نو باتوں کا حکم

حضرت ابو ہریرہؓ کہتے ہیں کہ رسول اللہ نے ارشاد فرمایا۔

"میرے رب نے مجھے نو باتوں کا حکم دیا ہے۔

1۔ کھلے اور چھپے ہر حال میں اللہ سے ڈروں۔

2۔ کسی پر مہربان ہو یا کسی کے خلاف غصے میں ہو دونوں حالتوں میں انصاف کی بات کہو۔

3۔ راستی و اعتدال پر قائم رہوں چاہے امیر ہو یا فقیر۔

4۔ جو مجھ سے کٹے میں اُس سے جڑوں۔

5۔ جو مجھے محروم کردے میں اُسے دوں۔

6۔ جو مجھ سے زیادتی کرے میں اُسے معاف کروں۔

7۔ میری خاموشی غور و فکر کی خاموشی ہو۔

8۔ میری نگاہ عبرت کی نگاہ ہو۔

9۔ میری گفتگو ذکر الٰہی کی گفتگو ہو"

اس کے لئے آپ ﷺ نے فرمایا کہ:۔

"نیکی کا حکم دو اور بدی سے روکو" (مشکوۃ)

اسلامی جمیعیت طلبہ خیبر میڈیکل کالج پشاور۔

SAFE

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7.	Inflammation	

All signs and symptoms are of coma.

Postmortem appearances are:

a. Brain and its meninges are congested.
b. Contusion and laceration of brain may be present.
c. Rupture of middle meningeal artery or venous sinuses.
d. Fracture of skull may or may not be present.
e. Extradural, subdural or intracranial hemorrhages.

II. INJURIES OF THE CHEST:

Injuries of chest may be suicidal, homicidal or accidental

TRAUMATIC ASPHYXIA:

It is due to the compression of the chest and abdomen sufficient to prevent respiration, as being crushed in dense crowded or heavy objects. Injuries to the chest may be produced by:

a. Blunt trauma b. Sharp weapons
c. Shotguns

The injuries may be:

1. Abrasions 2. Bruises
3. Stab wounds 4. Lacerations
5. Incised wounds 6. Firearm injuries
7. Contre coup injuries

There may be simple or complicated fractures of the ribs.

Stab wounds may penetrate deep into the lungs or pleura etc. pneumothorax may occur and the chest may get collapsed and the abscess of the lungs is observed on the X-ray examination. Hemothorax may occur and the fluid lines are observed in X-rays. When the heart is stabbed, there is more internal bleeding than apparent external bleeding and death occurs due to internal bleeding. Gun shot injuries may be homicidal, suicidal or accidental. Suicidal are on the left side in right handed people and vise versa, while homicidal and accidental may be present anywhere on chest.

In vehicular accidents, the aorta may be ruptured due to intense compression of chest with or without signs of the external injury to the chest or fracture of ribs. The sudden violent compression of chest wall may lead to ventricular fibrillation and death with little or no evidence of injury to chest wall.

Wounds of large veins of chest cause air embolism.

III. INJURIES TO THE ABDOMEN:

Blunt injuries of the abdomen don't show external signs but internal hemorrhages occur. Blunt injuries may be due to road traffic accidents. Sharp injures may cause perforations of the peritoneum or the intestines, thus having grievous nature. Shotgun injuries can be present anywhere on the abdomen.

Shotgun injuries if many and lower down, are always homicidal.

IV. INJURIES TO THE LIMBS:

These include:

1. Abrasions 2. Bruises
3. Lacerations 4. Incised wounds
5. Stab wounds 6. Firearm injuries

These injuries are explained in their relevant chapter.

V. TRANSPORTATION OR VEHICULAR INJURIES:

The injuries produced are due to three causes.

1. Atmospheric conditions.
2. Human conditions
3. Vehicular conditions

A. Atmospheric:

1. Rain (Weather)
2. Bad roads

B. Human conditions:

1. Lack of traffic sense 2. Age
3. Temperament 4. Sleep
5. Addiction 6.Disease like epilepsy

C. Vehicle conditions:

1. Bad brakes 2. Impaired tyre rods

1. Injuries sustained by pedestrians:

The injuries sustained by a pedestrian are:

I. Primary impact injuries
II. Secondary impact injuries
III. Secondary injuries
IV. Run over injuries

(I) Primary Impact Injuries:

These are the injuries caused by the first impact between vehicle and pedestrian. The

concentration of various conents. Being filtrate of blood plasma, it has a higher concentration notably of chloride and magnesium and the volume of cerebrospinal fluid soon after death is about 150 ml. After twenty-four hours, it gradually disappears. ***Mason, Klyne and Lennon (1951)*** investigated the postmortem rise in potassium and other consistuents over about 60 hours. Diffusion of constituents like lactic acid, non-protein nitrogen and amino acids were non-specific.

❖ SUDDEN DEATH:

Sudden death is the type of death in which medical certification of its cause cannot be done with confidence by medical practitioner either due to few clinical symptoms or insufficient medical supervision.

The cause of death in such cases can only be determined following an autopsy examination.

Sudden death, whether natural or unnatural, must be investigated to determine its cause before its disposal. Natural deaths are generally about 80% of all deaths in a community, which is a significant portion of the total mortality.

Natural death is uncommon between the ages of one thirty. The most common causes of such deaths are clinically silent degenerative disease, fulminating infection or malignant growth in almost every organ system. Men greatly out-number women as the victim of this type of demise.

Unnatural deaths constitute a lesser proportion of the total number of deaths occurring in a community and according to the World Health Organization, they are the 5th largest group of causes of death. The greatest percentage of natural causes follows the involvement of the cardiovascular system. The mechanisms of death in this system in order of increasing suddenness are hemorrhage from a vessel, peripheral blockage of a vessel, and inhibition of the action of the heart. The extent of hemorrhage from a vessel depends upon the two factors, namely the size of the bleeding vessel and the ability of the area involved to tolerate the accumulation of blood. With smaller vessels, the effect is less but given the same size in the cranial or the pericardial cavity, the lethal effect may be because of concurrent effect on the functioning of these organs.

COMMON NATURAL CAUSES OF SUDDEN DEATH

Cardio-vascular System	
Heart	Coronary artery disease, hypertensive heart diseases, aortic stenosis, cardiomyopathies.
Great blood vessels	Atheromatous and dissecting aneurysms.
Nervous system	Sub-arachnoid and cerebral hemorrhages, epilepsy.
Respiratory system	Pulmonary embolism, tumor, TB, asthma and viral pneumonia
Gastro-intestinal system	Perforated viscus, mesenteric thromboembolism, G.I hermorrhages
Uro-genital system	Tumors of testis, ovary, uterus and cervix, abortion, ruptured ectopic pregnancy.

MEDICOLEGAL IMPORTANCE:

i. It is important to determine whether any violence has played some part in the death.

ii. Insurance claims or civil suits based on allegation that death resulted from accidental injuries may arise.

iii. The question of "workman's compensation" may be raised if death occurs at work and if there is possibility of industrial disease or accident.

iv. The possibility of death from poisoning may be there.

v. The investigation is important if a communicable or epidemic disease is detected.

PRESUMPTION OF DEATH:

If an individual is away from his home or he is working in armed forces and is missing or he just leaves his home without any information, the question arises of claim of insurance and distribution of property. If an individual is missing for 7 years, the law presumes that the individual is dead and this is called "Presumption of Death".

PRESUMPTION OF SURVIVAL SHIP:

When two natural heirs of each other or relatives die in a common accident e.g. earthquakes, air crashes, battles etc. the question of distribution of property arises after death. As there is no witness at the scene of death to declare who died first, it is presumed that the following factors on consideration will help in determining the question of survival and death. These factors are as follow,

1. Age:

The newborns, infants, children and old people will die earlier as compared to an adult on account of his greater resisting power.

2. Sex:

Females are weaker and die earlier than males. A strong energetic female may live longer than a weak emaciated male.

3. Post Mortem Changes:

Depending on the appearance of changes, time of death can be presumed.

4. Injuries:

The individual receiving more injuries on vital organs like heart, lungs etc. will die quickly.

5. General Physique:

A healthy individual survives longer than a weaker one.

6. General Health:

Diseased, drugged, disabled, addicts, anaemic etc. will die first as compared to a normal person.

7. Mode of Death:

It means proximate cause of death.

a. Parturition:

Mother lives longer than the child except when death is not due to hemorrhage.

b. Asphyxia:

Females consume less oxygen than males so, in conditions where O_2 is less, they live longer. People having muscular work as in mines, will die quickly due to exhaustion, in an earthquake, survival will depend upon the extent of injuries caused by debris from house fall and also by the depth to which one is buried i.e. deep people die first.

8. Child Birth:

During parturition, the baby dies first because of low resistance. Difficult labor, diseases of placenta and strangulation with the umbilical cord will cause death of the baby first.

9. Temperature:

In cold and heat, children and old will die first.

10. Burns:

Extent of part of the-body burnt is more important than the depth and severity. Burns on head, trunk and genitals are more dangerous than on other parts. Old people and children will die first as compared to adult because of:

i. Initial shock.

ii. Secondary complications of burns.

11. Starvation:

Females will live longer than males because of:

a. Less food consumption.

b. Being more fatty.

The presumption of survival ship is important because if Mr. A, under a will leaves his property to Mr. B and both of them die in the same disaster. The heirs of Mr. B will get the property only if Mr. B survived or Mr. A dies earlier than Mr. B. If Mr. B dies earlier, legally he has died before acquiring the property. The property naturally passes too the heirs of Mr. A, "In such situations, eyewitness evidence is not generally available and the medical man has to assume or presume certain factors about the time of death and survival as discussed above.

DEATH CERTIFICATE:

A legal document issued by a register medical practitioner stating that the individual is dead is called Death Certificate. This is issued for:

i. Tissue transplantation.

ii. Disposal of the dead body.

Individual is first identified with his name, age, sex, and father's name and after, that death certificate is given. Afterwards doctor has to write his name and his registration number.

Death Certificate

The following is the specimen of the certificate of the cause of death.

To: The Municipal Commissioner, Peshawar.

I do hereby certify that I attended the deceased (full name) ..... aged about ..... residing at .....during his last illness and that to the best of my belief, the cause of death at (time) ..... on (date) ..... was as stated below:

Cause of death		Approximate interval between onset and death
1. Disease or condition directly leading to death.	a. ..... (due to or as consequence of)	Years/ Days Months/ Hours
Antecedent cause: morbid conditions, if any, giving rise to the above cause, stating the underlying condition last	b. ..... (due to or as consequence of)	Years/ Days Months/ Hours
2. Other significant conditions	c.	Years/ Days Months/ Hour

CARBON MONOOXIDE

Sourses

1. CO is prepared by decomposition of oxalic acid with H_2SO_4.
2. Combustion or incomplete combustion of any carbonaceous material or carbon
3. From blast furnaces, coal fire, gas heaters, gas engines, H_2O heaters, house on fire, disused wells.
4. Explosion of dynamite or explosion of mines.
5. Coal gas contains 4-7% of CO.
6. Constituent of natural gases used for illumination purposes.
7. Exhaust gases of motor cars.
8. Tobacco smoke.

If 20 horse power engine is on in a garage of 10-20 feet for 10 minutes. As it produces 1 cubic feet / min of CO_2, the atmosphere of garage will be deadly poison in 10 min.

Characteristics

It is colorless, tasteless and non-irritant. When it combines with metals like nickel and iron, it produces carbonate and when it combines with chlorine it produces carbonates chlorine (Phosgene Gas). It burns with blue flame.

Mechanism of Action

CO is the most poisonous gas. When it is inhaled, it is absorbed and combines with Hb to form carboxy-Hb, which is a very stable compound. Thus there is no Hb left for carrying of O_2 because the affinity of CO for Hb is 210-300 times more than O_2, so it means that it is chemical asphyxiant and tissue poison. Toxicity depends upon quantity of Hb. So in an anemic person, Hb level is low and is affected quickly and drastically.

Fatal dose

50 – 70% saturation of blood with CO.

Fatal period

Not fixed

SIGNS AND SYMPTOMS

ACUTE POISONING

i. If CO is inhaled in concentrated form, there will be weakness, dizziness, coma and sudden death due to respiratory failure. Sometimes coma may last for 3-8 days.

ii. If it is taken in diluted form, there will be dizziness, confusion, throbbing headache, noises and ringing in the ear (TINITIS), nausea; vomiting; muscular weakness, lethargy, drowsiness, fixed dilated pupil, dimness of vision, increased breathing, coma and death. But before death one feels convulsions and tremors. There is rapid feeble pulse and low BP. There may be some nervous symptoms after recovery such as cerebral hemorrhage, encephalitis, mental confusion, dementia and retrograde amnesia. Sometimes you may also see patches of erythema and blisters on body surface.

CHRONIC POISONING

When person is exposed to CO for a longer period i.e. working in garages, workshops or living in rooms which are ill ventilated, without windows or where incomplete combustion of charcoal and wood takes place. Following symptoms will be exhibited in patients.

Dull frontal headache, nausea, digestive disturbances, dyspnoea, dizziness and loss of memory, palpitations, loss of sensation in fingers, anemia and visual disturbances.

1. **When saturation reaches upto 20%:** then symptoms produced are headache and lassitude.
2. **With 30% saturation:** the symptoms produced are slight increase in pulse and respiration, throbbing headache, and nausea.
3. **30-40% saturation:** loss of memory, mental confusion, and in co-ordination of movements.
4. **40-50% saturation:** Patient behaves like a drunk collapse man and is unable to move his limbs
5. **50-70% saturation**: Unconsciousness, sphincters relaxed, incontinence of feces and urine and rapid death.
6. **Above 70% saturation:** Rapidly fatal due to respiratory arrest.

If a patient has tuberculosis, his Hb is low and death may occur even if conc. is 40% but there are cases in record that patient may survive upto 70% and may die at 80%.

Treatment (SCHAFER'S METHOD)

1. Remove the patient form source of poisoning into fresh air.
2. Remove any obstruction to respiratory tract, external or internal.
3. Give 100% oxygen by nasal catheter method or by mask method. Medical research council advises that you add 5% CO_2 to O_2 and this will increase the separation of CO from Hb.
4. Give adrenaline (1ml), coramine (5ml). If there is cerebral edema, give 50% dextrose. When the patient is recovered, give coffee or tea and antibiotics to avoid infections.

Prophylactic Measures

Those working in garage and workshops must have mask respirators.

Autopsy Findings:

External

Lips and nails are bright red or cherry red in color.
Erythematous patches on anterior aspect of body.
PM-lividity is also cherry red in color.

Internal

1. Due to formation of carboxy-Hb, blood is fluid and bright red in color
2. Internal organs are hyperemic and red due to color of blood
3. Mucus membranes of air passages are red and covered with froth.
4. Lungs are edematous and congested
5. There are hemorrhages and necrotic lesions in heart muscles.
6. Petechial hemorrhages are found in cerebral cortex
7. Renal failure

Medico-legal Importance

1. Poisoning with CO is mostly **accidental** and common in diseased, disabled and dragged person as they will not be able to leave the site e.g. burning house.
2. Accidental poisoning also occurs when people are sleeping in a room with combustion of wood and charcoal or coal or accentual poisoning in streets due to traffic.

CO can be used for **suicidal poisoning**. A determined suicide may set in his car and connect pipe from the exhaust to his nostril or remain near the exhaust pipe in his garage with doors closed. Due to weakness that soon sets in, he cannot get up and turn off the gas, even if he wishes to do so.

Homicide is very rare. In homicide one opens the lap of pipe when victim is already sleeping in the room.

Choice Sample:

Lungs, blood, heart, bones

WAR GASES

The term war gases is inappropriate as all the substances used are not gases nor used in times of war only. The term is meant to signify an agent suitable for destruction or damage, according to need, e.g. in war or to disperse unruly mobs. These substances may be either true gases, smokes, vaporized liquids, or line powders. An ideal war gas must have the following qualities:

1. It must be capable of being manufactured cheaply in enormous quantities.
2. It must be definitely toxic in low concentration.
3. The substance must be heavier than air.
4. It must be capable of enough volatilization.
5. Its chemical composition must be stable.

Classification of War Gases

1. Lacrimators or tear gases
   a. Chloracetophenone (C.A.P.)
   b. Bromobenzyl cyanide (B.B.C.)
2. Lung irritants or asphyxiants
   c. Chlorine
   d. Phosgene
3. Vesicants or blister gases
   e. Mustard gas
   f. Lewisite
4. Sternutators or nasal irritants
   g. Diphenyl chlorarsine (D.A.)
   h. Diphenyl cyanarsine (D.C.)

5. Nerve and blood poisons
   i. CO
   j. H_2S
6. Nerve gases
   k. Toxic chemicals with action like acetylcholine
7. Miscellaneous
   l. Yellow or red rain
   m. MIC (Methyl isocyanate)

COCAINE

It is prepared synthetically as well as extracted from leaves of eythroxylum Coca. It is colorless, odour less, crystalline substance with bitter taste. It causes numbness of tongue and mucus membrane of mouth.

Uses of cocaine:

Common use is that it has antifatigue activity and increases hunger. Cocaine HCl is used as local anesthetic in eye, dental and minor surgery.

Fatal period

2 hrs

Treatment

1) Emet
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4) If th
5) Artif

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6) Sho
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7) Syn

Postmorte

External

Rigor mort

	convulsions, coma		30 gm sodium sulphate purgative	
Carbon dioxide *Respiratory depressant*	Throbbing headache, dyspnoea, mental confusion, cyanosis, drowsiness, muscular weakness, fainting attacks, unconsciousness	Above 30% concentration in blood Not fixed	Remove the patient from source. Artificial respiration. Oxygen. Tham, if available. Stimulants. Maintain body warmth	Accidental

		for cyanides	oxygen. Coramine i.v. slowly	
Hydrogen sulphide *Local irritant* *CNS depressant*	Irritation of air passages, dizziness, nausea, cyanosis, dilated pupils, tetanic convulsions, stupor, coma	0.2% in air Within few minutes	Oxygen. Artificial respiration. Coramine 2 ml 25% i.v. Supportive treatment	Accidental Exposure in sewers Sewer gas
Hyoscyamus	Bitter taste, dryness of mouth, dysphagia, burning	125 mg of hyoscyamine	Stomach wash with 5% tannic acid. Prostigmine	Stupefying. Homicidal. Truth

CHAPTER – 9
ASPHYXIA

Asphyxia is the mode of death resulting from interference of oxygenation of the RBC's at the level of the lungs.
The essential substance of asphyxia is the struggle to breath against some kind of interference with respiration.

CLASSIFICATION OF ASPHYXIA

a. Mechanical Asphyxia:

Obstruction of the air passages in an unnatural way either from within or by exerting pressure from the outside is called mechanical asphyxia.

b. Pathological Asphyxia:

In this type of asphyxia,transfer of air to the lungs is prevented due to the disease of upper air way or lungs.

c. Toxic Asphyxia:

In this type of asphyxia,Poisonous substances prevent uptake of O_2 e.g. CO poisoning. It commonly occur in industries.

d. Environmental Asphyxia:

In this type of asphyxia,there is insufficiency of O_2 in the inspired air.(vitiated atmosphere of deep wells or closed spaces)

e. Iatrogenic Asphyxia:

This type of asphyxia is associated with anesthesia and surgery.

SIGNS OF ASPHYXIA:

They are grouped into two classes

A. GENERAL PATHOLOGICAL SIGNS:

These are due to decreased O_2 tension and are present in all forms of asphyxial deaths.

B. SPECIFIC PATHOLOGICAL SIGNS:

These are due to the asphyxiating mechanisms given in the table below.

SIGNS OF ASPHYXIA

General Pathological Signs:
1. Cyanosis
2. Congestion
3. Petechial Hemorrhages
4. Pulmonary edema
5. Fluidity of blood
6. Cardiac dialation
7. Pharyngeal hemorrhages
8. Laryngeal fracture
   a) Hyoid bone b) Thyroid cartilage
9. Biochemical changes
10. Clinical signs
    a) Stages of dyspnea
    b) Stage of convulsion
    c) Stage of exhaustion

Specific Pathological Signs:
1. Hanging
2. Suffocation
3. Stangulation
4. Drowning
5. Traumatic asphyxia

GENERAL PATHOLOGICAL SIGNS:

1. Cyanosis:

(Greek word – meaning dark blue)

The cause of cyanosis is decreased oxygenation of blood that results in hypoxia and capillary dilation leading to stasis of blood. Due to this venous return to the heart is decreased and so is the cardiac output. The pulmonary flow is therefore both slow and reduced in volume, resulting in deficient oxygenation making the condition worse and ultimately leading to death.

This vicious cycle continues ultimately leading to death. Cyanosis occurs generally but is more marked in areas of increased capillary and venous circulation: notably the ears, lips, cheeks and internally in the liver, spleen, kidneys, lungs and meninges.

Mild cyanosis is of no value because it is present in other forms of deaths. For confirming asphyxia; there should be marked cyanosis along with asphyxiating mechanism. Cyanosis is apparent when 5 gm of reduced Hb is present.

2. CONGESTION:

This is the abnormal accumulation of blood in a part due to increased volume of blood in the veins.

This is produced due to back pressure within the veins. In earlier asphyxial deaths, there is increased degree of congestion of tissues. This may be apparent on the skin of the face, which appears purple and slightly swollen.

Congestion is also seen in blood vessels of eyes.

Congestion in the nasal septum and ear drum is so intense that the hemorrhages may be caused due to rupture of the engorged veins.

The congestion above the ligature mark is of particular significance which indicates that the ligature was applied when the person was alive.

On internal examination, organs especially the lungs show congestion.Pulmonary hemorrhages may be caused due to rupture of capillaries.

Congestion is not a reliable sign of asphyxia as it can also occur in deaths due to natural causes. To confirm asphyxia, there should be marked congestion accompanied by other signs of asphyxia and the asphyxiating mechanism.

3. PETECHIAL HEMORRHAGES OR TARDIEU'S SPOTS:

These are the puncture hemorrhages of capillary origin due to:

a. Stasis of blood.
b. Increase in intra-capillary pressure.
c. Anoxia of capillaries:This increases cell permeability and gap between the cells.

It is not a confirmation of asphyxiation, as it is also seen in deaths due to natural causes e.g. in myocardial infarction, electric shock, purpura, hemophilia and poisoning etc.

Gravitational accumulation of blood in parts of body may cause petechial hemorrhages. They may be produced as a postmortem artifact, so the presence of petechial hemorrhages only serves as a warning to the observer that he must consider mechanical asphyxia as a probable cause or factor in death.

They are usually pin head in size but may coalesce to form large hemorrhages.

Externally they appear commonly as fine spots in scalp, eyebrows, face and conjunctiva and **internally** in larynx, air passages, pleura and pericardium.

4. Pulmonary Edema:

In deaths from asphyxia blood pools in the lungs where capillaries are present in abundance. Due to the tension of stasis of blood and anoxia, the cell membrane permeability and the gap between the cells increases, so the fluid shifts from intravascular to extravascular compartment of the lungs making the lungs edematous.

5. Fluidity of Blood:

It is due to fibrinolysin produced during the agony period.

PM fluidity of blood is not a characteristic of asphyxia because it is also present in other forms of death.

6. Cardiac Dilation:

It is considered as one of the characteristic signs of asphyxia but considered with great reserve. Right ventricular dilation is common in asphyxial death but not pathogenic.

7. Pharyngeal Hemorrhages:

The submucosa of pharynx consists of a plexus of fine capillaries that may be ruptured due to trauma in asphyxia against the anterior surface of the cervical spine. These pharyngeal hemorrhages usually occur in strangulation, hanging etc. but may occur in other forms of death also.

8. Laryngeal Fracture:

a. Hyoid bone fracture:

The fracture of hyoid bone can be demonstrated by exposing the hyoid bone. A fracture appears as an irregular break in the continuity of the bone and is usually accompanied by hemorrhage at the site of fracture.

The greater horn is united with the body by a plate of cartilage, while the lesser horn is united to body and to the greater horn by synovial joints, which only disappear in old age. This cartilaginous separation between the greater horn and body, and joint should not be mistaken for fracture.

The hyoid bone can be fractured by direct force on the bone as well as by indirect violence. Normally, hyoid bone is held rigid by the powerful muscles attached to its upper and anterior surface. Violent downward movement of the thyroid cartilage or pressure between thyroid cartilage and hyoid bone will exert traction through the thyrohyoid membrane and cause fracture of the bone.

b. Thyroid cartilage fracture:

i. Fracture of superior cornu due to the traction of thyrohyoid ligament.

ii. Fracture of the body that is vertical and near the junction of lamina in the midline. They are the result of direct blow on the laryngeal prominence.

iii. These fractures are commonly found in elderly people with calcified cartilages and ossified hyoid bone.

9. Biochemical Changes:

The estimation of levels of O_2, CO_2 and pH of stagnant blood are of no value in differentiating obstructive asphaxial deaths from other forms of rapid hypoxic or anoxic deaths.

Some people say that the agony hyperglycemia is characteristic of deaths from mechanical interference with respiration but there is no corroborative evidence.

In agony, rise of urea and other blood components also occurs.

10. Clinical Signs:

a. Stage of dyspnea.
b. Stage of convulsion.
c. Stage of exhaustion.

B. SPECIFIC PATHOLOGICAL SIGNS DUE TO ASPHYXIATING MECHANISM:

These mechanisms include:

I. HANGING:

"Hanging is form of violent asphyxial death as a result of suspension of the body by a ligature around the neck, the constricting force being the weight of the body".

CLASSIFICATION OF HANGING:

I. Classification according to suspension:

1. Complete Hanging:

The term complete hanging is used when the whole body is suspended and the feet do not touch the ground. **The whole body weight acts as the constricting force.**

2. Incomplete or partial hanging:

The term incomplete hanging is used when the body is not completely suspended and the feet touch the ground. **The weight of the body's head is the only constricting force.**

II. Classification according to the position of the knot:

1. Typical Hanging:

The term typical hanging is used when knot lies at the back directly over the occipital region and ligature is situated in middle of neck above the thyroid cartilage. Death is due to the occlusion of the carotid arteries.

2. Atypical Hanging:

The term atypical hanging is used when the point of suspension is anywhere else. Death is due to occlusion of:

i. Carotid Arteries
ii. Vertebral arteries (due to lateral flexion).

MECHANISM OF DEATH:

1. Hypoxic hypoxia:

The obstruction of air way occurs due to the displacement of the base of tongue against the posterior pharyngeal wall.The airway obstruction results in hypoxic hypoxia and death.

2. Reflex Cardiac Inhibition:

Compression of carotid sinus stimulates vagal nerve endings, which cause vasovagal shock and instantaneous cardiac inhibition and death.

3. Fracture dislocation of cervical vertebra:

This may occur in certain forms of hanging such as judicial and suicidal hanging. In these cases, the deceased jumps from a height and the fall is arrested by a sudden jerk of the ligature.

A sudden drop from 7 feet causes fracture dislocation of C2 and C3 or C3 and C4 vertebrae.

4. Injuries to vital centers:

These occur due to fracture dislocation of cervical vertebra. So,

i. Spinal cord may be lacerated.

ii. Medulla oblongata containing important centers may be destroyed. As a result, unconsciousness and death occur, although heart continues to beat for 10 – 15 minutes.

5. Cerebral congestion:

It is also called cerebral apoplexy. It is due to the compression of jugular vein leading to stoppage of outflow of blood and unconsciousness.

6. Cerebral anoxia:

It occurs due to compression of carotid arteries in case of typical hanging and compression of carotid and vertebral arteries in case of atypical hanging.

AUTOPSY FINDINGS:

EXTERNAL FINDINGS:

I. General Pathological Signs:

1. Cyanosis.(especially of hands and nails)
2. Congestion.
   - Eye balls appear prominent due to congestion.
   - The face is usually pale. But in some cases when there is obstruction to venous drainage, it may be congested and swollen with profuse petechiae in the head and neck.
3. Fine petechial hemorrhages.
4. In some cases, saliva can be found dribbling from the angle of the mouth opposite to the knot. It is due to the stimulation of salivary glands by ligature. This is a vital sign and indicates ante-mortem hanging. It is therefore, necessary to look for dried up dribbled saliva marks on the chest or on the clothes.
5. Tongue may be protruding by the pressure of the ligature at the base of the tongue and exposed part may become dark brown or almost black as a result of drying.

II. SPECIFIC PATHOLOGICAL SIGNS DUE TO ASPHYXIATION:

1. Neck is stretched due to the pull of ligature.
2. Head is always inclined to one side or the other, opposite to the knot and the ligature mark is more pronounced at the opposite side of knot.
3. **When knot is below the right angle of the mandible,** then the head moves forward resulting in fracture dislocation and laceration of medulla oblongata, while the heart continues to beat for 10 – 15 minutes.
4. **When knot is below left angle of mandible,** the head moves forward, resulting in strangulation and death.
5. PM lividity in complete hanging usually develops in the dependent parts of the body such as lower limbs, hands and in males the scrotum and penis are considerably engorged.
6. In complete hanging, the blood shifts to legs and distension of capillaries occur. As a result petechial hemorrhages are produced and these are the PM artifacts.
7. Ligature mark is present on the neck.

LIGATURE MARK:

The pressure mark on the neck at the site of ligature is called ligature mark. It appears as a groove it is an important external sign.
If ligating material is present, then cut the rope away from the knot and preserve the knot. Then look for:

i. Number:

The ligature mark is better seen on the sides and on the front than on the back where firm muscular tissue and scalp hair intervene. If it is more than one mark, it points towards homicide.

ii. Pattern:

Sometimes the pattern of the ligating material is left on the skin that helps in its identification. A single or a double strand may be present, corresponding to the pattern of ligating material.

iii. Colour:

In early period of death, the skin in the furrow of ligature is pale and later turns to dry and brown.

iv. Depth:

It is commonly depressed below the level of the skin and depends upon,
Body weight.
Direction of suspension.
Complete or incomplete hanging.

v. Width:

The width of the ligature mark depends upon the width of ligature e.g:
When a wire is used, it is narrow.
When a scarf is used, it is broader.

vi. Situation:

It is in upper part of larynx between the larynx and chin in complete hanging but may be lower in cases of partial suspension.

vii. Direction:

It depends upon the type of noose.
Fixed noose.
Running noose

Fixed Noose:

It is a noose in which the ends of the rope are knotted (Granny knot or Reef knot). The ligature mark in fixed knot will be in the shape of an inverted V as the two limbs of the noose near the knot are pulled upward. When the fixed noose is applied in the midline under the chin or on the back, then the mark is seen on both sides of the neck and is directed upward towards the knot. When the fixed noose is used and knot is behind the ear then the mark differs on each side on the neck, i.e. on the side of the knot it is directed upwards while on the opposite side it is placed transversely.

Running Noose:

It is the noose in which one end of the rope is passed through the slip or loop of the other end (slip knot). The ligature mark in the running noose will be horizontal due to tightening of noose by weight of the body in horizontal (transverse) direction.

INTERNAL FINDINGS

A. GENERAL PATHOLOGICAL SIGNS:

a. Congestion.
b. Few petechial hemorrhages.
c. Fluidity of blood
d. Pulmonary edema
e. Cardiac dilation
f. Pharyngeal hemorrhages

B. SPECIFIC PATHOLOGICAL SIGNS DUE TO ASPHYXIATION:

a. Dry white glistening band of subcutaneous tissue due to sudden occlusion of blood supply at the site of ligature.
b. Rupture of platysma and sternocleidomastoid muscles.
c. Rupture of intima of carotid arteries.
d. According to Garden and Shapiro, the hyoid bone rarely fractures in hanging.
e. The hyoid bone fracture is (not always) accompanied by hemorrhages and the absence of hemorrhage does not mean that the body was hanged after death.
f. Injuries to laryngeal mucosa are fairly uncommon.
g. Internal structures are not ecchymosed. The only condition in which internal structures are ecchymosed is that when the knot is on the front and it is complete hanging. Now, in this case when the body is suspended, the knot will move up resulting in bruises and abrasions of the skin, and due to body weight, the muscles

will be ecchymosed. The abrasions would be linear imprint abrasions.

h. There is usually a certain amount of hyperemia of trachea and epiglottis.

i. Congestion and hemorrhages in lymph nodes above and below the ligature mark.

OCCURRENCE OR MEDICOLEGAL VALUE OF HANGING

A. SUICIDAL HANGING:

It is very common. People hang themselves by ropes, wires, azarbunds, curtains and sheets etc.

Partial hanging is enough to cause death but it is slow and painful if cerebral anoxia does not develop.

The deceased usually finds a quiet place or if he is in the room, he closes the door and the windows so that he should not be disturbed. Then he writes a suicidal or a farewell note but not necessarily. He chooses the readily available material and makes a ligature around the neck. The ligature may be a running noose or a fixed noose. The other end is tied along a tree or a ceiling fan. He then jumps off or kicks of the stool, which results in, complete hanging with feet clearly off the ground.

Relatives or dissentients at the scene may provide information of social or financial problems or history of depression.

PM lividity can change within four hours of death if the position of the body is changed. Moreover, if the cloth intervenes between the neck and ligature, the ligature mark would be absent and it would appear that the death is due to natural cause.

Suicidal hanging is thought of as the last resort after previous attempts of poisoning and cut throat etc.

B. HOMICIDAL HANGING:

"Except judicial hanging, homicidal hanging is rare because of the resistance offered by the victim anyhow an intoxicated person or an infant may be killed in this way".

Homicidal hanging should be suspected in a victim if.

1. Knot is at the back.
2. Mouth is gagged.
3. Limbs are tied in a manner not tied by the person himself.
4. Signs of struggle are present.
5. The person is marking debilitated, weak, addicted or intoxicated.
6. If victim is a female, she may be sexually assaulted.

Lynching:

It is a method of homicidal hanging in South America in which a group of people act jointly to overpower an individual and hang him by means of a rope to a nearby tree or any other object.

Judicial Hanging:

It is the official method of execution of death sentence. The face of the condemned person is covered with a dark mask. He is made to stand on a platform above the trap doors, which open downward when the bolt is drawn.

A rope is looped around the neck with,

1. Knot under the left angle of jaw.
2. Length sufficient to allow a drop of 5-7 feet or more according to the weight, age and built of the person.

The bolt is withdrawn and due to stoppage of movement of body and due to the position of ligature's knot, causes the head to jerk towards the right side resulting in a

1. Fracture dislocation of C_2 and C_3 or C_3 and C_4.
2. Rupture of intima of carotid arteries.
3. Laceration of medulla and so damage to vital centers. (Respiratory centers, vasomotor center).

But the heart continues to beat for 10 – 15 minutes.

D. ACCIDENTAL HANGING:

- May occur during work or play or during masturbatory exercise.
- Children hang themselves in ropes of the swings.
- Laborers falling off scaffoldings.
- Children playing with cords of window blinds.
- Person slips from the staircase and may get entangled in one of its things.
- Toddlers slipping off the restraining straps
- Sexual asphyxia or autoerotic asphyxia.

WHETHER DEATH IS DUE TO HANGING OR NOT?

1. Death could be attributed to hanging if one finds a ligature mark, with petechial hemorrhages and ecchymosis into or around its substance.
2. Marks of dribbled salvia at the angle of the mouth or chest.
3. Tearing of intima of carotid arteries with extravasation of blood with in their walls.
4. Congestion and hemorrhages in the lymph nodes above and below the ligature mark.
5. Fracture or fracture dislocation of cervical vertebra.
6. Absence of fatal injuries and poisoning.

II. SUFFOCATION

"Suffocation is that form of violent asphyxial death in which air is prevented to go inside the lung by other means than by pressure on chest and neck or drowning".

OR

"Suffocation is obstruction of the passage of air into the respiratory tract by closure of external respiratory orifices".

FORMS OF ASPHYXIA FROM SUFFOCATION

A. Smothering
B. Overlying
C. Gagging
D. Choking

A. Smothering:

It is a form of asphyxia caused by closure of mouth and nose by hands, cloth, plastic bag or some other material. It is not necessary that the mouth and nose should be completely closed from the start because obstruction would increase as the congestion stays and traces of blood and saliva pour into the mouth and nose to further obstruct the breathing.

Occurrence or Medico-legal Value

1. Accidental Smothering:

It may occur in infants if the face is buried in a soft pillow or if bedclothes or plastic material covers the face. In adults, accidental smothering may occur during a perverted sexual activity, epileptic seizures or when person is under the influence of drugs and drinks. Such accidents involving adults and middle-aged persons with some history of medical problems, showing total absence of asphyxial signs may create diagnostic challenges. So, before the diagnosis of smothering is given, the cause of natural death may be searched out.

2. Homicidal Smothering: (Usually)

In this case abrasions and bruises are generally found in the region of nose and mouth. They may be absent if soft material such as cloth or pillow has been used. Injuries on inside of lips from pressure of teeth, bruising of gums occurs and tongue may also show injures. All these injuries are produced as a sign of struggle but they may be absent in infants and young children and drug abused persons so although autopsy may reveal signs of asphyxia but there may not be any corroborative evidence to prove that the death was an outcome of some foul play.

Burking:

The form of asphyxia arising as a result of a procedure used by the murderers ***Burke and Hare***, to kill their victims and to sell their bodies for dissection to the Edinburgh Medical students. This is the mixed form of both smothering and traumatic asphyxia.

3. Suicidal Smothering:

It is rare. Reports indicate that it may occur in prisoners or the mental patients "TAYLOR" described an un-usual suicide by smothering. "A person was held dead with his face on the prison cell. His mouth and nostrils were stuffed with the pieces of clothes held in position by a handkerchief tied around his mouth".

B. OVERLYING

Death may occur due to overlying e.g. a baby is sleeping with the mother and mother is a sound sleeper or intoxicated. She turns over the baby and there is overlying. As she is over the baby, the baby becomes asphyxiated because of pressure on the mouth and nose. In non-intentional overlying, the mother is charged only for negligence. For intentional killing the mother is charged for infanticide also.

C. GAGGING

It is a form of suffocation when something is thrust into the oral cavity or pharynx. It is frequently encountered in house breakings, sex and adventure tragedies and in infants. The gags are commonly composed of hand kerchiefs and chadars etc.

D. CHOKING

It is a form of asphyxial death in which the obstructing material is in the respiratory passage i.e. larynx, trachea and bronchi.

Occurrence:

Choking is mainly accidental. Accidents may occur in children on choking candies, chewing gums and buttons and so on. Elderly may also choke on their partial dentures. One common form of choking is the inhalation of regurgitated material but the presence of regurgitated material in the air passage is not a sure sign of asphyxia because it may be the result of terminal phase vomiting in asphyxia, which is not the cause of asphyxiation.

Mechanism:

If a foreign body impacted in the larynx is large enough to cover the laryngeal opening completely, the air passage way will be blocked. Death occurs due to anoxic anoxia or hypoxic anoxia. If foreign bodies impacted in larynx are not large enough to obstruct the airways completely but may still stimulate laryngeal nerve endings (a branch of vagus nerve). Sudden death due to cardiac arrest occurs. If a foreign body passes through the larynx then it may become impacted at the bifurcation of trachea or may lodge in a bronchus. In both cases death occurs due to hypoxic anoxia or irritation of the region leading to reflex cardiac arrest.

MECHANISM OF DEATH IN SUFFOCATION

1. Asphyxia (hypoxic hypoxia).
2. Vagal inhibition.

AUTOPSY FINDINGS

EXTERNAL FINDINGS

A. GENERAL PATHOLOGICAL SIGNS:

1. Cyanosis.
2. Congestion.
3. Petechial hemorrhages.

B. SPECIFIC PATHOLOGICAL SIGNS DUE TO ASPHYXIATING MECHANISM:

1. Pressure marks on face, lips and nose.
2. Bruising and laceration of lips against the teeth.
3. Frothy fluid may be coming out from the mouth and nose.

INTERNAL FINDINGS

A. General Pathological Signs:

1. Congestion.
2. Petechial hemorrhages.
3. Pulmonary edema.
4. Fluidity of blood.
5. Cardiac dilation.
6. Pharyngeal hemorrhages.

B. Specific Pathological Signs Due To Asphyxiating Mechanism:

A foreign body is responsible for suffocation in the mouth or respiratory passages.

III. STRANGULATION

It is a form of violent asphyxial death caused by constricting the neck by some means other than body weight. e.g. by ligature, hand elbow and stick etc.

Classification of Strangulation:

It can be classified into

A. Manual strangulation.
B. Strangulation by a ligature.

A. Manual Strangulation or Throttling

It is defined as "Asphyxia caused by compression of the neck by hands".

MECHANISM OF DEATH IN THROTTILNG

1. Hypoxic hypoxia:

Compression of neck (air passages) leads to hypoxic hypoxia, which leads to rapid death.

2. Reflex cardiac inhibition:

Compression of one or both carotid sinuses results in instantaneous death due to vagal stimulation.

3. Cerebral anoxia:

Obstruction of carotid artries results in cerebral anoxia and quick death.

4. Cerebral congestion:

Obstruction of jugular veins results in cerebral congestion and death.

Cause of death in throttling may be due to a single mechanism or combination of

mechanisms. (signs of asphyxial death are surely present).

DIAGNOSIS OF DEATH IN THROTTLING OR AUTOPSY FINDINGS

EXTERNAL FINDINGS

A. General Pathological Signs:

1. Cyanosis
2. Congestion
3. Petechial hemorrhages

B. Specific Pathological Signs Due To Asphyxiating Mechanism:

Injuries like abrasions and bruises are seen on the neck. The nature and extent of injuries depends upon method of throttling. Assaults may, take place from front, behind or side of the victim. The assailant may apply pressure with one hand, both hands or the forearm. A cloth may intervene between hands and neck. In this case pressure marks would be absent, soft tissues of the neck are not compressed but are forced upwards and backwards against the cervical vertebrae.

If the assailant uses one hand and from front, then he grips the upper part of the neck usually below the angle of jaw. If assailant were right handed then there would be a single bruise on the right side and multiple bruises on left side of the neck. For left handed person multiple bruises are present on the right side and single bruise on the left side.

If the assailant uses both the hands for throttling (from front), then there will be multiple bruises on both sides of the neck.

If assailant attacks from behind, then there will be multiple bruises on the front of the neck in the middle and a single bruise on the posterior aspect of neck.

If victim is conscious and uses his nails to protect himself and to relieve pressure, then position of bruises changes and semi-circular abrasions (due to nails) are seen.

If assailant uses his forearm for strangulation, then he mostly attacks from behind. Pressure in this case is exerted by forearm against neck in such a way that the external injuries are absent.

INTERNAL FINDINDS

A. General Pathological Signs:

1. Congestion.
2. Petechial hemorrhages.
3. Fluidity of blood.
4. Pulmonary edema.

B. Specific Pathological Signs Due To Asphyxiating Mechanism:

1. Multiple bruise of muscles of the subcutaneous tissue beneath the skin.

According to Gorden and Shapiro, the hyoid bone and laryngeal cartilages are fractured.

HYOID BONE FRACTURE:

It can be demonstrated by exposing the hyoid bone. Fracture appears as an irregular line or breaks in the continuity of bone and is accompanied by a hemorrhage.

The greater cornu is attached to the body by means of a cartilage, while lesser cornu is attached to the body and greater cornu by a synovial joint which disappears in old age due to ossification. Cartilaginous separations of the joint should not be confused with fracture.

In ante-mortem fracture of hyoid bone, if fracture is seen with magnifying glass, the edges would be red due to blood but in post mortem fracture it would be yellow.

THYRIOD CARTILAGE FRACTURE:

1. Fracture of superior cornu due to traction of thyrohyoid membrane.
2. Fracture of body, which is vertical, and near the midline at the junction of two laminae. This fracture is the result of direct blow on laryngeal prominences.

These fractures are commonly found in elderly persons with calcified cartilages and ossified bones. They are seldom seen in children.

MEDICOLEGAL IMPORTANCE OF THROTTLING

a. Homicidal:

Deaths in throttling are always, always and always homicidal, when manual strangulation is done on a young boy or girl. Homicidal throttling is usually done in case of robbery.

b. Accidental:

These have been reported when firm pressure is suddenly applied on the neck of a person e.g. the assailant just wants to frighten the victim by applying pressure on the neck, this causes the carotid sinus stimulation and reflex cardiac arrest leading to death.

c. Suicidal:

Cases of suicidal throttling have not been recorded because the moment the pressure is applied, the person would suffer from cerebral anoxia and would not be able to exert pressure sufficient to cause death. (as he becomes unconscious due to cerebral anoxia).

B. STRANGULATION BY LIGATURE

"It is constriction of the neck by a ligature, the constricting force being applied directly to the ligature".

Ligating Meterial :

It may be:

1. Rope	2. Wire	3. Cord
4. Dupata	5. Shalwar	6. Azarband

Mechanism of death in strangulation

1. Hypoxic hypoxia:

Compression of airway passages results in hypoxic hypoxia and rapid death.

2. Reflex cardiac inhibition:

Compression of one or both carotid arteries results in cardiac inhibition and instantaneous death.

3. Cerebral congestion:

Obstruction of jUgular vein results in cerebral congestion (cerebral apoplexy) and death.

AUTOPSY FINDINGS

EXTERNAL FINDINGS

A. General pathological signs:

1. Cyanosis.
2. Congestion.
3. Petechial hemorrhages.

B.Specific Pathological Signs Due To Asphyxiating Mechanism:

Ligature Mark:

If ligature is still present it should be removed by dividing it away from the knot so that the knot is preserved. The knot should not be opened if the cord is tied around the neck, it may encircle the neck completely or it may not completely encircle the neck. If it does not completely encircle the neck, a second turn is given and before the 2nd is given, a knot is made. The position of knot has no value and it depends upon the sweet will of the assailant.

General appearance of the mark:

It depends upon the nature of ligating material e.g.

1. The pattern of ligature may be imprinted on the neck as pressure absrasions **(mirror image phenomenon).**
2. If the ligating material has gone more than one rounds on the neck, corresponding numbers of marks, one above the other are seen and there may be skin bruising if it is caught between the rounds of ligature.
3. If a soft material like dupatta, tie, shalwar or towel is used, the ligature mark can not be seen; instead there may be a depression and margins may not be ecchymosed.
4. If a rough material like rope than it will leave distinct ligature mark.

Moreover, if there is struggle during the approach of the ligature, the skin may be grossly abraded and damaged and the underlying tissues badly bruised. The ligature mark should not be confused with the creases of the neck skin.

Colour:

In the early period after death, it looks pale, later it becomes yellowish brown, dry, hard and parchment like. The absence of ligature marks at the back of the neck may be due to the intervention of clothing (collar) or hair between the skin and ligating material.
If the ligature has been crossed and pulled tightly, then the ligature mark would be more prominent at the site of crossing over.
However, the two ends of mark may be at different levels.

Situation:

Ligature mark may be situated anywhere in the region of the neck but is lower down than the mark of hanging. According to Grad Whorl, it is situated across or below the thyroid cartilage, while according to Gordan and Shapiro, it is found at the lower part of larynx and upper part of trachea.

Direction:

It is usually directed transversely across the neck.

Abrasions and bruises:

These are commonly found in the skin in relation to ligature mark. The victim produces these when he pushes his own

fingers in between the ligature and neck, in an effort to release the pressure.

INTERNAL FINDINGS

A. General Pathological Signs:

These are:

i. Congestion.
ii Petechial hemorrhages.
iii. Fluidity of blood.
iv. Pulmonary edema.

These above findings depend on the area of ligature. If the ligature is at the level of carotid sinus, the person dies quickly due to shock and signs are not marked.

If the ligature is lower down and the arteries, veins and air passages are compressed, then slow death occurs and there is every possibility of struggle and muscles exertion and in doing so, the signs of asphyxia would develop.

In slow death, the lungs make every effort to breath more and more and to get rid of CO_2 and in doing so the following may happen.

a) The lungs become congested.
b) The fluid oozes out of neck, the pressure and the respiratory passages get stumped up by mixing with the air in the lungs and causes production of froth, which becomes obvious at the nose.

Due to compression of neck, the pressure and congestion above the ligature increases. Due to severe congestion, bleeding from nose and ear may occur.

B. Specific Pathological Signs Due to Asphyxiating Mechanism:

1. Dissection of neck reveals a moderate degree of bruising of muscles and subcutaneous tissues but this is not an invariable finding.
2. The fracture of hyoid bone is usual in strangulation.
3. Fracture of laryngeal cartilages also occurs.
4. Injuries to mucosal membranes of larynx are less common than throttling.

MEDICOLEGAL IMPORTANCE OF STRANGULATION

1. Accidental Strangulation:

This is common in children e.g. when they are playing, the cord of the toys is tied around the neck and the weight of toy act as constriction force i.e. TALIGON. Similarly, small children may get entangled in pram harnesses or other impediments. Asphyxia may result from wearing tight collars. Also in industries, other parts of clothes, belts and ropes may be caught in a roller and cause accidental strangulation. It can also occur in tightening of the umbilical cord around the neck of the fetus in uteri. It can also occur in intoxicated people. There was a case of a man in a habit of sleeping next to his dog and one day he was accidentally strangulated by the dog's chain.

2. Homicidal Strangulation:

It is a common means of murder. Suspicion of homicide must arise when.

1. Knot is tied on the back of the neck.
2. Mouth is gagged.
3. Limbs are tied.
4. Injuries are found on the body.
5. Signs of struggle are present.
6. In case of female, she is sexually assaulted.

Infanticide by Strangulation:

It is done by passing umbilical cord around the neck. In this case umbilical cord shows the sign of violent hanging and the damage to the WHARTON`S jelly.

3. Suicidal Strangulation:

Strangulation is always and always homicidal unless the person ties the ligature with some device and makes turns and turns to increase pressure and tighten the ligature. The device used may be stick or a pencil etc.

Apart from ligature strangulation, the methods in common use to commit homicidal strangulation are: (a) mugging (choke-hold) (b) garroting and (c) bansdola.

(a). Mugging (Choke-hold): When strangulation is effected by compressing victim's neck against the forearm, it is known as mugging (choke-hold). It may leave no external or internal mark of injury. This hold is not permitted in wrestling because of its danger.

(b). Garroting: When a victim is attacked from back without warning, and strangled by throwing a ligature over the neck and tightening it quickly, it is known as garroting. It can overpower and kill even a healthy

robust male without any struggle. Loss of consciousness is so rapid that the assailant is able, single handed, to tie the ligature with one or more turns. Garroting, as a mode of execution, was practiced in Spain, Portagal, and Turkey.

© **Bansdola:** This is a form of strangulation practiced in Northern India. In this, the neck is compressed between two stick or hard objects, usually bamboos, one being placed across the throat in front and another behind. These are strongly fastened at one end and a rope is passed at the other end to bring the two bamboos together. And, the unfortunate victim is thus strangled to death. Sometimes, the throat is pressed by means of a bamboo or lathi placed across the front of the neck, the murderer standing with a foot on each end of the bamboo or lathi, thus squeezing the victim.

Comparison/Similarities Between Hanging And Strangulation :

s.no	Hanging	Strangulation
	External	
1	Eyes prominent due to congestion.	Same
2	Pupils dilated	Same
3	Clenched hands with purple nails.	Same
4	Tongue swollen and protruded.	Same
5	Petechial hemorrhages in scalp and face	Same
	Internal	
1	Blood is dark in color	Same
2	Right side of the heart is distended with blood while left side is empty.	Same
3	Large blood vessels are full of blood.	Same
	Ligature Mark	
1	Appears as a depression or groove.	Same
2	Looks pale in early period after death and later becomes yellowish, brown, dry, hard and parchment like.	Same
3	Ecchymosed along the edges.	Same
4	Pattern of ligating material is imprinted on the neck as pressure abrasion.	Same
5	Fibers of ligature may be found adhering to the skin.	Same
6	Character of mark depends upon nature of ligature, number of turns and length of time,it is there.	Same

Difference between hanging and strangulation :

S.No	HANGING	STRANGULATION
1	Suicidal usually.	Homicidal usually.
2	No signs of struggle.	Signs of struggle are present.
3	Ligature is found above thyroid cartilage, incomplete, directed obliquely upward with a gap indicating position of knot with no damage to the skin in the gap.	Ligature may not be with the body but when found, it is below the thyroid cartilage, completely encircles the neck horizontally. There may be more than one turns of ligature and there is always some damage to the skin underneath.
4	Abrasions and bruises round about the neck are rare.	Abrasions and bruises round about the neck are common.
5	Dissection of ligature mark reveals dry glistening white band of	Dissection of ligature mark reveals ecchymosed

	subcutaneous areolar tissue.	subcutaneous areolar tissue.
6	Neck is usually stretched.	Neck is not usually stretched.
7	Fracture of hyoid is rare.	Fracture of hyoid is common.
8	Fracture of larynx and trachea is rare.	Fracture of larynx and trachea is common.
9	The carotid arteries injure only in cases of long drop.	Injuries to the carotid arteries are common.
10	Injuries to muscles of the neck are rare.	Injuries to the muscles of the neck are common.
11	Fracture dislocation of cervical vertebrae is common in judicial hanging.	Fracture dislocation of cervical vertebrae is rare.
12	Saliva is running out of the angle of mouth vertically down along the neck and front of chest and abdomen.	Saliva may not have escaped from mouth but if so, usually blood tinged and may not be vertically down.
13	External signs of asphyxia are not well marked if death is due to vagal inhibition.	External signs of asphyxia are well marked.
14	Face is usually pale.	Face is usually congested and with marked petechial hemorrhages.
15	Bleeding from mouth, ears and nose is very rare.	Bleeding from mouth, ears and nose is common.
16	Emphysematous patches on the lungs may be present.	Emphysematous patches on lungs are common.

4. Drowning Or Immersion

"It is a form of violent asphyxial death in which air is prevented from entering into the lungs due to submersion of mouth and nose under water or other liquid, viscid or pultaceous".

CLASSIFICATION:

A. Typical or WET Drowning:

It means obstruction of air passages and lungs by inhalation of fluids. In case of water inhalation the victim gets severe chest pain and chances of survival are also reduced. Fresh water when inhaled causes different pathological changes.

Changes in fresh water drowning:

In fresh water drowning the large quantities of water crosses the alveolar membrane and enters into circulation. This produces marked hypervolemia. The RBCs swell and subsequently burst librating ions. So, there will be anoxia, increased K^+ conc. decreased Na^+ conc. and hypervolemia. SWANN and STAFFORD showed that with inhalation of fresh water, death occurs rapidly due to ventricular fibrillation caused by hypervolemia and electrolyte imbalance. Respiratory failure may precede or follow ventricular fibrillation by a few seconds.

Changes in salt water/sea water drowning:

In salt water drowning, the marked hyper tonicity of the inhaled water causes loss of fluid from circulation into the lungs giving rise to pulmonary edema with progressive hypovolemic shock and cardiac arrest. The death is slow as compared to fresh water drowning due to asphyxia and pulmonary edema.

B. Atypical Drowning:

It indicates the condition in which there is little or no inhalation of fluids etc. into respiratory passages.
It includes:

1. Dry drowning.
2. Immersion syndrome.
3. Submersion of unconscious.
4. Near drowning.

1. Dry Drowning:

When water enters the nasopharynx it causes irritation of the mucosa and stimulation of laryngeal nerve endings, which leads to laryngospasm and death occurs due to asphyxia. Little or no water enters the air passage or lungs. There is no time for signs of asphyxia to develop and autospsy is negative. Only presence of water in nasphyarynx and laryngospasm are found in dry drowning. With the passage of time even laryngospasm due to the process of putrefaction will wear off and there is no evidence left behind.

2. Immersion Syndrome:

A sudden impact with water stimulates the vagus nerve causing cardiac arrest and death e.g. horizontal entry of a person into water with consequent blow on epigastric region. No usual signs of drowning are found.

3. Submersion of Unconscious:

This is possible when the victim suffer from severe disease (epilepsy, rupture of cerebral aneurysm, heart diseases, dizziness due to hypertension etc.) or sustained head injury (concussion) during fall into water.

4. Near drowning or secondary drowning syndrome:

This is mainly due to infection from contaminated inhaled water causing lung complications, tired heart, cerebral edema etc. The victim when rescued shows apparent recovery from drowning, but after hours or days he develops increasing respiratory distress, hypotension or cardiac arrhythmias or he may die of it. This is called near drowning. Such victims should be kept under observation in hospitals.

MECHANISM OF DROWNING:

Drowning occurs in three stages:

Stage 1: It begins with holding of breath for few minuts. Accumulation of carbon dioxide stimulates respiratory center in the brain and leads to inevitable inspiration and thus inhalation of water into the lungs. Swallowing of water into the stomach also takes place.

Stage 2: It is chatracterized by swallowing, coughing and vomiting. Progressive loss of consciousness follows. With frequent inhalations of water, air in the lungs is completely replaced by water.

Stage 3: It starts with deepening of unconsciousness accompanied by gasping till respiratory arrest. Finally, irreversible changes take place in the brain precipitating death.

Fatal Period:

In vasovagal shock death is immediate. Asphyxia supervenes within two minutes after complete submersion and heart stops in 2-5 minutes (4 minutes in fresh water and 8 minutes in salt water are maximal).

Autopsy Findings:

These changes are seen in those cases where the mode of death is asphyxia. When the death is due to any causes other than asphyxia, these changes are not seen.

A. External Findings:

i. Clothes are wet if examined early and may be soiled by mud, sand or weed.

ii. Skin is cold, pale and sometimes pimples appear called Cutis anserina or Goose skin due to spasm of erector pilli muscle. The skin appears granular and puckered with hairs standing on one end. Extremities are mainly affected.

iii. Contraction of the penis and scrotum occurs (it occurs when water is cold).It may also occur if body is submerged in cold water immediately after death, so it is not a diagnostic sign.

iv. PM lividity is mostly marked on head, neck and chest, as head is lowest in H_2O.

v. Eyes are half open, conjunctiva is congested and pupils dilated.

vi Tongue is swollen and protruded.

vii. Lips and nose are covered with fine froth. The bubbles are extremely fine and

this is a diagnostic sign of drowning. If wiped from nose, it recurs on applying pressure to chest (in putrefaction it is blood stained).

viii. Skin of palms and soles of feet are bleached, wrinkled and sodden and appear like "Washer man's hand and feet" and it occurs only when body has been in water for 10-12 or more hours.This is due to the osmotic action of water on the thickened epidermis.

ix. Mud and sand is present under the fingernails and abrasions are present on the fingers.

x. Grass, gravel or weeds may be found firmly grasped in hand, due to cadaveric spasm.

B. Internal Findings:

i. Lungs are ballooned and on removing the sternum, bulge out of the chest cavity, They look edematous and show marks of ribs. They are usually pale. Tardieu`s spots are rare. On section, the lungs exude frothy blood stained fluid.

ii. Larynx, trachea and bronchi usually contain a fine froth and water, mucus and foreign matter as mud, sand and algae etc.

iii. Venous system is engorged with dark blood. Left side of heart contains blood passed to it by pulmonary vein. It must be remembered that water cannot enter the left side of the heart if dead body is thrown in water.

iv. Brain and its membranes are congested.

v. Stomach in 10% cases contains water that the person had drunk. Presence of mud is a sure sign of drowning.

vi. Small intestines, especially duodenum and jejunum contain water mixed with sand and it is positive evidence.

vii. Liver, Spleen and kidneys are congested.

viii. Middle ear may contain water.

MEDICOLEGAL ASPECTS OF DROWNING:

The objectives of the examination are summarized as follow:

I. Identity of the Dead Body:

Here in addition to the parameters of identification applicable, Special attention should be given to:

1. Clothing and personal belongings.
2. Fingerprints when the skin is removed from hands in the form of glove.
3. Odontology and hair.

II. Whether person was alive on entering the water:

In decomposed bodies it may be difficult. In fresh bodies unless there is an obvious cause of death the conclusion depends upon implication and examination.

Look for PM changes with special reference to,

1. Water in middle ear.
2. Persistent , profuse and fine froth at nostrils, mouth and in respiratory passages.
3. Conditions of lungs.
4. Presence of H_2O in stomach and duodenum.
5. Diatoms in the tissues specially brain , bone marrow ,liver and spleen.
6. Biochemical changes.
7. Cadaveric spasm.
8. Injuries etc.

III. Accidental, suicidal and homicidal drowning:

a. Accidental drowning:

Death involving all the ages can result from boating and bathing accidents (e.g. falls because of old age, disease, intoxication, and accidents involving children who cannot swim, take many lives). In most of accidents, the circumstances are clear,

1. If the accident is not witnessed, findings at the scene of death may give an indication of nature of death. A person falling accidentally into water may be fully dressed. (Those unclothed or without a swimming suit on are also likely to have signs of victims of accidents).
2. Trivial injuries on the body may be present especially on the arms caused by a fall or an attempt to grasp an object. These should be properly identified as accidental in origin.

3. If a body is recovered from navigable water, extensive trauma may be present from being hit by a moving vehicle or its part (especially propellers) and from being bitten by marine animals.
4. At the scene of death the marks of slipping should be looked for.
5. A fatal accident in a bathtub is frequently associated with an epileptic attack, an acute attack of coronary artery insufficiency and alcohol or dry intoxication. In such cases of death, minor injuries from a fall may be present.
6. The body should be examined for injection marks and electric burns etc.
7. Past medical history of the descendent must be reviewed.

b. Suicidal drowning :

1. The scene of investigation may reveal distinct evidence of suicide. The person intending to commit suicide may remove a hat, overcoat and gloves for instance before he jumps into the water. These articles are usually found neatly piled up at the scene background. Finding of a suicidal note would confirm the intentions.
2. He may tie hands and feet to make sure that he does not survive with a last change of mind and occasionally the victim ties heavy weights around the body to ensure drowning. With such findings however, the possibility of homicide must be ruled out before rendering the verdict of suicide.
3. Suicide by jumping into the water from a bridge is not uncommon in the absence of any clues at the scene; the personal history of the descendent will help to establish the manner of death.
4. Suicide in bathtub is rare but when it does occur the features indicating the intent are usually obvious.

c. Homicidal drowning:

This form of drowning is rare but cases have been recorded.
"Brides of bath" case in which Joseph smith was convicted in 1915 of murder of 3 women by drowning them in a bathtub a few days after he had married each".
It was possible to submerge an un expecting person all of a sudden into a bath and keep the head under water for 5-10 minutes till death occurred without producing any marks of injury.

IV. Origin of injury in drowned person:

Wounds may be found in external examination. They may be produced.
1. Before immersion.
(Suicidal, homicidal or accidental)
2. At the time of immersion by the deceased striking a hard object.
3. After immersion a body may be washed up against the hard object in water or attacked by fishes and crustaceans.

It is difficult to distinguish between these types of injuries. Ante mortem wounds can be differentiated from PM wounds only when the injury has preceded drowning by at least 1 hour. In such cases histological evidence of tissue reaction may be found in the wounds. The absence of tissue reaction would not exclude an ante mortem origin for the wound.

V. Cause of death and type of drowning:

By PM appearance it can become evident.

VI. Factors contributing to death and drowning:

The findings on external and internal examination, injuries, alcohol etc. can help in its determination.

VII. Whether the deceased entered the water alive or dead?

If death had been associated with inhalation of H_2O, the examination of diatoms may assist especially if their character is peculiar to an area.

VIII. Any natural disease or poisoning, contributing to the fatal results:

This underlines the need for an extensive autopsy and histological examination,
After establishing that the deceased was alive at the time of entry into water, it is found out whether death occurred due to immersion syndrome or ordinary drowning. Death may occur due to reflex cardiac inhibition or surprise or state of hypersensitivity. In case of hypersensitivity (alcohol intoxication) diagnosis can be made from characteristic history e.g. an

intoxicated seaman returning to ship falls over the edge of the deck. In fog and disappears and never seen to struggle to come into the surface. The body will be found at the bottom of rather than on the top as in case of swimming pools.

IX. The time taken to drown:

With ordinary circumstances the time taken to drown varies within wide limits, determined by various circumstances, namely personal reaction to submersion, which can be inferred from circumstantial evidence.

1. State of health of victim.
2. Volume and nature of fluid inhaled.

Under ordinary circumstances there is struggle with small gulps of H_2O followed by larger gulps and then a state of unconscious. Death develops in 2-12 minutes.
If recovered from H_2O there may follow a period of suspended animation during which resuscitation may be successful.

X. Time since death from drowning:

It is difficult to estimate time since death from drowning. The following parameters should be considered.

1. A non-waterproof watch may stop and indicate the time since drowning.
2. Temperature of body falls rapidly and cooling rate is twice as compared to that in air.
3. Wrinkling of the skin begins to appears shortly after immersing, bleaching of cuticle after 12 hours and sodden appearance of epidermis is seen in about 18 hours.
4. Floating of body due to accumulation of putrefactive gases occurs in about 24 hours in summer and 2-3 days in winter.
5. Skin slip takes about 2-4 days.
6. Adipocere formation is seen in 5-15 days, if there.
7. Rigor mortis sets in early due to the muscular activity prior to drowning and death.

TREATMENT:

It should be started immediately. The aim should be to restore normal arterial blood gas levels by effective ventilation and the restriction of normal acid base status by administering suitable buffers such as sodium bicarbonate to both seawater and fresh water victims. Only after this, restoration of blood volume by transfusion of plasma in sea water victim and transfusion of whole blood or packed cells in case of fresh water drowning may be considered.
Strip the person naked to waist, clear mouth and throat from mud, sand and froth etc. Turn the body with face down or low. Let water flow out from his lungs and stomach. Give artificial respiration. Also give mixture of CO_2 and O_2. Keep him warm under blankets and apply hot water bottles. Give stimulants e.g. adrenaline and nor adrenaline etc. Later in hospital electrolyte imbalance should be corrected.

Methods of artificial respiration:

Holger Neilson method:

It is the one currently favored.

Schafer`s method:

It is another easy method

Direct inhalation:

i.e. mouth to mouth. It is superior to the above two.

DIATOMS:

They are unicellular microscopic algae,having a siliceous cell wall, which resists acid digestion, heat and putrefaction. Only live body with circulation can transport diatoms from lungs to brain, bone marrow, liver and spleen etc. from where they have been demonstrated after autopsy. Diatoms are not present in dead bodies thrown in water and in dry drowning.

AUTOEROTIC ASPHYXIA OR SEXUAL ASPHYXIA OR SEX HANGING OR AUTOEROTIC DEATH

It is a special form of sexual deviation, which is seen in males of age between 18 to 25 years.
Sexual pleasure can be enhanced by partial reduction of blood supply to the brain.This is usually achieved by compressing the blood vessels of the neck with a padding under constricting noose.Since there is a fine line between the compression necessary to produce sexual pleasure and that which produces unconciosness,the victim may place himself in a position of accidental black out and unexpected death.

Condition of the body and the environment;

The dead body is partially dressed in female clothes or other items of female use. The dead body is tied with ropes in a complicated fashion with a noose around the neck and another around the penis. The neck is usually protected with a soft pad under the rope. The scene of incidence is usually as isolated spot. Overt sexual elements like pornographic material are present at the scene within the visual range of the deceased.

It is believed that such deviants being masochistic and transvestite derive sexual pleasure from such attempts.