AUTOPSY PROTOCOL

LEARNING OBJECTIVES

• By the end of the lecture the student should be able to know:
  • Autopsy and its type
  • Death, causes and mechanism
  • Difference between medico legal and pathological autopsy
  • Inquest report and its particulars
  • Rigor mortis
  • Postmortem lividity

HISTORICAL BACKGROUND

• The history of autopsy dates back to about 3000 BC.

• The ancient Egyptians used to practice embalming, must have exposed numerous lesions of the internal organs to the view of those who eviscerated the dead body, so it is believed that Egyptians were first to conduct autopsies.

• Record from Roman times necessitates the importance of this procedure from the time of examination of the wounds of Julius Caesar by a physician Anticus in 44 BC.

• In Byzantium, an ancient city of Roman empire, the name of which was changed to Constantinople, in 6th Century, autopsies were performed to investigate cause of plague.

• William of Salicito (1201-80), in Italy performed at least one medico legal autopsy on the dead body of his nephew Marches Pallavinci.

• In 1302, a medico legal autopsy was done on the order of the court in Bolagna (Italy) by Bartilomeo De Varignana on the dead body of a noble man Azzolino, who died under suspicious circumstances of alleged poisoning; the record of this is still present in a museum in London.
AUTOPSY

• The Word AUTOPSY means AUTOS=SELF and OPIS=VIEW means see for one own self.

• POSTMORTEM EXAMINATION means POST=AFTER and MORTEM = DEATH, so Post mortem examination is the examination of the body after death.

• It is also Known as NECROPSY, NECROS=DEATH and OPIS =VIEW

DEFINITION

• Post mortem is detailed external examination of the dead body without giving systemic incisions.

• Autopsy is detailed external as well as internal examination of the dead body by opening all the major cavities of the body such as head, thorax, abdomen & some times spine including further examinations such as histology, biochemistry and toxicological analysis of collected material.

TYPES OF AUTOPSY

• Medico legal or forensic autopsy
• Clinical, academic, hospital or pathological autopsy
• Negative autopsy
• Obscure autopsy
• Psychological autopsy
• Anatomical autopsy
• Mini autopsy
• Needle autopsy
• Digital autopsy / virtual autopsy or virtopsy

VIRTUAL AUTOPSY OR VIRTOPSY
It is a new and non intrusive form of performing autopsy. This system utilizes a CT scan and a MRI unit to obtain a detailed view of the body.

The MRI images and detailed x rays are combined to create a full three dimensional view of the body which the forensic pathologists and medical examiners can use to examine the state of blood vessels, organs, bones and tissues of the body and thus determining the cause and manner in which patient died.

Virtual autopsy can even bring to light some crucial information regarding the body that is difficult or time consuming to acquire using conventional methods.

**VIRTOPSY + NEEDLE AUTOPSY**

As radiology is unable to provide tissue information on the cellular level in a non-invasive manner and also diatom detection, DNA, bacteriological, chemical, toxicological and other specific tissue analysis are impossible using radiology so needle autopsy along with digital autopsy is a better prospect.

**AIMS AND OBJECTS OF AUTOPSY**

- To establish identity of an unknown dead body
- To determine the cause of death
- To determine the manner of death
- To determine the mode of death
- To determine the time since death
- In case of new born to determine whether the baby was live born or dead born

**MODES OF DEATH**
(STOPPAGE OR FAILURE OF VITAL SYSTEMS)

- Coma - permanent stoppage of the function of the brain (now known as brain death)
- Syncope - permanent stoppage of function of the heart
- Asphyxia - permanent stoppage of the function of the lungs

CAUSE OF DEATH

- Disease
- Physical injury
- Intoxication, which finally prove fatal

MECHANISM OF DEATH

- Train of changes in the body, physiology & biochemistry, which is incompatible with life (asystole, ventricular fibrillation, hemorrhagic shock, severe acidosis or alkalosis, sepsis, toxemia)

MANNER OF DEATH

- Natural, when due to disease
- Unnatural, when due to causes other than disease such as trauma or intoxication, which can be:
  - Accidental
  - Homicidal
  - Suicidal

DIFFERENCE BETWEEN MEDICO LEGAL AND PATHOLOGICAL AUTOPSY

<table>
<thead>
<tr>
<th>Medico legal autopsy</th>
<th>Pathological autopsy</th>
</tr>
</thead>
<tbody>
<tr>
<td>is done on request of agencies appointed by the government to investigate in cases of unnatural, sudden or suspicious deaths</td>
<td>is done on patients dying in big hospitals after taking permission from the relatives to confirm the clinical diagnosis or in cases where diagnoses could not be made till death</td>
</tr>
</tbody>
</table>

- Identity of dead body is usually not known
- Cause of death is mostly not

<p>| Identity of dead body is known from the case sheet in the ward where he was admitted |</p>
<table>
<thead>
<tr>
<th>Known</th>
<th>Cause of death is usually known from the case sheet in the ward</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Time since death is usually not known</td>
<td>• The exact time since death is known form the notes on the case sheet by the duty doctor</td>
</tr>
<tr>
<td>• External findings are of vital importance</td>
<td>• External findings are not so important except in skin manifestations of systemic diseases</td>
</tr>
<tr>
<td>• All the three major cavities i.e. Head, Thorax and Abdomen are opened. Spinal column is also opened in certain cases</td>
<td>• Only the cavity containing the diseased organ is opened</td>
</tr>
<tr>
<td>• It is a valid documentary evidence in the court of law</td>
<td>• It is not a valid documentary evidence in the court of law</td>
</tr>
</tbody>
</table>

**AUTOPSY PROTOCOL**

- Protocol is a signed document containing a written record which can be used as a proof for something when required.

- An autopsy protocol is a document containing written record of autopsy findings which can be used as a proof for cause of death, manner of death and time since death or in short it is the detailed autopsy report duly signed by the authorized medical officer.
ESSENTIALS BEFORE MEDICO LEGAL AUTOPSY

• Permission or authorization
• Dead body challan
• Inquest report or panchnana
• No undue delay
• Identification
• Visit to the scene of crime
• History of the case
• Examination without delay in the mortuary
• Verification of injuries noted by police
• Preservation of viscera and other tissues
• Notes. List of articles
• Preserving chain of evidences

PROCEDURE OF MEDICO LEGAL AUTOPSY

• All the entries should be made on prescribed forms of PM reports
• First of all mention the name of the hospital where autopsy is being performed
• Mention the name of the deceased s/o, d/o, w/o, unknown s/o, d/o of unknown
• Mention the name of medico legal officer performing the autopsy
• MEDICOLEGAL CENTRE
• __________________________ HOSPITAL, KARACHI
• P.M. No. __________________ Date:-

Memorandum of Post Mortem Examination held at
___________________________ Karachi on the dead body of
__________________________________________ By

I. GENERAL PARTICULARS:
• By whom was the corpse sent? __________________________
• By whom was the corpse brought? ________________________
• By whom identified (1) ______________________________
• (2) ______________________________
• (a) Exact time of its receipt ____________________________
• (b) Exact time of beginning P.M. Examination.
• (c) Exact time of completion of P.M. Examination
• Substance of accompanying report from the Police Officer Magistrate, to-
 gather with the date of death – if known, supposed cause of death or
 reason for examination.

II. EXTERNAL EXAMINATION:
• Sex, Apparent Age, Race etc
• Description of clothes or ornaments on the body
• Condition of the body
• Special Marks on the skin
• Condition of the clothes
• Rigor Mortis:
• General description about feature extent
  and signs of de-composition, presence
  of post Mortem lividity, (P-M-L.)
  position of Tongue, State of pupils, oozing
  from mouth, nostrils, ear, etc.
GENERAL PARTICULARS

• By whom was the corpse sent? (Mention about the SHO and name of the police station)
• By whom was the corpse brought (mention the name and belt number of the accompanying police constable in cases of unknown dead bodies)
• By whom identified: if the name of deceased is known, identification by two relatives with their signature and relationship to the deceased
  i) name (relationship) signature & CNIC no.
  ii) name (relationship) signature & CNIC no.
• In case of unclaimed bodies, the police constable accompanying the dead body identifies it and his signature is taken.

REPORT

• Exact time and date of receipt of dead body from police.
• Exact time and date of beginning of the postmortem.
• Exact time and date of ending of the postmortem.
• Substance of accompanying report from the police officer or magistrate, together with date of death if known, supposed cause of death and reason for examination.

INQUEST REPORT

• This inquest report should be read carefully as from certain findings such as circumstantial evidence or farewell note or letter or injuries may point towards a specific organ, so that the MLO should lay more stress in examining that particular portion.
• Here it should be clearly mentioned that according to police report, the dead body was found on a particular place on a specific date and time and jurisdiction of the concerned police station.
EXTERNAL EXAMINATION

- Sex, apparent age, religion.
  SEX: can be easily identified before putrefaction, but in highly decomposed bodies sex can be determined by nuclear sexing from scalp hair root.

  RELIGION: From clothes, tattoo marks, vermilion Hindu bodies can be identified and in Muslims callosity marks over fore head and left lateral malleolus due to posture while offering prayers is helpful

- Articles recovered from the clothes may contain national identity card, which is helpful in identification

- Ornaments on the body can help in determining the religion, such as chain with cross in the neck in Christians, locket with Allah or Mohammad (peace be upon him) or some verse from holy Quran in Muslims.

CONDITION OF THE BODY

- Whether of average or weak built indicating some chronic wasting disease such as tuberculosis, cancer or of good built which raises strong suspicion of foul play in death as healthy individuals have more power to resist.

SPECIAL MARKS ON THE SKIN

- Note scars due to injuries, surgical operation scars, birth marks, moles. In medicolegal autopsies we should always take two marks of identification for further references, as they help in identification in unknown dead bodies
CONDITION OF THE CLOTHES

- Can give a rough idea about death e.g. If clothes are torn or buttons are missing indicate struggle.
- The clothes may be stained with blood, mud, grease, paint, imprint marks of a vehicle in road traffic accident.
- May be stained with blood and seminal stains in cases of sexual assault.
- Blood stains of accused may be found on clothes of the deceased according to Locard’s principle of exchange.

LOCARD’S PRINCIPLE OF EXCHANGE

- According to this principle ‘when ever two bodies come in to contact with each other there is always exchange of material between them’.
- Common examples are transfer of semen of accused in to vagina of the victim, epithelial cells of accused under finger nails of the victim.
- In road traffic accidents, paint and grease from vehicle to victim, blood and cloth fibers of victim may be transferred to the vehicle.
- In hanging, epithelial cells from neck will be found on rope and fibers of rope in the ligature mark on the neck.

RIGOR MORTIS

- It is the stiffening of the body due to physio-chemical phenomenon involving muscle fibers after death.
- Each muscle fiber is composed of myofibrils that are contractile elements, made of two types of proteins namely myosin and actin which are arranged in inter-digitating manner.
- During contraction actin is drawn in to myosin. This process is dependent upon the presence of enzyme adenosine triphosphate which is absorbed in myosin of the muscle.
- After death this enzyme disappears leading to fusion of actin and myosin to form a stiff dehydrated gel.
RIGOR MORTIS

• Another theory is that after death due to permanent oxygen lack, lactic acid and other tissue metabolites accumulate in myofibrils. The cytoplasm which is liquid during life becomes sufficiently acidic, thus becoming a gel, adhering the myofibrils together and making muscles rigid.

RIGOR MORTIS

• **Onset and duration**
  - Proximo-distil course
• **Development phase**
  - Clinically manifested in 2-4 hours after death. Fully developed (top to toe) in 9-12 hours.
• **Static phase**
  - Persist in the body for 12 hours.
• **Passing off or resolving phase**
  - Passes off in 12 hours
• **Rule of thumb**
  - Each state lasts for 4-6 hours in summer, 10-12 hours in winter.

RIGOR MORTIS

• Sequence in voluntary muscles
• Muscles of eyelids
• Muscles of face
• Muscles of lower jaw
• Muscles of neck
• Muscles of chest
• Muscles of upper extremities
• Muscles of trunk
• Muscles of lower extremities
• Last to be affected are small muscles of fingers and toes.
• It is checked by
  – Attempting to lift eye lids
  – Depressing the jaw
  – Gently bend up the neck and various joints of the body
• In warm or summer season:
  • It begins 1-2 hours after death.
  • Take another 1-2 hours to develop.
  • Duration is 18-24 hours.
• In winter season:
  • It begins 2-3 hours after death
  • Take another 2-3 hours to develop.
  • Duration is 24 – 36 hours
  • In very cold weather duration is 2-3 days.

CADAVERIC SPASM

• When rigor mortis sets in early, it disappears early and vice versa.
• Some times when death occurs during struggle, the muscles which were in a state of contraction during life remain, so, with out passing through initial phase of primary relaxation. This is known as cadaveric spasm and some times pieces of clothes from the accused are found firmly grasped in hand or if a person commits suicide, the weapon of assault is found firmly grasped in the hand after death in some people.

CADAVERIC SPASM
PUGILISTIC ATTITUDE

• In cases of burns, rigor mortis is absent and body assumes pugilistic attitude or boxers attitude. Such attitude is seen also in highly decomposed bodies and is known as false pugilistic attitude and is due to gases of putrefaction.

GENERAL DESCRIPTION

• In general description features, complexion, color of hair are mentioned

• If decomposition has started, describe bloating of features, sites of greenish discoloration due to formation of gases of putrefaction eg. Greenish discoloration in right iliac fossa which is first external sign of decomposition and presence of maggots, their size if any.

• Gases of putrefaction are hydrogen sulphide, ammonia, phosphorated hydrogen, carbon di oxide, methane, cadaverin, putricin, indol and skitol.

DESCRIPTION OF MOUTH & CONJUNCTIVA

• Describe mouth and position of tongue whether inside or protruding out, any smell from mouth.

• Conjunctiva are usually pale in shock and excessive hemorrhage

• Conjunctiva are congested in cases of traumatic asphyxia, violent asphyxial deaths as in hanging, strangulation etc and certain poisons eg. Dhatura.
CONDITION OF PUPILS

- They are usually dilated in shock, asphyxia.
- Markedly dilated in dhatura poisoning.
- Pupils are pin point in pontine hemorrhage, opium poisoning and
- Also constricted in organo-phosphorus compounds.

PRESENCE OF POST MORTEM LIVIDITY

- It is the discoloration of the dependent parts of the body after death due to the fact that after death blood also obeys the law of gravity and accumulate in toneless capillaries and veins in most dependent parts of the body and stagnate there.
- As it is due to stagnation of blood it has same color as blood.
- It appears in patches in 1-3 hours after death and these patches increase in size and unites with each other to form uniform discoloration in 6 hours and is fixed in 6-8 hours.
CONTACT FLATTENING

- The distribution of P.M.L. Gives an idea about position of body at time of death
- Its color gives an idea about the cause of death
- Its fixing gives time since death eg. If body was lying on the back the P.M.L. Will be seen over back of head, excluding occiput, back of ears, back of neck, back, sacral region, external genitalia and posterior aspect of extremities, excluding scapular regions, buttocks and posterior expects of calf’s due to CONTACT FLATTENING.

COLOR OF PML

- The color of P.M.L gives some idea about the cause of death e.g.
  - Very faint – In severe hemorrhages and anemia.
  - Intensely bluish violet or purple – Asphyxia.
  - Bright cherry red – CO poisoning, excessive cold.
  - Pink – HCN & KCN.
  - Chocolate brown – Potassium chlorate.
  - Dark Brown – Phosphorus.
  - Reddish brown – Nitrites.
  - Bluish Green – H2 S.
  - Black – Opium poisoning.

TIME SINCE DEATH

- P.M.L also gives a rough idea about time since death.
- It starts developing in patches over dependent parts in 1-3 hours after death and these patches gradually increase in size and unite with each other so by 6 hours it becomes fixed and so no blanching is seen when pressed.
- If within 1st 6 hours the position of the body is changed, blood gravitates to new dependent parts but small stains will still persist over previous dependent parts.

-------------THE END-------------