

Asphyxia -2

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Objectives

- At the end of the lecture the students should be able to:
 - Know the autopsy diagnosis and the mechanism of death in choking
 - List the different forms of application of pressure on the neck
 - Know the mechanism of death in neck compression
 - Know the pathology of neck compression in common and specific to different modes of neck compression.
 - Know the circumstances specific to different modes of neck compression
 - Know the mechanisms of death and autopsy findings of hanging



Choking

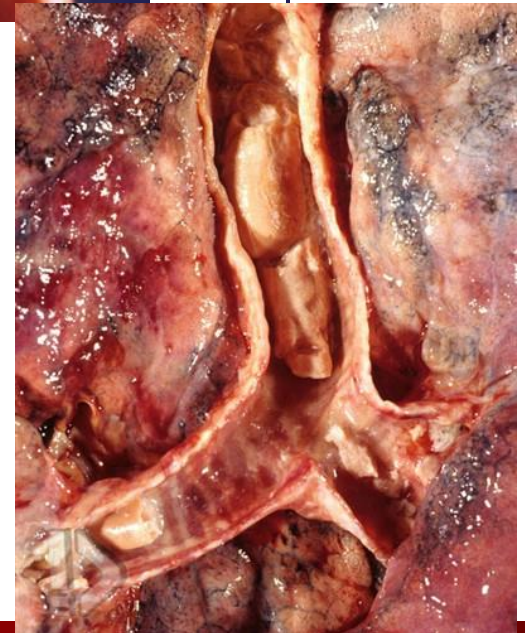
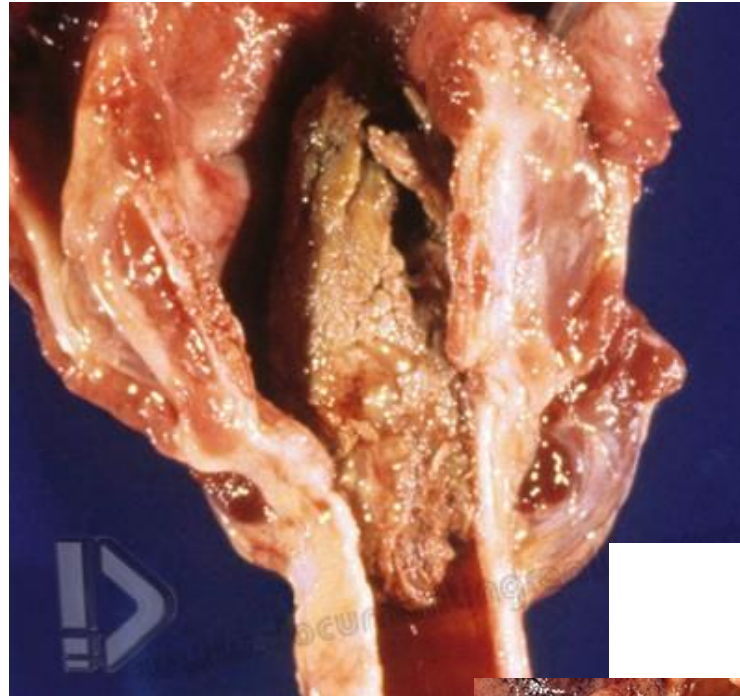
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Choking

- Blockage of the internal airways, usually between the pharynx and the bifurcation of trachea.



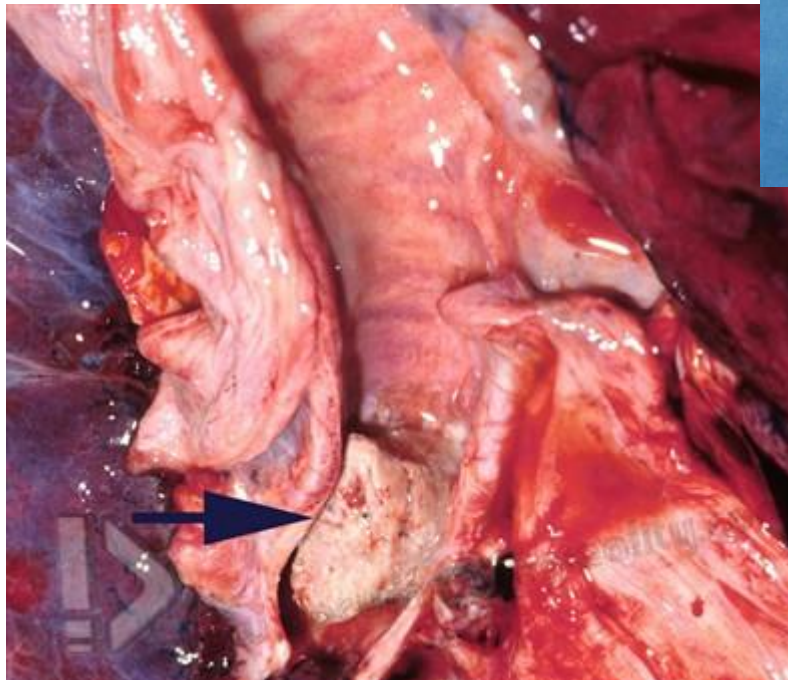
Choking

- Mechanism of death
 - pure asphyxia including or
 - as a result of neurogenic cardiac arrest before any possible hypoxic manifestations.
- If hypoxia, with struggle to breath -may see congestion and perhaps petechiae.



Choking

- Almost invariably associated with:
 - a predisposing impaired swallowing
 - and a bolus of incompletely masticated food.
- Could be due to foreign bodies, dentures and blood clots



PREDISPOSING CONDITIONS

- ethanol intoxication
- neurological conditions
- poor dental hygiene
- rapid and poorly controlled ingestion
- Manner usually accidental



autopsy diagnosis

- History of death while eating- important indicator
- Discrete piece of material- firmly wedged



DIFFICULTIES IN DIAGNOSIS

- Resuscitation and removal/further displacement of the bolus
- Postmortem transfer of gastric contents
- Smell of acid and pH -important in distinguishing PM aspiration



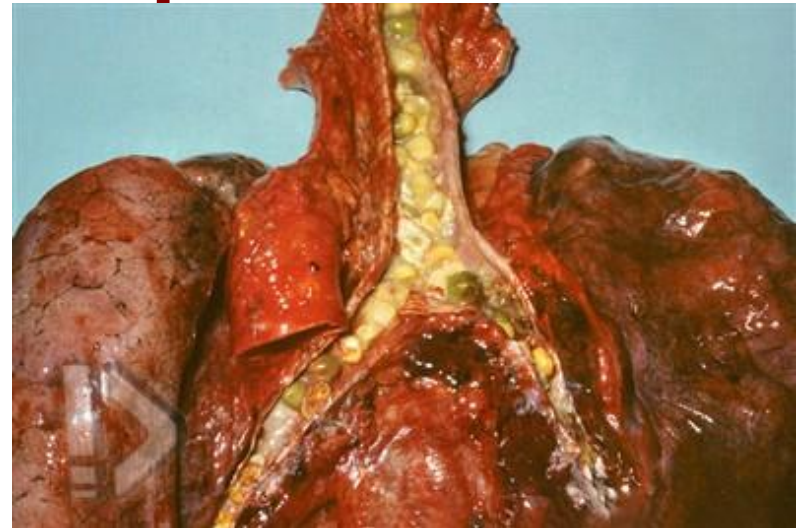
Gastric contents in the air passage

- Not as significant as finding fresh food
- Could be agonal postmortem spillage.
- No way of distinguishing agonal or early postmortem overspill
- To conclude aspiration as a COD-
 - reliable eye witnesses during life
 - histological finding of advanced vital reaction (Not seen soon)



incidents where a firm opinion can be given

- Undoubtedly drunken person
- Found dead with a massive blockage of air passage by gastric contents
- Other evidence of external vomit in clothing and surrounding
- No other cause of death at autopsy



Fatal pressure on the neck

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different forms of application of pressure

- Hanging
- Ligature strangulation
- Manual strangulation
- Arm locks
- Entanglement with cords
- Direct compression by objects or foot



Post mortem diagnosis of neck compression

- The injuries reflect:
 - **nature of the compressive force**
 - **physical effects of compression**
- Difficulties
 - Missing cases with minimal pathology
 - Postmortem artifacts can mimic internal injuries
 - Wrong interpretation of findings



Mechanism of death in neck compression

- **Airway occlusion**
 - closure of the pharynx by the root of the tongue.
 - direct compression of the larynx or trachea
- **Occlusion of the neck veins**
 - responsible for appearance of 'classic signs of asphyxia': congestion, cyanosis, oedema and petechial haemorrhages
- **Compression of the carotid arteries**
 - Less common
- **Nerve effects**
 - Controversial not based on scientific evidence.
- **Combined mechanism**
 - More likely than individual mechanisms



Pathology of neck compression

- There are 5 characteristics
- However there are pitfalls associated



5 characteristics

- Ocular petechiae
 - Due to increased venous pressure
- Injuries on the skin of the anterior neck
 - Helpful in determining the nature of the neck compression.
 - Has to exclude hypostatic haemorrhages and neck folds.
- Injuries to the strap muscles and soft tissues of the neck
 - Has to exclude hypostatic haemorrhages



5 characteristics

- Injuries on hyoid larynx complex
 - Presence of fractures is a good evidence of neck compression.
 - Superior horn of the thyroid cartilage) is more often fractured than hyoid.
- Miscellaneous
 - Intimal tears of carotid arteries



Postmortem examination in neck compression

- a special layered anterior neck dissection
- under an avascular field.
 - (After opening and evisceration of thoracic and abdominal organs and brain is completed)



Steps in neck dissection

- Continue the scalp incision as a “V” or “U” incision to the neck
- Reflect the skin flap upwards on the neck
- Reflect the muscle layers (sternocleidomastoids, sterno-hyoids, sterno-thyroids, crico-thyroids, and thyro-hyoids)
- Examine the thyroid gland
- Examine the thyroid cartilage and hyoid bones for fractures
- Take the neck organs out and open the larynx and trachea on the cutting board

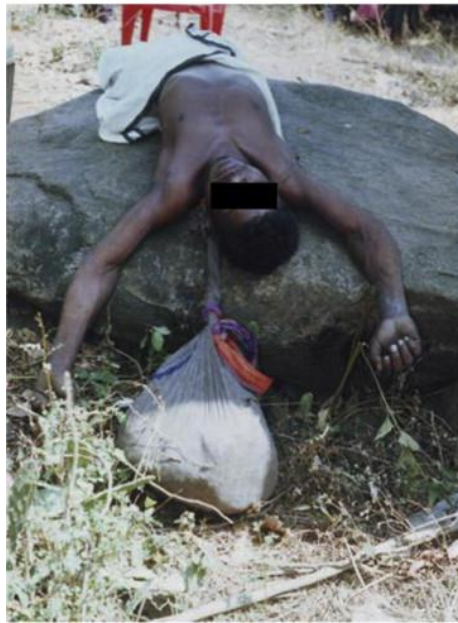


Hanging

- Ligature compression of the neck with/accompanied by suspension of the body
- Pressure is caused by gravitational tension on the cord (body weight whole or part in partial suspension)
- Pathology is based on:
 - Nature of the ligature
 - Degree of suspension
 - Relative position of the ligature
 - Physical arrangement of the body and ligature



self suspension of a weight



Circumstances of hanging

- Commonly suicidal with some accidents.
- Accidental hanging can occur from entanglement in ropes or cords (Infants) or associated with sexual asphyxia.
- Homicidal hanging is rare and associated with incapacitation



Autopsy findings

History and scene visit

- Degree of suspension (partial/complete)
- Point of suspension
- Evidence of support.
- Evidence of disturbance/violence
- Distribution of hypostasis
- Look for suicide notes.
- Don't undo the knot until the postmortem is carried out



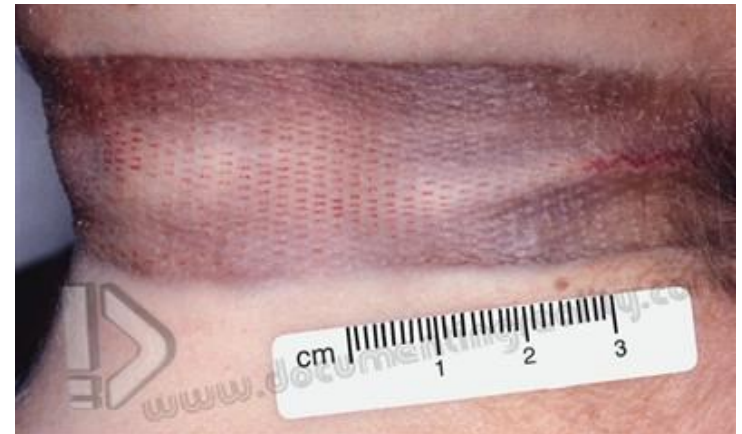
External examination

- **Neck markings** Depend on the :
 - noose used
 - Soft nooses - minimal markings.
 - A hard noose -very deep, distinct groove
 - Duration of suspension
 - If longer – deeper groove.



Neck marking

- pronounced pattern in the cord-
Imprint on the neck
- Postmortem changes
 - The mark may be abraded, brown and dried to a parchment like consistency after death



Neck marking

- There may be a narrow red zone around the mark
 - due to lateral displacement of blood.
- Mark may be slightly wider, narrower or of same width as the ligature.



Position of the mark:

- higher on the neck directly under the chin anteriorly, passing around and beneath the mandible.



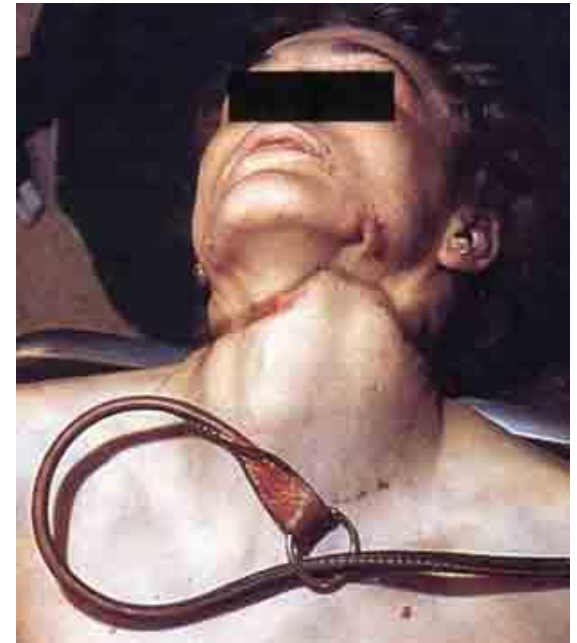
POSITION OF THE MARK

- an inverted V pattern
-rises up to a gap at the sides or back of the neck.
- The gap indicates the point of suspension
- The groove is deepest at the side diametrically opposite the suspension point



Exceptions

- If a ligature slips
 - there may be two furrows
- If the point of suspension from front
 - -an inverted V pattern –in front
- If a slip knot is used:
 - get tighten around the neck
 - may completely encircle
 - may be more horizontal
- If the suspension point is lower:
 - mark horizontal
 - at a lower level



Other findings

- **Postmortem hypostasis**
 - Legs and hands-if the body is in a vertical
 - If the body had been lying horizontal position for a considerable time
 - either hypostasis of both back and lower limbs or only at the back.
- **Petechial haemorrhages**
 - Exception rather than a rule
 - Seen in partial suspension
- **Facial color changes:**
 - Face is usually pale
 - Tongue may be dark purple and protract from the mouth.
- **Can have scratch abrasions rarely-**
 - due to victim trying to loosen the ligature at the last moment
- **Examine the ligature**
 - The ligature should be examined and documented



Internal examination

- Surprisingly little
- Soft tissue haemorrhages (in 20-30% -associated with ligature mark)
- Laryngeal fractures
 - in 35-45% and are directly beneath
 - thyroid superior horns and hyoid
- In long drop
 - fracture of upper cervical vertebra



Ancillary testing

- **Toxicological study:**
 - Usually not done
 - If homicide is suspected must do



Mechanism of death

- Reflex cardiac arrest from pressure on the carotids.
- Airway obstruction due to:
 - lifting of the larynx pushing the base of the tongue
 - direct crushing of larynx or trachea
- Venous occlusion
- Occlusion of the carotids
- Spinal cord-brainstem disruption



Sexual asphyxia /autoerotic or masochistic practice

- Production of cerebral hypoxia
 - hallucinations of erotic nature
- often achieved by constriction of neck by a ligature



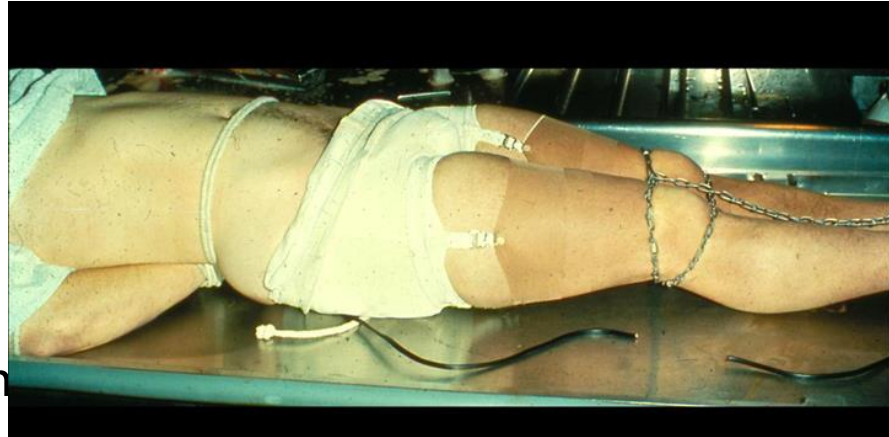
Constriction is caused by

- There is a mechanism to cause constriction, once cerebral hypoxia occurs loses voluntary control allowing the device to loosen resulting in recovery.
- If the mechanism fails to loosen- death



Findings

- Commonly men.
- Young to middle aged
- Secured scene ; locked with
- Bondage is common:
- There may be masks and gags in order to restraint



Findings

- Transvestism ; female attire under male clothing,
- Fetishism ; rubber, shiny plastic/leather
- In front of mirror
- **No** suicide notes



Findings

- Pornographic literature
- Rope may be padded to avoid telltale marks
- There may be scars on the neck from previous attempts



SUMMARY

- Fatal pressure on the neck could be applied in many ways.
- Occlusions to the airway, vasculature, and neurological effects in isolation or in combination are identified as mechanisms of death in pressure on the neck.
- There are 5 characteristic pathologies associated with neck compression in common.
- There are specific features which are helpful in distinguishing the mode of application of pressure.
- Incidents could be homicidal, accidental or suicidal.



