swab .....
h) Vaginal smear ..... microscopy

B. Clothing .....

C. Swabs and Smears

a)Vaginal b) Buccal c) Anal

15. OPINION

There is evidence / no evidence of vaginal / anal penetration
There is evidence / no evidence of generalised body injury

After receiving lab reports
There is evidence / no evidence of recent vaginal / anal intercourse

FINAL OPINION IN NON PENILE PENETRATION
There is no evidence of vaginal / anal intercourse. But there is evidence suggestive of genital assault / physical assault.

Signature
Medical officer

Date:

Seal

REPORT OF EXAMINATION OF A MALE ACCUSED IN SEXUAL OFFENCE (INCLUDING POTENCY)

Date

Ref No.

Requisition dated ..... Was received at..... on..... from the .....for the examination of .....aged .....years involved in crime No..... of .....police station

1. Name and address of the subject .....
2. Age .....years
3. Accompanied by
4. Consent .....
5. Date and time of commencement of examination .....
6. Identification marks (1).....
   (2) .....
7. Clinical history, history of any disease or trauma which may affect potency.
   Present / Not present
8. Sexual development
.....
9. Marital history. Married / Unmarried. Age of marriage ..... years.
   Whether having children Yes / No
10. History of alleged cause of injury (if any) .....
.....
11. Physical examination
    A. General. Height .....cm Weight ...kg.
    Build Good / Moderate / Poor.
Body hair ..... Facial hair
Pubic hair .....

B. Local (a) Penis Present / Absent.
Length ..... Circumference ..... (flaccid state)
Disease / deformity / Injury
Foreskin Retractable / Non-retractable / Circumcised
Smegma deposits on corona Present / Absent
Sensations Normal / Abnormal
Urethral discharge Present / Absent
Tenderness on palpation Present / Absent

(b) Scrotum Pendulous / Non-pendulous
Right testes Present / Absent Small / Medium / Adult size
Left testes Present / Absent. Small / medium / adult size

Sensations & reflexes Normal / Impaired
Disease deformity or injury (if any) .....

C. Systemic examination Pulse .... BP.....

Other systems
CVS

CNS

RS

GIS

D. Injuries on the body (if any) .....
.....
.....
.....

12. Material objects preserved
(a) Nail clippings
(b) Scalp hair (cut) samples
(c) Pubic hair (cut)
(d) Pubic hair combings
(e) Penile swabs, Wet& Dry to look for vaginal epithelial cells and DNA profiling
(f) Penile washings in normal saline
(g) Blood for DNA profiling
(h) Others if any.....
.....

OPINION

There is nothing to suggest that the above person is incapable of performing sexual act

Above subject may be incapable of performing sexual act

There is evidence / No evidence of recent sexual act (Based on the result of laboratory examinations)

Opinion as to the cause of injury Could be as alleged / Could not be as alleged

Other if any

REASONS FOR CONCLUSIONS ARRIVED AT .....
.....

Date
Place

Signature
Name
Designation

EXAMINATION AND REPORT OF DRUNKENNESS

Ref no._____

Requisition was received from _____ vide his letter no. _____ dated _____ through CPO. No. _____ involved in crime No _____ of _____Police Station

1. Name and address _____
2. Age_____Sex_____ Occupation _____
3. Accompanied by _____
4. Consent _____
5. Date and time of Examination _____
6. Marks of identification
1. _____
2. _____

7. History

a) Whether he took alcohol or not _____

b) How much quantity _____

c) Food or drink taken along with _____

d) Did he suffer from fits or any disability, neurological or psychiatric illness

e) If diabetic, history of oral hypoglycaemic drugs or insulin

8. Physical Examination

A) Appearance and demeanour
   a) State of clothing (decent/soiled/disarrayed)
   b) Deposition (calm/talkative)
   c) Speech (normal/thick/slurred)

B) Gait (steady/staggering)

C) Memory (all questions about the incidence, present, past)

D) Mouth (smell of alcohol, dribbling of saliva, lips etc)

E) Eyes (congested conjunctiva, pupil, nystagmus, accommodation, etc)

F) Ears

G) Pulse_____, Blood pressure_____, Respiration_____,

Temperature_____

H) Reflexes

Deep_____

Superficial _____

I) Muscular coordination

a) Walking along straight line _____

b) Finger-nose test _____

c) Picking of objects from the floor _____

d) Romberg's sign _____

J) Reaction time: Normal/Delayed

9. Systemic examination: CNS CVS

GIT RS

10. Blood Examination

Opinion:

I am of the opinion that the above person

1. Consumed alcohol and is under its influence
2. Consumed alcohol, but not under the influence of alcohol
3. Has not consumed alcohol

Seal

Signature of the Medical Officer
Name
Designation
Address
Reg. No:

PROFORMA FOR RECORDING DYING DECLARATION

Dated

Ref. No.

1, Dr. .....son of / daughter of .....Working as .....residing at .....

In the presence of witness (1) ..... son / daughter of.....
(2) ..... son / daughter of .....
Shall record the dying declaration of ....male / female aged .....years
Residing at .....on .....at .....AM / PM in the word by word order as narrated by the declarant.

Before recording the dying declaration, I have examined the declarant and found that his / her condition is critical and he / she may die any time hereafter, in spite of the life saving treatment being given to him / her. I have also thoroughly examined his / her consciousness, orientation of time and space, memory and other mental faculties and hereby certify that the declarant is in possession of sound mind to deliver his dying declaration. The words of the declarant as said by him / her are .....
.....
.....
.....

In order to clarify the points as revealed by the answers to the questions were recorded. I asked the following questions which the declarant gave the answers .

Question.....
.....
.....

Answer.....
.....

I, Dr.....certify that the above declaration was recorded by me and I also certify that the declarant .....maintained his . her sound state of mind throughout the dictation of his / her declaration. The recording ended at .....AM / PM.

Seal

Signature
Name
Designation

Read over to me and found to be correct

Signature of declarant
Name
Address

Recorded and signed in my presence

Witness (1)

Signature

Witness (2)

Signature

MEDICAL CERTIFICATE OF CAUSE OF DEATH

(For non-institutional deaths. Not to be uased for still births)
To be sent to registrar along with form No. 2 (Death report)

I hereby certify that the deceased Shri / Smt . Kum ..... Son of / wife of / daughter of ..... resident of ..... was under my treatment from ..... to..... and he / she died on ..... at ..... AM / PM.

NAME OF DECEASED

Sex

Age in completed years
Age below one year in months and days

1. Male
2. Female

CAUSE OF DEATH

1. Immediate cause — (a)
due to (or as a consequence of)

II. Antecedant cause — (b) .....
due to (or as a consequence of

Morbid conditions if any, giving rise to the above cause, stating underlining conditions last — (c) .....

III. Other significant conditions contributing to the death but not related to the desease or conditions causing it .....

If deceased was a female, was pregnancy the death associated with? Yes / No
Was there a delivery Yes / No

Signature
Name
Designation

Seal