ASPHYXIAL INJURIES
Caused by the failure of cells to receive or utilize oxygen
Lack of oxygen→↑ carbon dioxide→acidosis→ paralyze of respiratory centre →suffocation (asphyxia)
Patophysiology of anoxia:

a) Lack of 02 (anoxic anoxia): altitude, small spaces, diseases of respiratory tract
b) Disturbance in circulation (delayed anoxia): shock
c) Inability in transportation of 02 (anemic anoxia): disarrangement of erythrocytes, hemoglobin
d) Inability in use of 02 (hystotoxic anoxia): out/in cell, metabolic, substrates

Examination findings:

- clinical - depends on acute or subacute form
- autopsy – external: cyanosis, congestion and edema, petechial hemorrhages, hemorrhages from the nose and external auditory meatus
  - internal: intracranial bleeding or hemorrhage, cerebral and pulmonary edema, visceral hemorrhages, fluidity of blood, visceral congestion

Division:
- non-violent – result of illnesses: damages of centers, anemia, impenetrability of respiratory tract)
- violent - result of mechanical, physical (electrocution) or chemical (intoxication) injuries

MECHANICAL ASPHYXIA
Mechanism:
- obstruction of respiratory tract (suffocatio)
- pressure on the neck (strangulatio)

Phases:
- Dyspnoic phase: expiratory dispnea with increased respiratory rate, cyanosis tachycardia (60-80 sec.)
- Convulsive phase: loss of consciousness, depressed respiratory movements, facial congestion, bradycardia, hypertension, convulsion (2 min.)
- Pre-terminal respiratory pause: no respiratory action, paralyzed respiratory and circulatory centers, tachycardia (1-2 min.)
- Gasping fro breath due to primitive respiratory reflexes
- Finally, loss of movements: absence of reflexes, dilatation of pupils (1-4 min.)

Reflectory death
Subacute (no convulsions and dyspnea)
Autopsy findings: non-specific, characteristic!

SUFFOCATION
In these deaths there is failure of oxygen to reach the blood

1. ENTRAPMENT / ENVIRONMENTAL SUFFOCATION
   - Inadequate oxygen in the environment
   - Almost exclusively accidental in nature
   - Only one finding - nonspecific acute visceral congestion
2. SMOTHERING (Occlusio n./o.)
   - Caused by the mechanical obstruction or occlusion of the external airways
     a) Manual pressing – as a rule homicide
     b) Covering – more often homicide

c) Pressing to surface – most often accident

- Traces on the skin!

3. CHOKING (Obturatio p./l.)
   - Asphyxia is caused by obstruction within the air passages
   - Foreign body – by accident or intentionally
   - Bolus death /"cafe coronary"/ (Mors e bolo)! – associated with alcohol intoxication, bad-fitting dentures, neurological injury or senility
4. OBTURATIO OF TRACHEA AND BRONCHES (Obturatio tracheobronhiorum)
   - Most often accident (sand, beans, pits)
   - Distinction from ante- and post-mortem obstruction
5. DROWNING (Submersio)
   - Obstruction of final respiratory ways with liquid
     1. phase: entry of liquid - breath holding
     2. phase: involuntary inspiration, gasping for air
     3. phase: loss of consciousness, death
   - mechanism: combination of asphyxia, reflectory and circulatory events

Division:
- Apparently (indirect) – some other event before
- Dry – loss of consciousness doe to max. Use of oxygen sudden laryngeal spasm (vagal reflex)
- In fresh-water– haemodilution
- In seawater– haemoconcentration
- Near drowning – after reanimation
- Reflexes¸

Submersion during the live / post-mortem

Characteristics:
- froth (edema spumosum), congestion of the face, reddish livor mortis
- "goose flesh" (cutis anserina – spasm of the erector pilae muscles; 3-4 h), "washerwoman" palms (few h – 2-3 d.),
- peeling of skin(2-3 w.), algae adherent (7-10 d.), saponification (6 w. – 12 m.)
- unicellular algae - diatoms, physical-chemical analyses, x-ray examination

B. STRANGULATION

Form of asphyxia characterized by closure of the blood vessels and air passages of the neck as a result of external pressure

1. MANUAL S. /throttling/ (Strangulatio colli manualis)
   - External/internal findings (abrasions, bruises, severe cyanosis, fractures of the hyoid bone or thyroid cartilage)
   - Unintentional: caused by vasovagal reaction (reflex cardiac death) brought on by touching, grasping or striking the neck
   - Almost all homicide, accident possible, suicide impossible
2. LIGATURE S. /strangling/ (Strangulatio colli funalis)
   - the pressure of the neck is applied by a constricting band that is tightened by a force other than the body weight
   - characteristic: ligature mark (! pseudo-ligature marks in infants, elderly, decomposed bodies)
   - internal findings: exception rather than a rule (hematomas, fractures)

- most often homicide; suicide and accident are rare (characteristics of knot / wrapping a ligature around the neck)

3. HANGING (Suspensio)
   - secondary to compression or constriction of the neck by a noose or other constricting band tightened by the weight of the body
   - characteristic: ligature mark (sulcus strangulationis, noose: arch, shanks, knot
   - typical - atypical
   - complete - incomplete
   - mechanism of death (vasovagal, compression of vessels, obstruction of the airway, fracture of upper cervical vertebrae)
   - most often suicide
4. PRESSURE ON THE CHEST /traumatic asphyxia/ (Compressio thoracis)
   - respiratory movements are impossible
   - combination with compression of upper abdomen / neck
   - weight of 40-50 Kg for normally developed adult
   - most often accident

REST

- Resuscitative injuries (secondary to intubation)
- Positional asphyxia (associated with alcohol or drug intoxication)
- Riot-crush (compression of the chest)
- Combinations: compression of he chest + smothering (children, burking)
- Autoerotic death
- Crucifixion
- Upside-down suspension
- Deaths from choke or carotid holds (by LEA)