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ASPHYXIA

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Asphyxia (Greek) literally means "absence of pulse". But in broader sense, it refers to a state in which body becomes deprived of oxygen.

Asphyxia can be defined as "a method of rendering the tissue hypoxic".

Asphyxia is also defined as 'state of impaired transfer of oxygen to the lungs".

ROUTE OF OXYGEN

- ATMOSPHERE
- LUNGS CIRCULATION
- TISSUE

HYPOXIA

- Hypoxia is defined as "State of reduced oxygen supply to the tissues".

Types Of Hypoxia

- 1. Hypoxic Hypoxia
- 2. Anaemic Hypoxia
- 3. Stagnant or Ischaemic Hypoxia
- 4. Histotoxic Hypoxia

CLASSIFICATION OF ASPHYXIA

Basically there are two types:

1. *Mechanical:-* Flow of oxygen into the body is interfered through some physical impediments.

Examples:

- a) Suffocation
- b) Choking
- c) Hanging
- d) Garroting
- e) Throttling
- f) Traumatic asphyxia

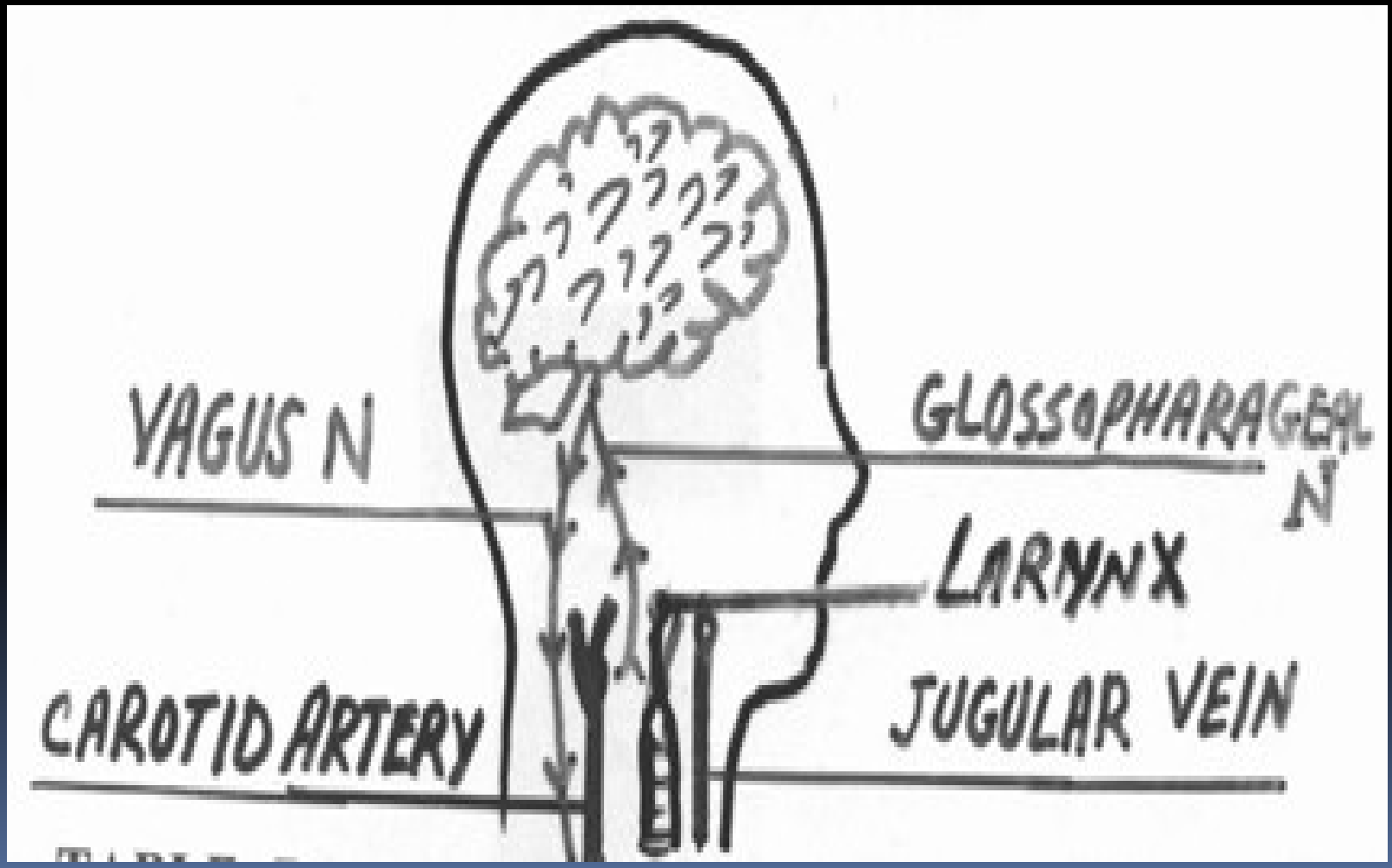
CLASSIFICATION OF ASPHYXIA

2. *Non-mechanical:-* Supply of oxygen to the body is interfered through some physiological/ chemical interference or disease process.

Examples:

- a) Environmental Asphyxia
- b) Toxicological Asphyxia
- c) Pathological Asphyxia
- d) Iatrogenic Asphyxia

ANATOMY OF ASPHYXIA



Rope Tension Required to Occlude the Neck

Structure	Tension (kg)
Jugular veins	2
Carotid arteries	5
Trachea	15
Vertebral arteries	30
Least Tension needed to occlude all the neck structures	5 -10
Greatest Tension needed to occlude all the neck structures	20-40

POSSIBLE MECHANISMS OF DEATH IN ASPHYXIA

- • Cerebral Anoxia/Hypoxia.
- • Hypoxic Hypoxia/Anoxic Anoxia.
- • Cardiac Arrhythmia.

CEREBRAL ANOXIA / HYPOXIA

- • Most common mechanism.
- • Occurs due to compression of
- jugular veins, with or without that
- of the carotid arteries.
- • Death occurs within few minutes.

HYPOXIC HYPOXIA/ANOXIC ANOXIA

- It is contributory factor in some hangings
- where the Hyoid bone and tongue are
- pushed upwards and backward against the
- Laryngo – Pharynx producing air hunger.

CARDIAC ARRHYTHMIA

- Pressure over the carotid sinus provokes "Vagal Reflex" causing bradycardia and cardiac arrest (Vagal inhibition of heart).
- It occurs particularly in the elderly or those with underlying cardiac disease.
- Petechiae or congestion are usually not present in these cases.

PHYSIOLOGY OF ASPHYXIA

- 1. Struggle - forceful breathing.
- 2. Quiescence - unconscious, lifeless.
- 3. Convulsions - disturbs scene, incontinence.
- 4. Apnea - lifeless, weak pulse.

BIOCHEMISTRY OF ASPHYXIA

Agonal changes in biochemistry of blood during mechanical interference with respiration are:

- O_2
- CO_2
- PH
- Blood Sugar

Different studies have revealed that these changes has no value in differentiation asphyxial death from other forms of

PATHALOGY OF ASPHYXIA

1) Non-specific general pathological changes.
2) Specific pathological changes.

Non-specific general pathological changes:

Nervous tissue & small blood vessels i.e. venules & capillaries are extremely sensitive to O_2 lack. Reduced oxygen supply can lead to following changes:

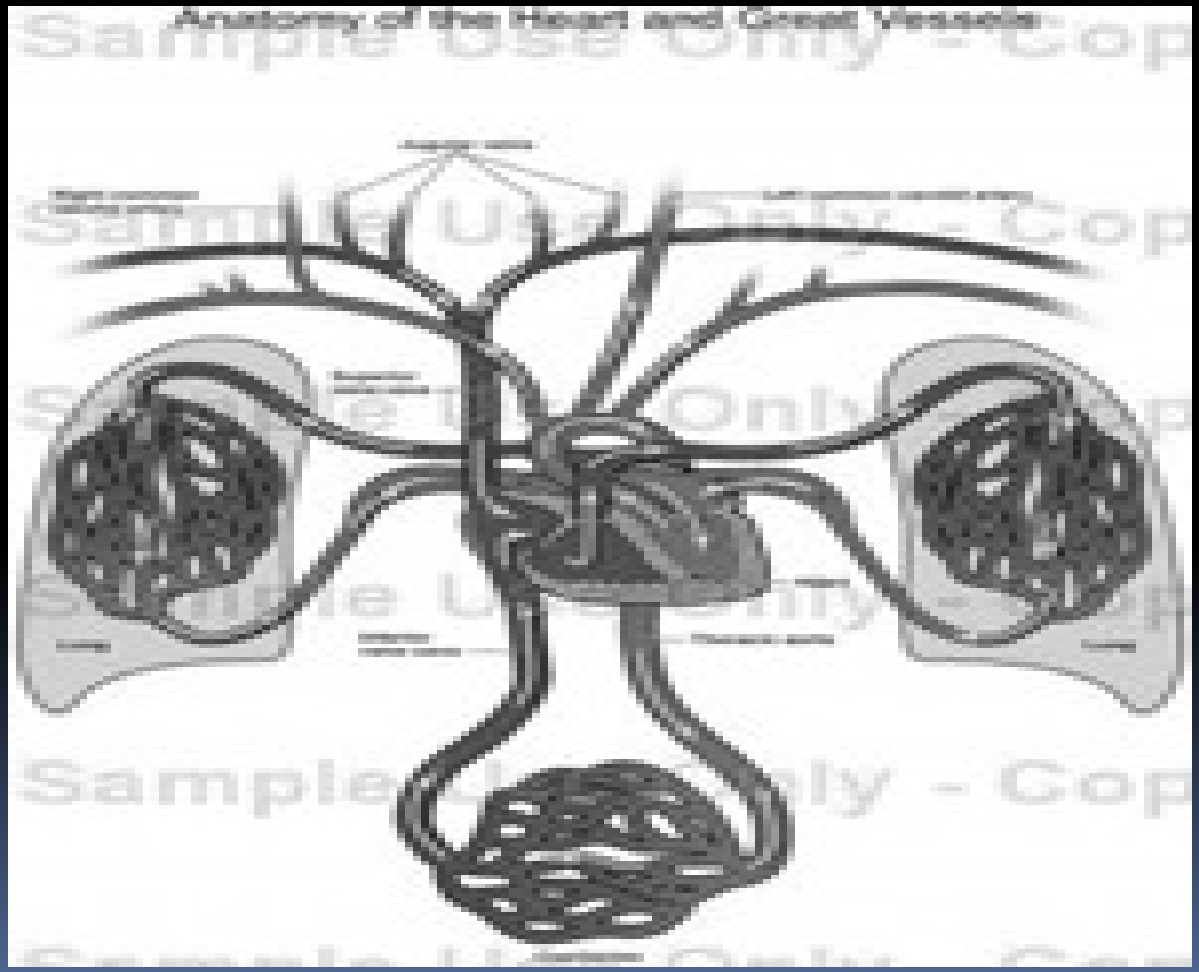
2)Specific pathological changes

- Cyanosis.
- Congestion.
- Generalized edema (Lungs, Brain).
- Petechial Hemorrhages (Tardieu spots).
- Fluidity of blood.
- Engorgement of right side of heart.

CYANOSIS

The word is derived from Greek meaning "dark blue". It is the colour imparted to the tissues by the presence of an excess of deoxygenated blood. It is easily visible in the skin & in mucus membrane. Development of cyanosis requires minimum concentration of 5g/100ml of reduced Hb%. It is significant as an evidence of death associated with generalized hypoxia. So cyanosis is present in bodies died of Asphyxia. It is also present in many natural deaths especially death from Coronary insufficiency.

CONGESTION



CONGESTION

Reduction in oxygen tension produces dilatation of capillaries & venules. It is a general pathological change in all forms of rapid hypoxic/anoxic deaths as well as deaths from shock & from many other natural causes. Intensity of congestion depends largely on the amount of blood & its distribution in organs & tissues at the time of death.

CONGESTION

If death occurs instantly, the amount of blood in various parts of the body will be the amount in the organs & tissues at the moment of death. If death occurs relatively slowly, then because the failing heart is unable to pump the blood effectively around the circulation, there is a damming back of blood into the organs & tissues.

CONGESTION

In this ways, organs such as the liver & the lungs may become distended with the blood dammed back in their capillaries, producing an enlargement of the organ as well as a congestion of the parts with blood. This congestion is due to the distension or over distension of the capillaries with blood.

CONGESTION

- Reduced oxygenation of the tissues
- Capillary dilatation
- Stasis of blood
- Reduced venous return to heart
- Reduced pulmonary blood flow
- Deficient oxygenation

GENERALIZED EDEMA

May be produced as a result of:

1) Increased hydrostatic pressure due to venous congestion.

2) Increased vascular permeability due to hypoxia.

- It may be responsible for congestive facial swelling, bulging of the tongue & pulmonary edema. It is more prominent if the agonal period is prolonged.

PETECHIAE (Tardieu Spots)

Petechiae also called "Tardieu Spots" after the name of French police surgeon who described them in 1866. They are small venular hemorrhages (characteristically pinhead size) formed as a result of hypoxia or increased intra-capillary pressure. They may be present anywhere but are most easily seen on the skin, serous surfaces e.g. pericardium, pleura or conjunctiva.

PETECHIAE (Tardieu Spots)

- Petechiae are most characteristic of local hypoxia and venous congestion.
- Petechiae are most commonly visible in:

a. The skin around the eyes in the "butterfly" or "mask" distribution.
b. The conjunctivae.
c. The skin behind the ears.

PETECHIAE (Tardieu Spots)

d. The face and neck.
e. The buccal mucosa.
f. The epiglottis.
g. The visceral pleurae.
h. The epicardium.
i. The serosa of the bowel.
j. The thymus gland.

Subconjuctival Petechiae

FLUIDITY OF BLOOD

- Frequently seen in asphyxial deaths.
- It is result of fibrinolytic activity of the enzyme fibrinolysin.
- It is so non-specific that no longer regarded as asphyxial sign.

ENGORGEMENT OF RIGHT SIDE OF HEART

Non-specific sign. Present not only in asphyxia but may also be seen in other congestive deaths as a part of generalized rise in venous pressure.

COMMON MECHANISMS OF MECHANICAL ASPHYXIA

A. Obstruction Of External Respiratory Passages (Nose, Mouth):- Suffocation:

- I. Smothering.
- II. Gagging.
- III. Overlaying.

COMMON MECHANISMS OF MECHANICAL ASPHYXIA

B. Obstruction Of Internal Respiratory Passage (Larynx, Trachea, Bronchi):- Choking

- I. Foreign Body Obstruction.
- II. Laryngeal Edema.
- III. Laryngospasm.

COMMON MECHANISMS OF MECHANICAL ASPHYXIA

C. Neck Compression:

- I. Manual Strangulation (Throttling).
- II. Ligature Strangulation (Garotting).
- III. Hanging (Suspension).

D. Chest Compression:

- I. Traumatic Asphyxia.

Levels Of Interference To The Supply Of Oxygen To Lungs