

# **Violent Asphyxial Death (also called) Mechanical Asphyxia**

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# Gordon's classification of anoxia

- Anoxia may be
  - **A.** Anoxic, - Defective oxygenation of blood in lungs
  - **B.** Anaemic, -Oxygen Carrying capacity of blood is reduced: Haemorrhage, CO Poisoning
  - **C.** Histotoxic-In this the enzyme system in tissue for utilization of oxygen are poisoned. Ex. Cyanide poisoning
  - **D.** Stagnant -Impaired circulation reduces oxygen delivery to tissue. Ex. Heart failure, embolism, shock

# Anoxic Anoxia

- Anoxic anoxia is asphyxia
  - 1. Primary paralysis of respiration
    - Narcotic poisoning, electrical shock
  - 2. Lack of oxygen in respired air-mines, wells, sewer gas, Nitrogen gas narcosis
  - 3. Or mechanical obstruction from within or from outside to respiration,
    - Causing lack of Oxygen and failure to eliminate CO<sub>2</sub>
    - Resulting in to unconsciousness and death

# ASPHYXIA

- Asphyxia is an interference with respiration leading to anoxic anoxia and retention of CO<sub>2</sub> due to external causes
- Interference with respiration due to any cause- mechanical, environmental or poison
- It is a condition characterised by lack of oxygen in blood

# Asphyxia

- Although many natural disease processes may involve inadequate uptake and/or delivery of oxygen (eg, chronic obstructive pulmonary disease [COPD]), the term "asphyxia" is generally reserved for conditions related to abnormal atmosphere and mechanical and chemical effects directly leading to anoxic anoxia and retention of CO<sub>2</sub> leading to unconsciousness and or death..

# Stages in Asphyxial Death

- **Stage of forced respiration:**
  - It is due to stimulation of the respiratory centre causes dyspnea
- **Stage of convulsions:**
  - It is due to cerebral irritation causes also cyanosis constricted pupil, loss of consciousness,
- **Stage of paralysis:**
  - Clinical picture: flaccid muscles & lost reflexes, deep cyanosis, dilated pupils, irregular breathing (Cheyne-Stokes respiration), death.

# GENERAL SIGNS OF ASPHYXIA

- **Cyanosis**- relevant only in fresh bodies
- **Tardieu's spots**-under conjunctiva, pleura, pericardium, peritoneum, and meninges
- **Congestion**- pulmonary and systemic congestion
- **Right side heart full, left side empty**
- **Pulmonary oedema**- as a result of congestion
- **Fluidity of blood**- due to liberation of fibrinolysin in blood

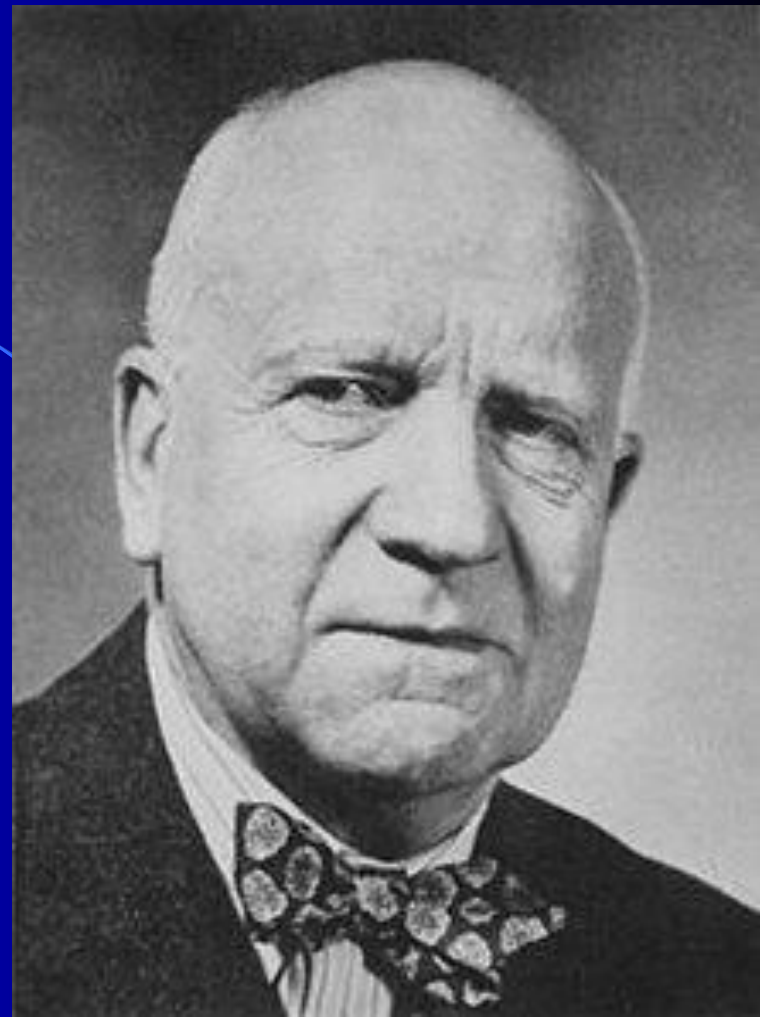
## Cyanotic lips

Also look for cyanosis  
in fingers

Action should be  
taken within minutes



In 1925 he was rated by the American Chemical Society as one of the 39 most eminent American Clinical chemists. Described 5gm/dl deoxyhemoglobin as threshold for development of cyanosis now with arterial blood gas analysis and pulse oximeter study led to an estimation of 2gm/dl as threshold for cyanosis.



Van Slyke Ph.D born in  
Pike, N. Y., Mar. 29,  
1883- 4<sup>th</sup> May 1971

# Auguste Ambroise Tardieu

10/04/1818- 12/01/1879

Paris France

a **French medical doctor**  
and the pre-eminent  
forensic medical  
scientist

President of the French  
Academy of Medicine,  
as well as Dean of the  
Faculty of Medicine and  
Professor of Legal  
Medicine at the  
University of Paris.





# Types of Asphyxia

- **Pathological**- Asthma, Acute respiratory distress syndrome, perinatal asphyxia
- **Chemical** (Poisoning)- Carbon monoxide inhalation, Phosgene or Hydrogen cyanide poisoning, nitrogen gas inhalation
- **Mechanical** Asphyxia- Hanging, strangulation, suffocation

# Violent Asphyxial Death/ Mechanical Asphyxia

- **Violent**- Uncontrolled, strong, rough physical force:
- **Mechanical**- Relating to or controlled or operated by physical forces

# VIOLENT ASPHYXIAL DEATH

- Constriction or pressure over neck:-
  - Hanging - suicidal
  - Strangulation ( by ligature, garrotting, lasso, throttling, mugging, & Bansdola)- homicidal
- Suffocation
  - Closure of nose and mouth - Smothering
  - Occlusion of lumen of air passage- Choking
  - Restriction of the movement of chest wall:-  
Traumatic asphyxia
- Replacing air by fluid in environment:-  
Drowning

# Hanging

- **Hanging is a form of violent asphyxial death ,produced by suspending the body with a ligature round the neck, constricting force being the weight of body or a part of the body weight.**
- Typical hanging, atypical hanging, complete hanging, & partial hanging
- Nature of ligature used

# Causes of Death in Hanging

- Asphyxia-With 15 kg pressure epiglottis and root of tongue pressed against the posterior wall of pharynx- Majority of cases
- Venous congestion-Due to blockage of jugular veins in neck.
- Cerebral Ischaemia-With 4.5kg Pressure carotid arteries & 30 kg vertebral blocked
- Shock- pressure on vagus causes cardiac arrest
- Fracture dislocation of cervical vertebrae-Fall of about 2 metre required
- Combined asphyxia and cerebral congestion

# Post- Mortem Findings

- External Appearance

**Ligature Mark**,- Pressure abrasion

Character -pale groove, parchment-like,  
situation-oblique, interrupted, directed  
upwards, in upper part of neck,  
margin especially upper congested

Other signs-

**PM Lividity**- stocking & Gloves

**Stretching of neck**,

**Lefacie sympathique**,

**Dribbling of saliva**,

# PM Finding

- Internal Findings- Signs of asphyxia

Tissue under ligature not injured, Blood dark & fluid, Rt side of heart, pulmonary arteries and venacava full, abdominal organs congested. Brain and lungs may be congested or pale. In judicial hanging fracture dislocation of 2<sup>nd</sup>-3<sup>rd</sup> cervical vertebrae, less commonly of 3<sup>rd</sup> & 4<sup>th</sup> or still less commonly of 1<sup>st</sup> & 2<sup>nd</sup> may be seen. Spinal cord then lacerated near foramen magnum. Inner coat of carotid arteries may show transfer tear.

Hyoid bone may be fractured in older age.

# Medico-Legal Aspects

- Similar ligature mark may be produced post mortem
- Diagnosis based on
  - Positive findings like:-
    - Saliva stain, slight abrasion & ecchymoses around ligature mark. Tear in carotid and signs of asphyxia, PM Lividity
  - And Negative findings:-
    - No evidence of struggle, injuries over body, nail marks, other fatal injuries or evidence of poisoning, injuries in the soft tissue of neck

# Homicidal & Accidental hanging

- Hanging as a rule is **suicidal**
- Homicidal shows mark of violence over body unless very weak or drugged.
- *Lynching- A form of homicidal hanging in which a group of persons jointly hang the victim as a mode of punishment*
- Accidental rare except in children or in sexual asphyxia

# STRANGULATIONS

- Form of violent Asphyxial death in which breathing is prevented by **compressing the neck by methods other than hanging**
- Types :-
  - Strangulation by **ligature**
    - Garrotting, Lasso
  - Manual strangulation or **throttling**
  - Mugging
  - Bansdola
- Manner of death- Usually homicidal

# STRANGULATION BY LIGATURE

- Breathing is prevented by constricting the neck with a ligature, the constricting force being external and Not the weight of the body
- Ligature material:- Any thing which can be tied round the neck or used from behind to compress the neck

# PM Finding In Strangulation By Ligature

- Ligature mark is horizontal or transverse in lower part of neck usually complete and often with more than one turn
- Abraded and contuses
- **Associated injuries** on neck, nail scratches and other injuries on body are commonly found
- Face is usually congested and cyanosed
- Eye balls and tongue may be protruding
- Tardieu's spot more abundant
- May have passed urine or defaecated while being strangulated.

# PM Finding(Cont.)

- Internal Findings:-
  - Skin of Ligature mark soft with abrasions
  - Subcutaneous tissue under ligature contused
  - Larynx & Trachea congested, there may be petechial haemorrhagic spots
  - Lungs intensely congested and haemorrhagic spots
  - Superior horn of thyroid cartilage fractured in elderly
  - Brain with meninges congested, Petechiae present more abundant above the ligature







Strangulation by ligature



Garrote



Killing by Garroting



Garroting being done

Spanish Garrote



Lasso



# THROTTLING

- Neck is compressed by one or both hands
- Finger tip bruises are characteristic
- Nail scratches on neck are common
- There are usually associated injuries like bruises and abrasions on other parts of body
- Soft tissue of neck contused extensively
- Hyoid bone and thyroid cartilage generally fractured in adults

Single left handed



# MUGGING

- Neck compressed in the fold of elbow or by knee
- As the pressure is in wide area by soft tissue elbow or knee, finding on neck vague or minimal
- Signs of asphyxia pronounced as the person continues to inhale some air.



# Mugging by Knee



# BANSDOLA

- Neck is compressed between two Bamboo sticks one in front and one behind or with one Bamboo stick neck being pressed against the ground
- Injury to neck structure are very extensive and gross
- Thyroid cartilage and tracheal rings fractured
- There may even be fracture of cervical vertebrae

# SUFFOCATION

- Suffocation means a group of conditions of violent asphyxial deaths where *passage of air between the atmosphere and lungs is prevented by lack of oxygen in the environment or mechanical obstruction in the air passages other than constriction of neck or drowning*
- Types:- **Smothering, Gagging, Choking, Burking, Overlying, & Traumatic asphyxia**

# SMOTHERING

- Breathing is prevented by closure of mouth and nose or lowered concentration of oxygen in environment
- Cause of death- Only by asphyxia
- **Accidental**- By plastic bags, or trapped in place with low oxygen concentration. Less than 16% dangerous. Less than 5 % fatal in a few minutes
- **Homicidal**-Pressing face with pillow, quilt
- Suicidal- Rare

# Gagging

- A gag (rolled up cloth) is pushed in to mouth sufficiently deep to block the pharynx Initially ventilation maintained till cloth dry.
- In adults done to prevent shouting for help and **death is usually not intended**
- In infants and children may be homicidal

# OVERLAYING

- In this form of asphyxial death an adult often under the influence of alcohol **overlays** an infant **during sleep causing compression of chest** to the extent that breathing is not possible.
- **Flattening** of nose, face and thorax may be present
- Nostrils may be filled with blood stained secretions
- Condition is not very common

# BURKING

- William Burke, & William Hare in Edinburgh killed 16 persons between 1827 –1828 (about 8 months) and sold their bodies to Dr. Robert Knox for teaching anatomy
- They invited their victims to their house gave them plenty of alcohol and then Burke used to sit on his chest and close his nose and mouth by hand. Hare meanwhile used to drag him by feet round the room
- Death by combined effect of smothering and traumatic asphyxia

Hare became King's evidence and was released. His wife was not prosecuted.

McDougal (mistress of Burke) was released after the charge against her was found to be not proven. Burke given death sentence. His body to be publicly dissected and bones preserved.



1828-29

Anatomist Knox was not prosecuted, despite public outrage at his role in providing an incentive for the 16 murders. Burke swore in his confession that Knox had known nothing of the origin of the cadavers

# CHOKING

- That form of asphyxia in which there is **obstruction within the air passage**
- Almost always accidental
- Usually seen in very young, old, weak, diseased, psychiatric
- While drunk
- Commonly during eating or aspiration of vomitus
- Asphyxial Changes well marked

# CAFÉ CORONARY

- Typical example of choking due to impaction of food bolus in larynx during meal especially while drunk
- The person gasps for breath, becomes cyanosed and collapses. Initially was thought to be a case of heart attack but on dissection impacted food bolus can be seen in larynx.

# Traumatic Asphyxia

- It is said to be the cause of death when thorax is compressed to the extent that respiratory movement of chest is not possible or where due to extensive injury to ribs and respiratory muscles or resulting in pneumothorax breathing is not possible
- Usually accidental Ex. **Building/ bridges collapse, stampede, mines disasters etc**

# PM Finding

- Extreme congestion in head, face and neck, and also petechial haemorrhage above the area of compression
- Pallor at the site of compression
- Injuries to the chest wall, including fracture of ribs, and even sternum
- Signs of asphyxia well developed.

