

# Department of Forensic Medicine, University of Dundee

## Lecture Notes

### Asphyxial Deaths

[Stages of Asphyxia](#) & [Mechanism of Death](#)  
[Pathological Signs](#)

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Asphyxia derives from Greek, meaning “*absence of pulsation*”.

Forensic use means “*Interference with oxygenation*”. Interference can be anywhere from environment down to cellular level..

- Environmental
  - Obstruction of External respiratory passages –mouth & nose
  - Obstruction of Internal respiratory passages --pharynx, larynx, trachea, bronchi
  - Restriction of resp. movements
  - Lung disease
  - Heart disease
  - Oxygen transport (Hb, tissue utilisation)
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### ***ASPHYXIAL DEATHS***

Used loosely, lack of oxygen as mechanism of death.

### ***SEVEN MAJOR TYPES OF "MECHANICAL" ASPHYXIA***

1. [Environmental](#)
2. [Suffocation](#)
3. [Traumatic or crush asphyxia](#)
4. [Choking](#)
5. [Strangulation](#)
6. [Hanging](#)

7. [Inhalation](#)

***STAGES OF ASPHYXIA***

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

***MECHANISM OF DEATH***

- Complex
- Oxygen deprivation
- Carbon dioxide accumulation
- Reduced blood flow to brain (neck pressure)
- Vagal inhibition (classic defence).

***PATHOLOGICAL CHANGES***

1. General - cyanosis, congestion, petechial haemorrhages, oedema.
2. Specific - reflects type of mechanical asphyxia.

***GENERAL SIGNS***

1. Cyanosis - plum colour
2. Congestion - face
3. Petechial haemorrhages
  - pinpoint (less than 1 mm)
  - eyelids, conjunctivae, lips, ears, face, neck, upper chest
  - distribution of diagnostic importance
  - post mortem petechial haemorrhages in livid areas
4. Oedema - face, tongue, larynx.

***INJURIES TO THE LARYNX***

1. *Hyoid bone*
  - horseshoe shaped, curve to the front - greater horns fractured by squeezing or downward traction.
2. *Thyroid cartilage*
  - Adam's apple

- two plates, midline ridge, notch
- superior horns fractured by squeezing
- 3. *Cricoid cartilage*
  - signet ring shaped
  - fracture uncommon, direct blow
- 4. *Carotid artery*
  - main blood supply to brain
  - divides adjacent to superior horn of thyroid cartilage
  - sudden loss of consciousness
- 5. *Vagus nerve*
  - alongside carotid artery
  - innervates heart
  - sudden death from reflex vagal inhibition

### ***1. ENVIRONMENTAL ASPHYXIATION***

- Low or no atmospheric oxygen
- Ships' holds, scuba diving, surgical anaesthesia, disused refrigerators
- Toxicological studies no value
- Circumstances of death.

### ***3. SUFFOCATION***

“Suffocation” is often used as a general term for deprivation of O<sub>2</sub>, due to lack of it in the environment or external obstruction of airways

- Obstruction of nose and mouth
- Homicidal, soft smothering
- "Overlying"
- Plastic bags, suicidal or accidental
- Difficult diagnosis; history and scene.

### ***3. TRAUMATIC OR CRUSH ASPHYXIA***

- Pressure fixation of chest wall and abdomen
- Trench collapse, pinned under vehicle, crowd collapse
- Florid asphyxial signs
- "Pressing", "burking".

### ***4. CHOKING***

- Obstruction of upper airway or glottis
- Gag, homicide, rarely suicide
- Accidental in elderly, mental defectives, children

- "Cafe Coronary".
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## **5. STRANGULATION**

- Airway obstruction at larynx from hand pressure or hand held ligature.

### **(i) STRANGULATION BY LIGATURE**

- Tied, held, removed; sexual assault
- Horizontal groove, uniform depth, imprint abrasion
- Bruises, abrasions
- Neck muscle haemorrhages, thyroid fractures
- Suicide uncommon, accident occasional

### **(ii) MANUAL STRANGULATION (THROTTLING)**

- Different grips, different patterns
  - Finger pad bruises, crescent abrasions
  - Neck muscle haemorrhages, hyoid and thyroid fractures
  - Mugging, sleeper hold
  - Grip for half a minute.
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## **6. HANGING**

- Body partly/completely suspended by ligature around neck
- Brown leathery ligature furrow, imprint abrasion
- Fixed noose - inverted V-shape, knot mark
- Running noose - horizontal
- Low suspension point - groove less marked, lower, horizontal
- Typically no classic asphyxial features
- Scene shows preparation and precautions.

### **SEXUAL ASPHYXIAS**

- Accidental hangings, failure of safety mechanisms
  - Male, transvestism or nudity, masochism, pornographic material
  - Scene is diagnostic.
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## **7. INHALATION**

- Foreign bodies or vomitus, airways below larynx
- Children, accidental
- Gastric contents, contentious

- See [drowning](#)
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## **8. POSITIONAL ASPHYXIA**

- Bodily position which obstructs airway or impairs act of breathing  
Typically ass. with sedative intoxication  
Usually accidental (alcoholics)
  
- Restraint asphyxia is a variant in which chest, diaphragm & accessory muscles are impaired by the act of physical restraint  
Typically ass. with stimulant intoxication  
Common in psychiatric & custody situations

Reference: A. Morrison & D.Sadler. Death of a Psychiatric Patient During Physical Restraint. Excited Delirium – A Case Report. *Medicine, Science & the Law* 2001. 41 (1): 46-50