MEDICO-LEGAL AUTOPSY TECHNIQUES

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AUTOPSY

AUTOPSY

- ~ also called necropsy, or postmortem examination, autopsia cadaverum or obduction- is the dissection and examination of a dead body, its organs and structures. Greek term= Autopsia.
- The term "Autopsy" is derived from two Greek terms- Autos= self and Opis/opsis= view. Literally, it means to see with one's own eyes; or to see for oneself. In medical science, autopsy/necropsy it means medical examination of the dead body.
- It has been in use in reference to determining the cause of death by examining a body since the 17th century.

POST-MORTEM EXAMINATION

- The two terms i.e. Autopsy and PME are frequently used interchangeably for each other.
- However, PME is a broader term which means all examinations conducted or performed after death (Post= after; mortem=death)
- Thus, PME includes the examination of the body at the scene/place of death as well as the autopsy.
- In our country, the former is invariably done by the Police (S/t in assistance with mobile FSL team) whereas the autopsy is conducted by a doctor (the nearest Civil Surgeon or other qualified medical man appointed in this behalf by the State Govt.)

TYPES OF AUTOPSY

1. *Clinical/Pathological/hospital autopsy*
2. *Medico-Legal Autopsy or Forensic autopsy*
3. *Anatomical* or *academic autopsy*

TYPES OF AUTOPSY

1. ***Clinical/Pathological/hospital autopsy*** : is performed with the consent of the next of kin of the deceased person.

Objectives

1. To determine the disease causing death i.e. to determine, clarify or confirm clinical diagnosis that remained unknown or unclear prior to the patient's death.
2. To evaluate the efficacy of treatment given.
3. To educate the medical students and doctors and for medical research purposes.
4. To allow removal of certain organs & tissues for transplantation purposes.

Types of autopsy cont....

2. ***Medico-Legal Autopsy or Forensic autopsy:***

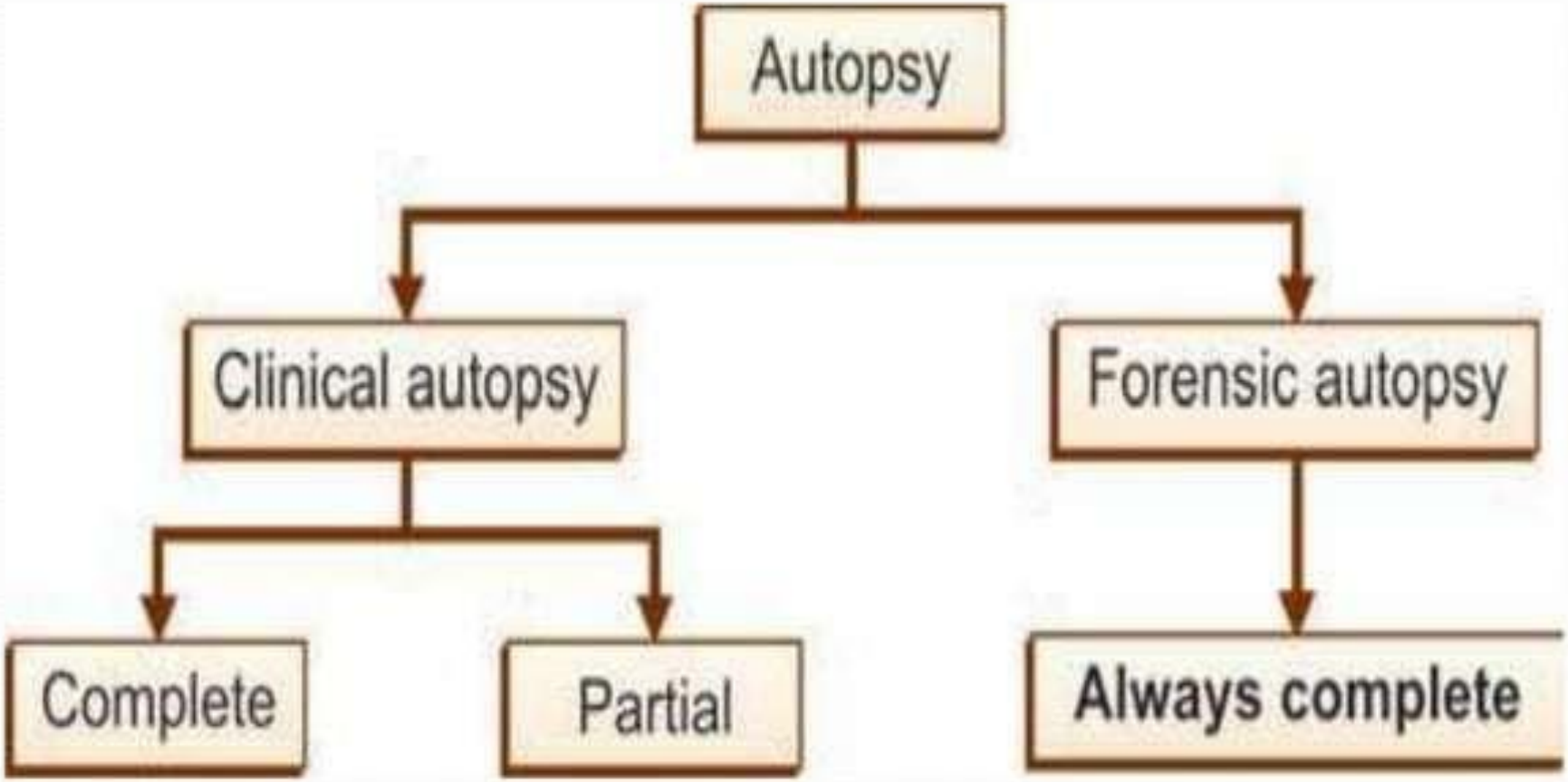
- It is a special type of scientific examination performed on the body of a deceased person. It is carried out under the laws of State only on the requisition of a legal authority responsible for the investigation of sudden, suspicious, violent or unnatural deaths.
- The legal authority is usually a police officer not below the rank of sub-inspector or a Magistrate.

OBJECTIVES OF ML AUTOPSY

1. To determine the cause of death
2. To determine the manner of death
3. To estimate the time since death
4. To establish identity of deceased when not known
5. To document injuries and to deduce how the injuries occurred
6. To collect evidences to identify the object causing death and to identify criminal
7. To retain relevant organs/viscera and tissues as evidence
8. To determine the question of viability and live birth in newborns

Types of autopsy cont....

3. ***Anatomical or academic autopsy*** :
   - are performed by students of anatomy under the supervision of the anatomist for study purpose.
   - To learn the normal structure of the human body by medical students.
   - It is usually done on an unclaimed dead body, handed over to anatomy department by municipal or such other governmental authority.
   - It is also performed on the voluntarily donated dead body.


Autopsy
Clinical autopsy
Forensic autopsy
Complete
Partial
Always complete

RULES FOR MEDICOLEGAL AUTOPSY

1. performed only when there is an official order authorising autopsy from police, magistrate or coroner.

2. The body must be identified by police man & relatives/friends & their names must be recorded. In unidentified bodies ,marks of identification, photographs, finger prints & all other means which may helpful must be noted.

3. It should be conducted only in mortuary & never in a private room.

4. It is performed on all the days of week inclusive of public holidays because there should be no delay in the process of crime investigation.

5. Inquest report, case sheet or summary, accident register must be read carefully by doctor.

6. The autopsy should be performed as soon as possible after receiving requisition.

7. The examination as far as possible should be conducted in day light because in artificial light colour changes are difficult to appreciate.

8. If the body is received late in evening a preliminary examination is done to external appearances, body temperature, superficial injuries, extent of cadaver lividity & rigor mortis. The actual PME may be conducted on next day.

9. No unauthorised person should be present at the time of autopsy. The IO may be present.

10. In each & every case examination must be thorough & complete. all cavities must always be opened because evidence of factors contributory to the cause of death may be found in more than one organ.

11. Even if body is mutilated, fragmented or decomposed autopsy should be performed, as certain evidence may still be discovered.

12. Nothing should be erased & all alterations must be initialed in the report.

13. After completion of autopsy the body is handed over to the police man.

14. PM report should not be issued to the party.

15. If any discrepancy in the injuries noted in the inquest report & those found on the body, the IO should be shown the injuries so that necessary corrections may be made in inquest report.

Preliminary autopsy data

Gather as much information as possible about the deceased and events that led to the death. This may include:

- Medical Records
- Consultation with doctor
- Statement of family members
- Investigation of the area where the person died
- circumstances surrounding the death
- Consultation with police

PARTS OF PMR (Autopsy Report)

THREE PARTS, NAMELY:

1) **PRE-AMBLE** (INTRODUCTORY DATA)
2) **BODY** (FINDINGS OBSERVED ON EXAMINATION
3) **POST-AMBLE** i.e. **OPINION**/ INFERENCE BASED ON THE FINDINGS/ OBSERVATIONS

PREAMBLE

1. PMR no. with date
2. Name
3. Father/ Husband's name
4. Age
5. Sex
6. Caste
7. Occupation
8. Address
8. Case DD/FIR No.

P.S.....Distt.....

9. Brought by
10. Names of the persons identifying the body
11. Date & hour of death
12. Date & Time of examination
13. Whence brought
14. Information furnished by Police (regarding the Cause of death) etc.

BODY OF PMR (FINDINGS)

- Consists of complete description and findings on external and internal examination of dead body.
- It should contain complete description of injuries- no., type, size (dimensions/measurements), shape, situation/ exact location (distance from 2 anatomical/bony land marks), direction etc.
- All important negative findings should also be recorded.

POST-AMBLE (OPINION)

Includes opinion regarding the cause, mode, and manner of death and the time since death based on the findings observed during autopsy.

The opinion should be honest, objective and scientific.

EXTERNAL EXAMINATION

1. ***General condition of body:*** as regards ht., wt., built, nutritional status, condition of skin & hair, RM,PMS & decomposition.
2. ***The clothing:*** should be listed & examined with regard to its nature, condition, tears, cuts, holes, loss of buttons or disarrangement. Each item is removed from the body.

   Remove the clothes carefully without tearing them. If they can't be removed intact they should be cut along the seams, not in haphazard way. Stains like blood, seminal, grease etc. should be described.

3. In all cases of sexual assault vaginal and anal swabs are taken.
4. Note the presence of stains on the skin from blood, mud, vomit, faeces etc.
5. Note the presence of signs of any disease.
6. ***Face:*** should be examined for the frothy fluid at the mouth & nose, cyanosis, petechial haemorrhages, pallor etc.
7. ***Eyes:*** should be examined for the condition of eyelids, conjunctivae, colour of sclera & pupils, contact lenses, petechiae & periorbital tissue for extravasation of blood.

8. ***Neck***: must be examined for bruises, fingernail abrasions, ligature mark or any other abnormalities.
9. Throid: size, nodularity
10. Lymph nodes: cervical, axillary, inguinal.
11. Thorax: symmetry, general outline.
12. Breasts: size, masses.
13. Abdomen: presence or absence of distension or retraction, striae gravidarum.
14. Back: bed sores, spinal deformity.
15. External genitalia: general development, oedema, local infection, position of testes etc.

16. Natural orifices: i.e. mouth, nostrils, ears, vagina etc. should be examined for injuries, foreign matter, blood etc. The hands should be examined for injuries, defence wound, electric mark etc. If clenched, to open the hand completely the flexor tendons cut at the wrist.
17. Look for needle puncture marks in the arms, buttocks etc.
18. External injuries such as abrasions, bruises, lacerations, burns, scalds etc. should be examined systematically with full details to include exact site, length, breadth, direction, position, margins, base and extent.
19. Determine whether they are caused before or after death & their time of infliction.

PRIMARY SKIN INCISIONS

The commonly employed ones are as follows.

1. **I -shaped**: extending from the chin straight down to the symphysis pubis and avoiding the umbilicus (because the dense fibrous tissue is difficult to penetrate with a needle, when the body is stitched after autopsy). Most common method followed.
2. **Y-shaped:** it begins at a point close to the acromion process → extends down below the breast & up to xiphoid process → make a similar incision on the opposite side → now make a straight incision from xiphoid process to symphysis pubis.

- **y-shaped incision** is desirable in those cases (especially females) where it is customary to keep a dressed body for viewing for sometime after death.

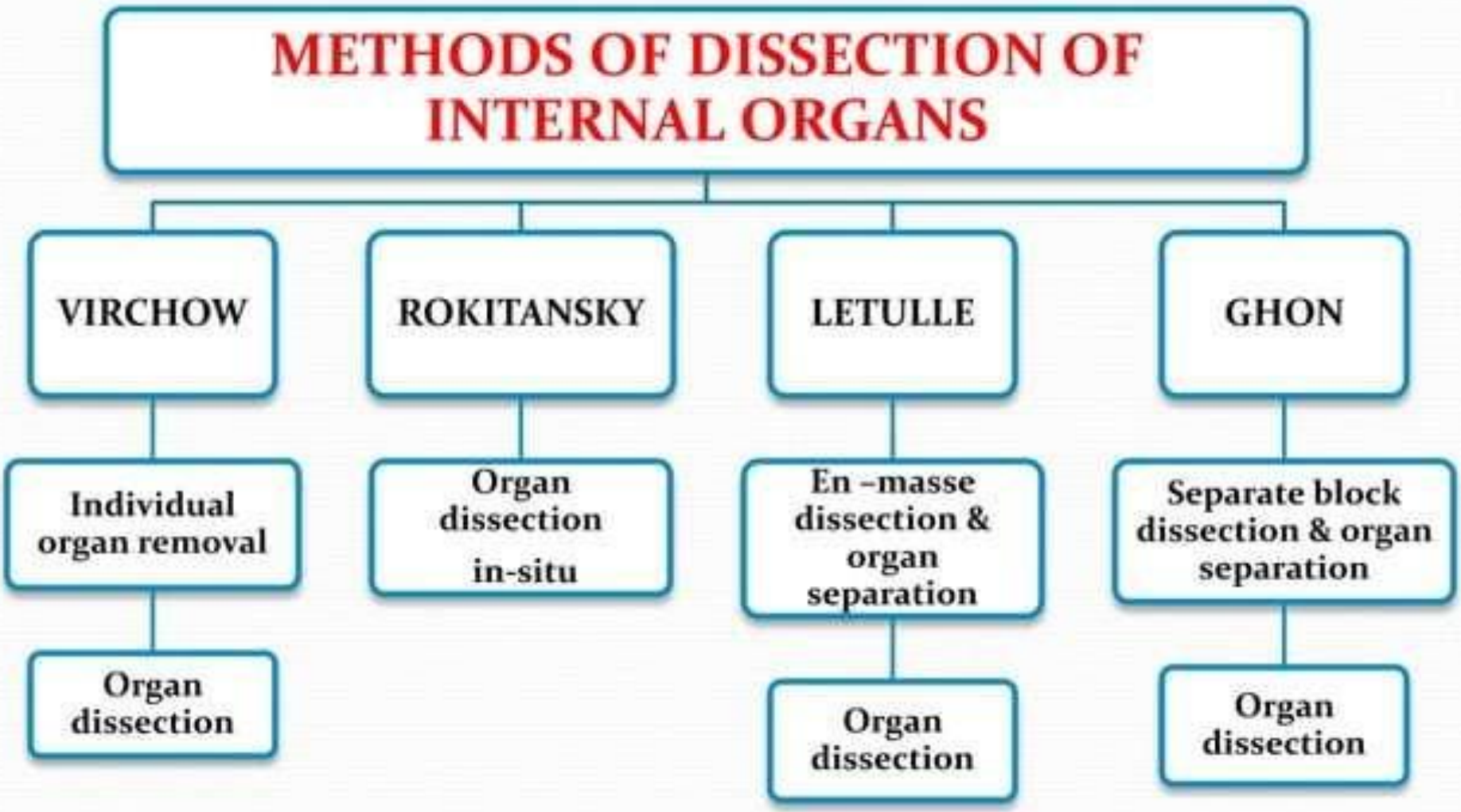
3. **Modified y -shaped:** incision from suprasternal notch to symphysis pubis in the midline → extend the incision from suprasternal notch up to the centre of clavicle on both sides. Then passes upwards over the neck behind the ear.

- It is used when a detailed study of neck organs is required, e.g. hanging or strangulation.

METHODS OF DISSECTION OF ORGANS

- Virchow's Methods
- Rokistansky's Method
- Letulle's Method
- Ghon's Method

METHODS OF DISSECTION OF INTERNAL ORGANS



VIRCHOW'S METHOD

- Advocated by Rudolf Virchow (Father of Pathology) German pathologist (1821-1902)
- Organs are removed separately one by one and studied individually.
- Cranial cavity → Thoracic cavity → Cervical region → Abdominal cavity
  - Adv: Quick & suitable for beginners
- Disadv: Causes loss of continuity
  - Difficult to evaluate inter-relationship b/w organs

ROKITANSKY'S METHOD

- Advocated by Carl Rokitansky, German pathologist (1804-1878)
- In situ dissection in part, combined with en bloc removal.
- Advantages
  - in infected bodies (HIV, Hepatitis-B),
  - considered good in children

Disadvantage: difficult to perform

LETTULLE'S METHOD

- Advocated by Maurice Lettulle, French pathologist
- *en masse method*
- All organs are removed *en masse & dissected as organ block.*
- *Adv: 1) organs inter-relationships are preserved*

  2) body can be handed over quickly

Disadv: organs difficult to handle

GHON'S METHOD

- Advocated by Anton Ghon, Austrian pathologist
- en block method
- Cervico-thoracic, abdominal, pelvic organs are removed in 3 blocks.
- Neuronal system is removed as another block.
- Adv: 1) excellent preservation
  2) handling of organs easier
- Disadv: inter-relationships is difficult to study, if disease is extending to all blocks.

CRANIAL CAVITY

SCALP INCISION

- **The typical scalp incision involves a cut that is made from- mastoid process just behind one ear → over the vertex → behind the opposite ear (inter-mastoidal incision)**

- **The scalp is reflected :**
  Forwards→
  Superciliary ridges.
  Backwards→ point just below the occipital protuberance

REMOVAL OF SKULL CAP

- Cut the temporalis & masseter muscles of each side
- Make a V-shaped saw line
- Saw line should passes through: centre of the forehead → base of mastoid process → in backwards & upwards direction, to a point a little above the occipital protuberance

REMOVAL OF BRAIN

- **Cut the dura all along the line of cleavage of skull → fold it back to midline → free the falx cerebri from the cribriform plate → pull the dura & falx backwards.**
- **brain matter is exposed.**

- now insert 4 fingers b/w frontal lobe & base of skull

  drawing frontal lobe backwards
- cut each vessel & nerve
- cut the tentorium
- cut the spinal cord, cerebral arteries through foramen magnum as far below as possible
- grasp the cerebellum by the other hand & remove the brain from cranial vault.

DISSECTION OF BRAIN

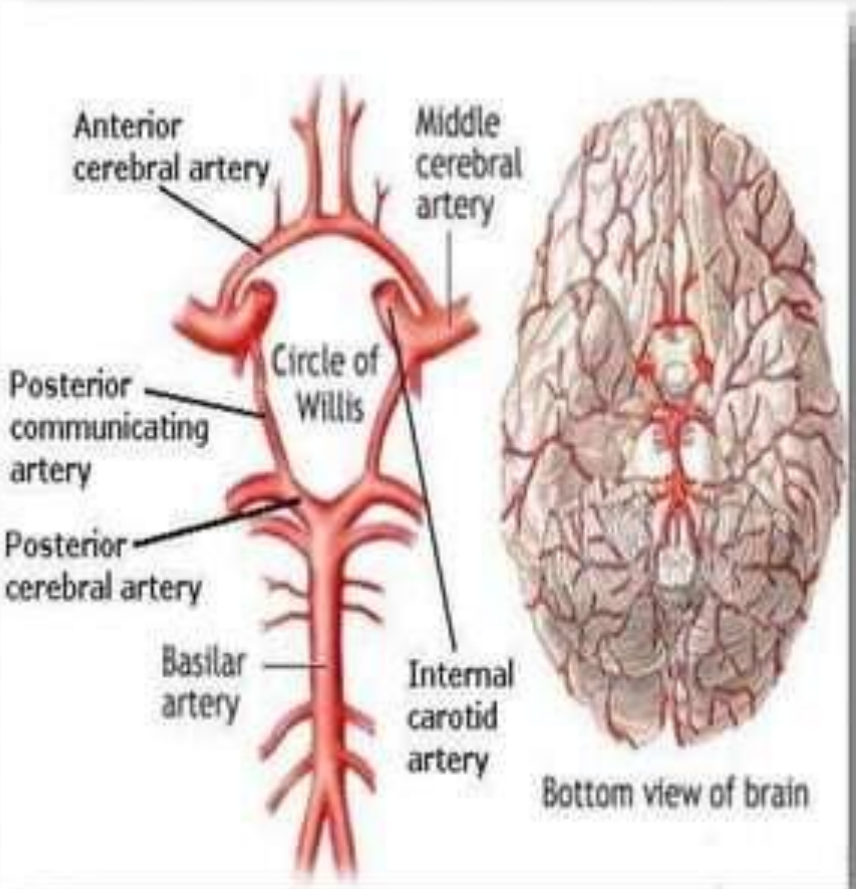
- Keep the brain in normal anatomical place & cut it in two halves with a long knife by a single incision passes through corpus callosum, midline of the midbrain, pons & medulla.
- The cerebral hemispheres are placed down on a board & serial sections made in coronal plane, starts from frontal pole to the occiput, at intervals of about 1 cm.

DISSECTION OF BRAIN

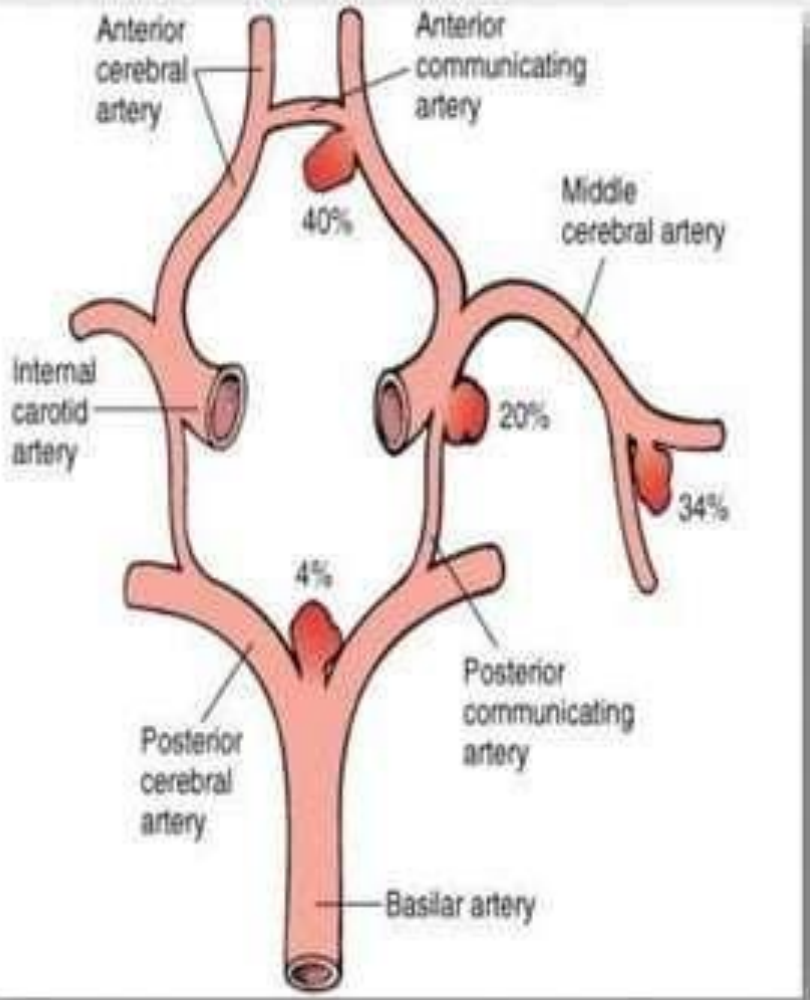
- Other method is to make cut through the cerebrum, parallel to the cutting board.

- Dimensions of wound can be measured by these parallel sections.

CIRCLE OF WILLIS

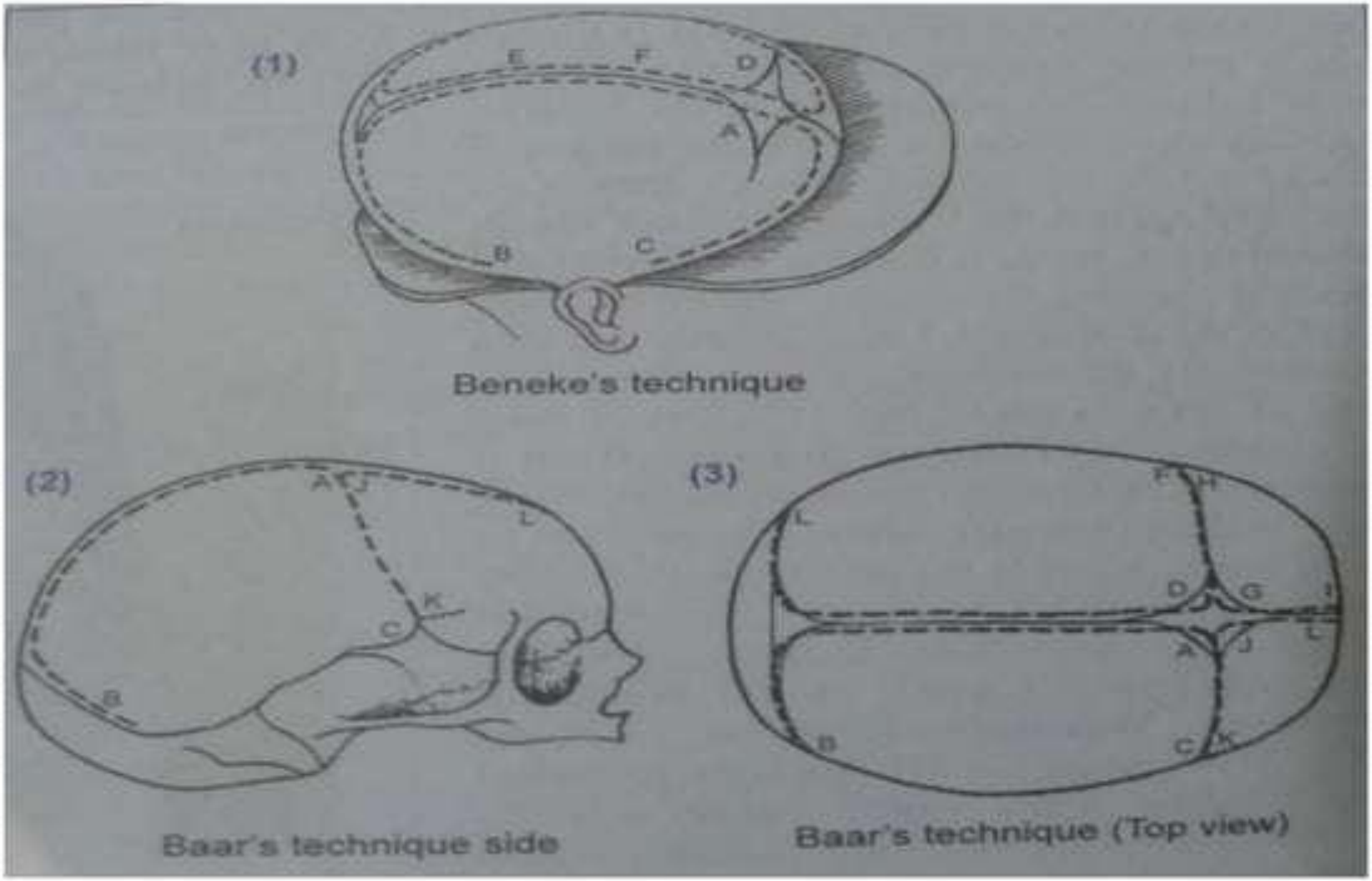


- See the circle of Willis at the base of brain & check for the Saccular or Berry aneurysms.
- Berry aneurysms are usually present at the junction of vessels.
- Most common site for berry aneurysm is the junction of anterior cerebral & anterior communicating artery.



- As we go from anteriorly to posteriorly, chances of berry aneurysm are decreased.

DISSECTION OF HEAD IN INFANTS



SPINAL CORD

- It is not examined routinely, unless there is an indication of any disease or injury.
- ***POSTERIOR APPROACH***:
  - Place the body in prone position
  - Place wooden block under chest to stretch cervical spine
  - Make a incision in midline, extending from occipital protuberance to lower end of sacrum
  - Muscles are dissected away from top of spinal column
  - Atlanto-occipital joint capsules are incised
  - Disarticulate the atlas

Spinal cord cont...

Laminae are sawed close to the transverse processes through entire length of vertebral column on each side.

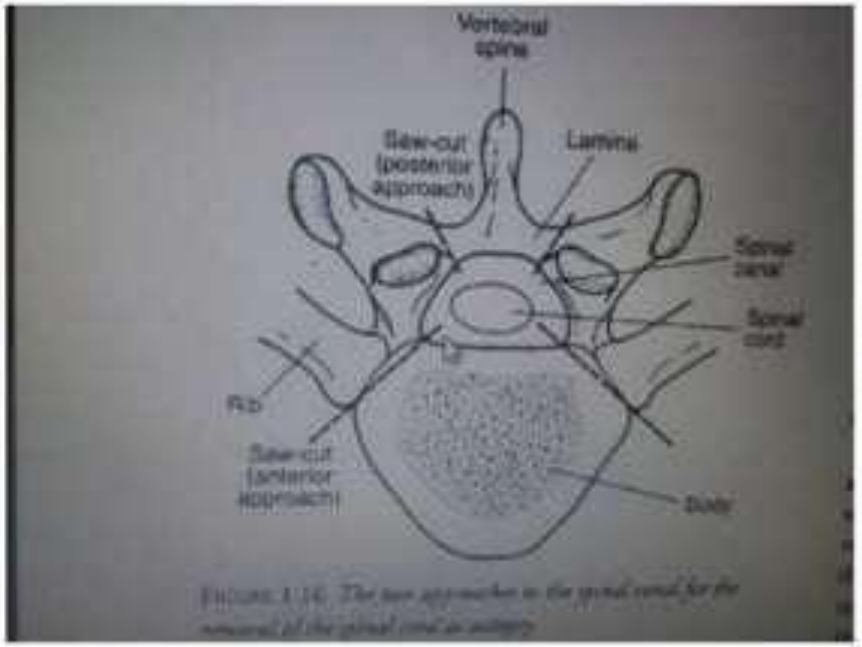
The freed spinous processes are grasped with bone forceps and spinous processes are lifted in one piece.

The spinal cord along with dura is picked up and succeesive nerve roots & attachment of dura being cut with scissors from below upwards.

Spinal cord cont...

- Cut the spinal cord at the foramen magnum.
- This separates the cord along its entire length.
- Now open the duramater by forceps and scissors to examine the cord

ANTERIOR APPROACH



The skin and underlying subcutaneous tissues are reflected, thus exposing the anterior chest wall, as well as the opened abdominal (peritoneal) cavity. The liver, stomach, and intestines are visible.

THORACIC CAVITY

A bone saw is used to cut the front of the chest plate off of the chest wall(sternum)

The anterior chest plate is removed, exposing the pleural cavities (containing the lungs) and the front of the pericardial sac.

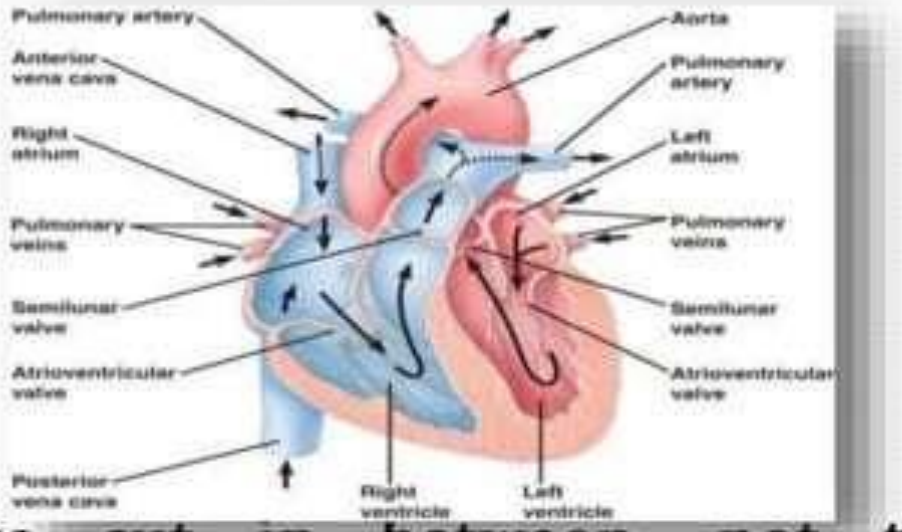
REMOVAL OF HEART

The heart is pulled forward (upward) and removed by cutting the inferior vena cava, the pulmonary veins, the pulmonary artery and aorta, and the superior vena cava.

DISSECTION METHOD OF HEART

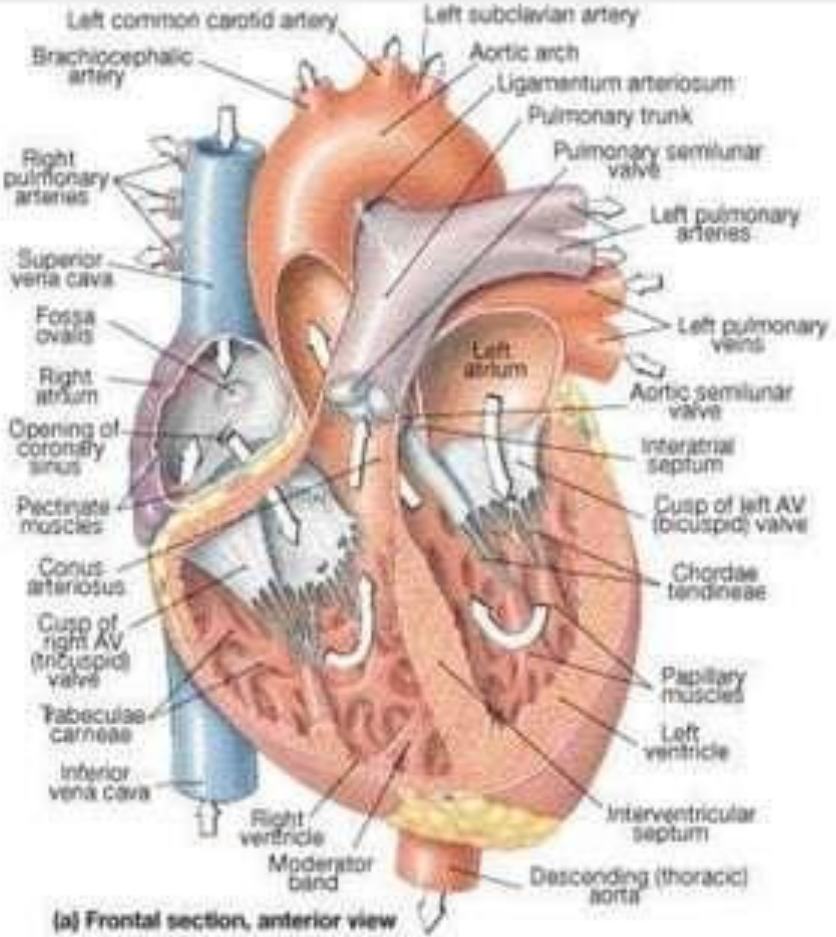
Inflow- Outflow method:

- suitable method primarily for normal heart.
- For each side, the atrium is opened first and then the ventricle is opened along its inflow and outflow tracts, following the direction of blood flow .

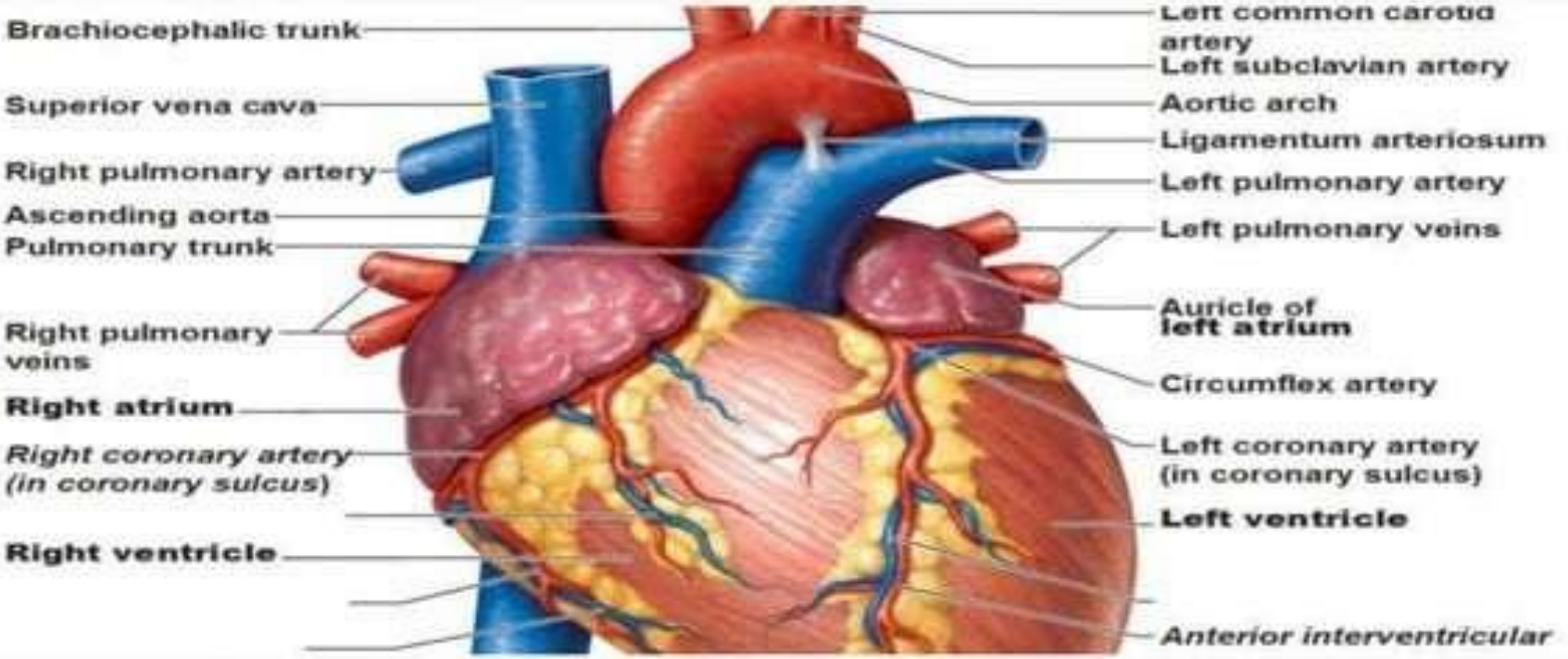


- **Valves are cut in between, not through their commissures .**

- Using scissors, the initial cut is made from the inferior vena cava to the right atrial appendage, sparing the superior venacava.



- The right ventricular inflow tract is opened with a knife or scissors from the right atrium, through the posterior tricuspid leaflet, running parallel to and about 1 cm. from the posterior ventricular septum.
- The outflow tract is opened in a similar fashion, approximately 1 cm. from the anterior ventricular septum, extending through the anterior pulmonary cusps into the main pulmonary artery.



- The left atrium is opened with scissors from the tip of the appendage, across the body of the atrium, cutting between the orifices of the upper and lower pulmonary veins, to the level of the atrium septum.

- The left ventricular inflow tract is opened with a scissors along the lateral aspect through the left atrial wall near its appendage, through the mid-portion of the posterior mitral leaflet, between the two mitral papillary muscles, and through the apex.

- The outflow cut travels parallel to the anterior ventricular septum and about 1 cm from it.

- This curved cut is best accomplished with a scalpel; care should be taken not to cut into either the anterior mitral leaflet or the ventricular septum.
- Scissors can be used to extend the cut across the left aortic cusps and into the ascending aorta, to one side or the other of the left coronary ostium.
- Further slicing into the myocardium is not recommended other than for microscopic slides.

LUNGS

- Long bladed knife is placed under the hilum of each lung with blunt edge upwards & turned around so that sharp edge is upward.
- With a short sawing motion the hilum is completely cut through.
- Cut across from apex to base with the large brain knife, held parallel to board.

DISSECTION OF NECK

1. **Extending the neck**: a wooden block is placed under the shoulders to allow the head to fall back & extend the neck.
2. **Incision:** neck is best dissected by modified Y-shaped incision.
3. **Layer of dissection of neck**: dissect the each layer separately to detect the signs of trauma.

   1st layer: Platysma

   2nd layer: Sternocleidomastoid

   3rd layer: a) Omohyoid (b) digastric

   4th layer: Sternohyoid

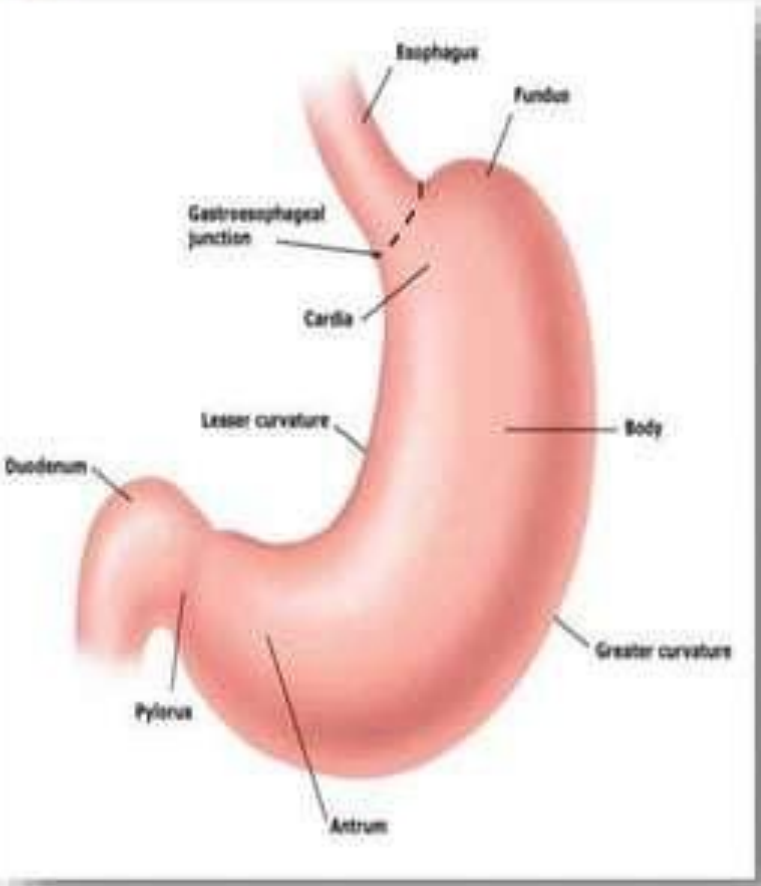
   5th layer: a) sternothroid (b) Thyrohyoid

- **Thyroid gland**: sectioned & examined.
- Sections are made in both lateral lobes along their longest diameter at 0.5 cm. distances.
- **Common carotid**: incise & intima examined. This may show haemorrhages in neck trauma.
- Oesophagus, larynx, & trachea are mobilized and pulled away from the pre-vertebral tissue by blunt dissection.
- All are examined by cutting & open them from the posterior surface.

ABDOMINAL CAVITY

STOMACH

- Apply double ligature at each end.
- Make a cut in b/w the ligatures(to avoid the spillage of contents of stomach & intestine)
- Open the stomach along its greater curvature; from the cardiac to pyloric end.
- Note the nature of any food, its state of digestion, smell, colour, character or any suspicious material & examined the mucosa for ecchymosis, haemorrhage ulceration or other abnormal condition.

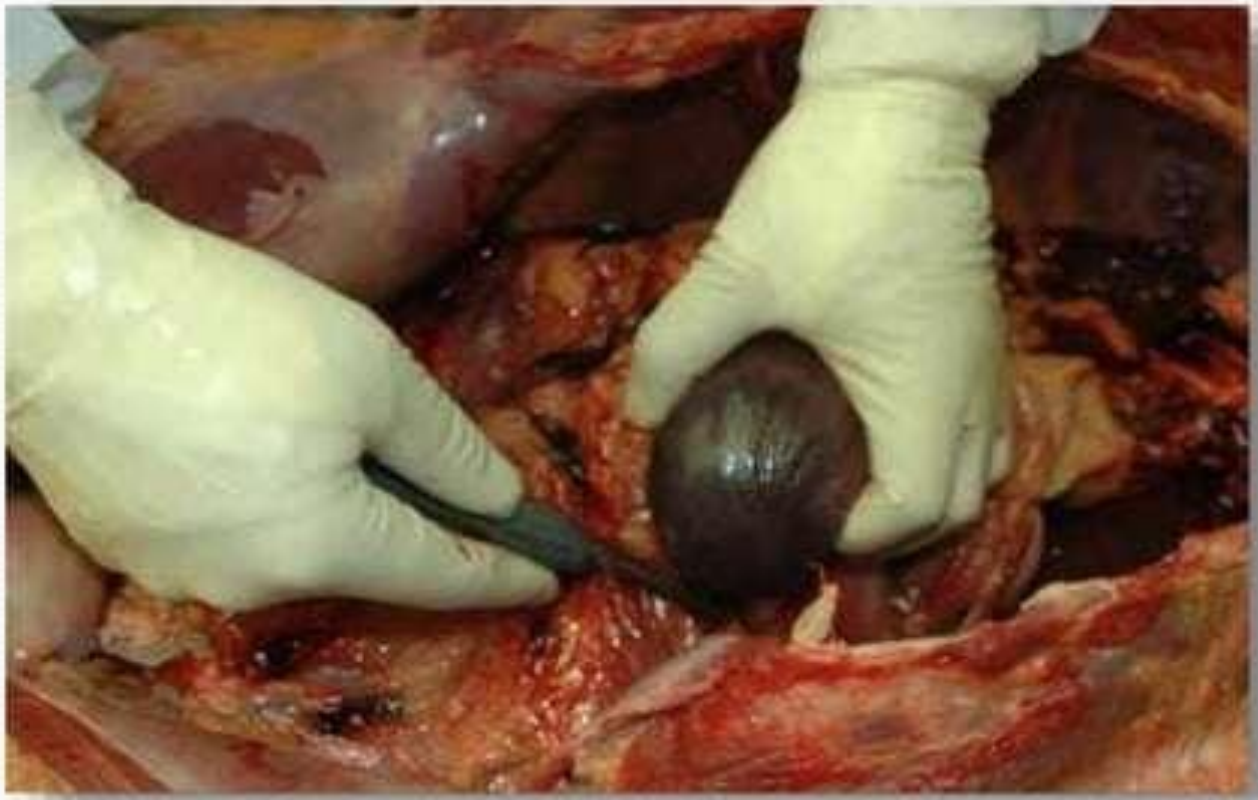


INTESTINES

- Both the small & large intestine should be removed by cutting the mesentery & freeing other attachments after ligating at both ends.
- The small intestine is opened by a longitudinal cut along the mesentric border & the large intestine along the anterior taenia & their mucosa & contents studied.
- In cases of suspected poisoning the contents should be preserved & sent for chemical analysis. (about 30 cm length)

SPLEEN

- **The spleen is reflected forward and cut away from the region near the tail of the pancreas.**



- It is sectioned in its long axis.
- Note the size, consistency, weight , condition of capsule, injuries or disease

KIDNEYS

- Expose the kidneys by incising their capsules.
- Detach them at their hilum.
- Then cut lengthwise to inspect the interior.

LIVER

- The liver must be cut away from the diaphragm, as well as the inferior vena cava and biliary system in order to remove it from the body.
- It is cut into 2 cm. thick slices which run in long axis.
- Preserve 200- 300 gm. of liver with gall bladder for chemical analysis.

TESTES

- Incise the peritoneal aspect of inguinal canal & pul out a loop of vas with finger.
- Free the vas to the internal inguinal ring.
- Push the testes up out of the scrotum with right hand & pull the vas with left hand.
- After removal of the testis , hold the testes and epididymus with left hand & cut longitudinally with knife.

FEMALE GENITALIA

- The vaginal canal should be opened from below upwards & examined for any foreign material or marks of injury.
- The vagina & uterus are slit anteriorly or posteriorly up to fundus.
- Two short incisions are made in fundus from main longitudinal incision towards each cornu to expose endometrium.
- After opening, examine the mucous membrane & thickening of wall.

FEMALE GENITALIA

- If the uterus contains a foetus the age of its intra-uterine life should be noted.
- Ovaries & fallopian tube are freed from the pelvis & uterus & then removed.
- The ovaries should be chiefly examined for corpora lutea.

THANK YOU