

## FORENSIC MEDICINE

Notes compiled by PJ Louw for LLB from the UNISA Study Guide & other material. Whilst care has been taken to ensure accuracy you are advised to also verify facts independently.

### TRAUMA

**DEF** → **TRAUMA** can be defined as a wound / injury to body as result of violence / force applied

### TRAUMA / VIOLENCE can be classified as follows -

#### PHYSICAL TRAUMA

##### » Mechanical trauma

##### ○ Blunt force

(Contusion / Abrasion / Laceration)

##### ○ Sharp force

(Incised wounds / Stab- or Penetrating incised wounds)

##### » Thermal factors

○ Heat      or      ○ Cold

##### » Electrical trauma

##### » Radiation-associated trauma

» **Barotrauma:** injury caused by a change in air pressure, affecting the ear or the lung.

##### » Ultrasound

#### CHEMICAL TRAUMA

##### » Acid or alkali

##### » Poisoning

### **MECHANICAL TRAUMA = Effective wounding / Injury Force**

**Effective amount of force resulting in a wound & will determine its extent & appearance -**

- 1) Amount of energy transferred to tissue → movement of body in relation to kinetic energy of object
- 2) Duration of application of force → is effective force that can cause trauma
- 3) Surface of application of force → energy loss over larger surface area → energy per surface area much higher in case of knife tip compared with larger flat surface of plank

- 4) **Behaviour of object when body is hit** → Object disintegrates at moment of impact  
→ less energy available to cause injury
- 5) **Biomechanical features of tissue** → Degree of resistance to injury by skin varies  
→ Bone / liver do NOT have same degree of elasticity as palm of hands → Fatty tissue bruises easily
- 6) **Protective material** → Helmet / thick leather clothes / thick hair covering scalp will diminish trauma

(9) **Factors which may influence APPEARANCE of SKIN WOUND caused by MECHANICAL TRAUMA**

**APPEARANCE of WOUND** - determined by number of factors -

- 1) **Effective wounding / injury force** → caused by **effective energy transferred** to tissue
- 2) **Age of a wound** → Certain **changes occur after time** (Colour changes / Swelling)
- 3) **Therapeutic interventions** → **Suture** material & other interventions change appearance of wound
- 4) **Complications** → **Inflammation** process can change appearance of small wound dramatically

(30) **Discuss skin wounds inflicted by application of blunt force to body, incl. discussion of distinction of some wounds from other types of wounds & processes such as hypostatic discolouration of skin**

(7) **Classify wounds caused by MECHANICAL TRAUMA applied to the skin & body**

**CLASSIFICATION of MECHANICAL TRAUMA**

**Mechanical trauma / Violence**

- » can be applied over **large surface area** (blunt trauma / violence)
- » can be applied over **smaller area** (sharp trauma / violence)

**BLUNT FORCE / TRAUMA** – Force applied over LARGER surface area

Also sequence in which these wounds appear as violence increases

**A) BLUNT FORCE / TRAUMA** **First wound** → **CONTUSIONS** (bruises)

- » **Blood vessels in subcutaneous region of soft tissue tear** with subsequent extravasation of red blood cells

**EXTENT of contusion influenced by number of factors -**

- 1) **Anatomical structure of tissue** → Skin well supported by underlying tissue - only limited space exists in which red blood cells can accumulate outside blood vessels (extravasation)
- 2) **Age of individual** → Elderly people - blood vessels very fragile / Babies - high percentage fatty tissue which offer little support for smaller blood vessels → more prone to bruising
- 3) **Medical conditions & drugs** → Warfarin -dilutes blood) -bleed more readily - increases extent of contusion
- 4) **Skin colour** → Contusions less visible in person with dark complexion
- 5) **Age of contusions:** → Contusions develop over period of time → Important in cases of alleged assault to re-examine living victim again - contusions more visible
  - » Assumed → **CONTUSION** with **no colour changes** is **less than 2 days old** - **except** in elderly → important to determine whether all contusions are more or less of same age

**CHARACTERISTIC CONTUSIONS** which can be of assistance in post-mortem examination -

- 1) **Impression contusion** → Shape of object which caused contusion visible (buckle / motor vehicle tyre)
- 2) **Tramline contusions** → Typically caused by cane - During contact of cane with body - skin & tissue in central aspect are compressed, while degree of stretching occurs at

border region where blood vessels can tear resulting in 2 parallel red lines with white area in-between

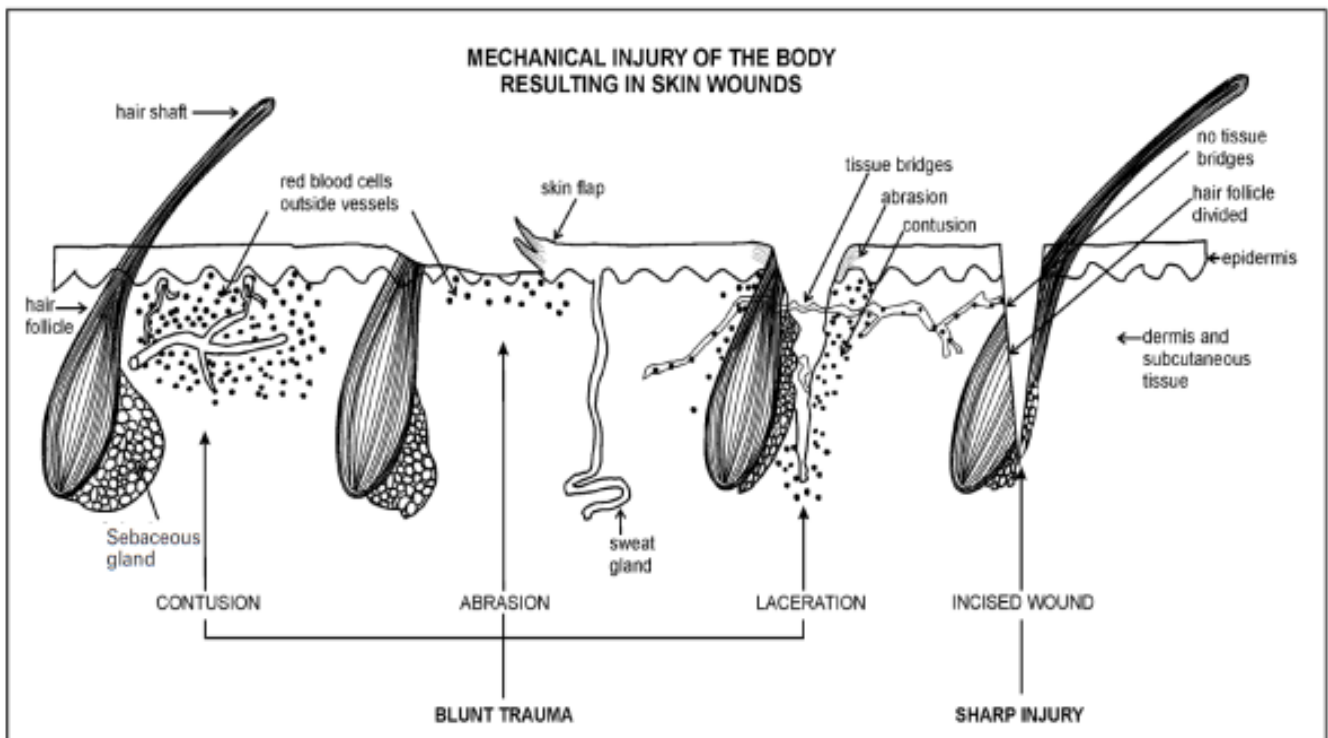
- 3) **Abrasion by fingers /-tips** →limbs of abused child / thighs of rape victim / neck of strangulation victim
- 4) **Contusions caused by teeth** →pattern left by teeth - assists - identifying alleged assailant
- 5) **Contusions due to resuscitation** →Substantial force exerted during cardiac massage - can result in contusion of breast bone & fractures

**B) BLUNT FORCE / TRAUMA - With more violence →ABRASIONS**

» **Partial or complete loss of epidermis after violence**

- » If **full thickness of epidermis** is lost →blood vessels in underlying **tissue exposed** & wound will **bleed**
- » To determine direction of force →**small heaped-up skin** fragments present in **direction** which the force was applied

**TYPES of ABRASION -**



- 1) **Brush abrasions / grazes** →due to rough surface force applied horizontally to skin (grass burn)

- 2) **Impression abrasions** → similar to impression contusions BUT **amount of force is greater** (Safety belt)
- 3) **Scratch wounds** → force applied linearly to skin (fingernail) - assaults / strangulation with hands
- 4) **Localised friction abrasions** → force applied linearly to skin over localised area - energy loss per surface area unit very high (whip)(**wound on neck of hanging victim** after removal of rope)
- » **Ante-mortem\* abrasions** - covered by scab (\*before death - healing shown).
  - » **Peri-mortem\* abrasions** – looks dry & leathery (\*near the time of death - no healing)
  - » **Post-mortem abrasions** - are yellow & transparent with NO sign of tissue response
  - » **Bite marks made by ants** can also look like small abrasions

**C) BLUNT FORCE / TRAUMA - With even more violence → LACERATION**

» **Severe amount of force** cause epidermis & underlying subcutaneous tissue to tear

- » Lacerated wound always surrounded by whole spectrum of injuries made by blunt force
- » Lacerated wounds develop at site where force is maximum
  - laceration surrounded by abrasion
  - abrasion further surrounded contusion

**(6) DIFFERENCES in appearance between INCISED WOUNDS & LACERATIONS**

INCISED WOUNDS	LACERATED WOUNDS
EDGES sharply outlined & smooth	EDGES irregular & ragged
STRUCTURES in wound line transected	STRUCTURES visible - Tissue bridges / blood vessels / nerve
FOREIGN MATERIAL in wound - NONE	FOREIGN MATERIAL in wound - SOMETIMES

WOUND MARGIN –shows NO injury / hair loss	WOUND MARGIN -shows surrounding abrasion & contusion with loss of hair around wound
<b>TYPICAL LACERATED WOUNDS</b>	

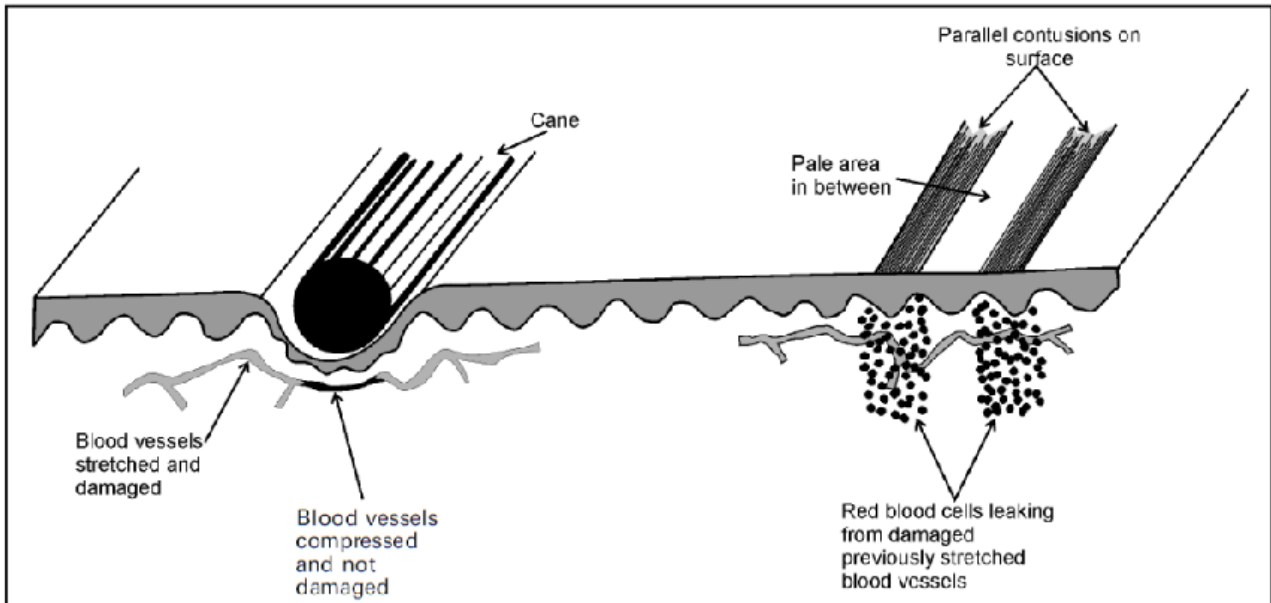


Fig 5.2. Tramline contusions

- 1) **Split wounds** → skin trapped between 2 hard objects (hard object & underlying skull)
  - o Surrounding abrasion & contusion minimal - sometimes loss of hair surrounding wound due to abrasion
- 2) **Hook lacerations** → sharp object tears skin/underlying tissue (linear or angled flap) (Animal bite wounds)
- 3) **Subcutaneous tissue lacerations & degloving injuries** → skin & soft tissue pulled from body like glove
- 4) **Blunt penetration wounds** → lacerated wound on surface with wound tract extending into underlying tissue (garden forks / bicycle spokes / screw drivers)

### **SHARP FORCE / TRAUMA / INJURIES**

- » Force concentrated on VERY SMALL surface area (knife)

### **SHARP FORCE / TRAUMA / INJURIES –**

- » **STRUCTURES** in wound line **TRANSECTED** (Tissue bridges / blood vessels / nerve)
- » If **underlying bone** is involved → will be marks on surface of bone (Seen with **panga injuries** to head)

**A) INCISED WOUNDS** » NOT DEEP BUT LONG WITH **NO** WOUND TRACK

- o **LOCATION** can give indication of circumstances in which wounds occurred
- o **TENTATIVE WOUNDS**
  - over front of arms & wrist often seen in **suicide** cases
  - over back of forearms often occur when victim tries to **defend** himself

**B) STAB- / PENETRATING INCISED WOUNDS**

» DEEP BUT NOT LONG **WITH** WOUND TRACK

**Stab wound has certain features**

- 1) **Skin wound** looks like incised wound
- 2) Depending on type of blade → both corners of wound can be sharp → one can be blunt & other sharp
- 3) **Branching out of wound** → happens when position of blade is changed while knife is still in body
- 4) If whole blade penetrated body → abrasion & contusion present on skin where hilt of knife hit body
- 5) **Length of wound tract** → NOT necessarily indication of length of blade
- 6) **Important to describe direction of wound tract** & direction of stab wound
- 7) Important to indicate whether any structures (arteries) are involved in wound tract
- 8) Tip of weapon sometimes found deep in wound

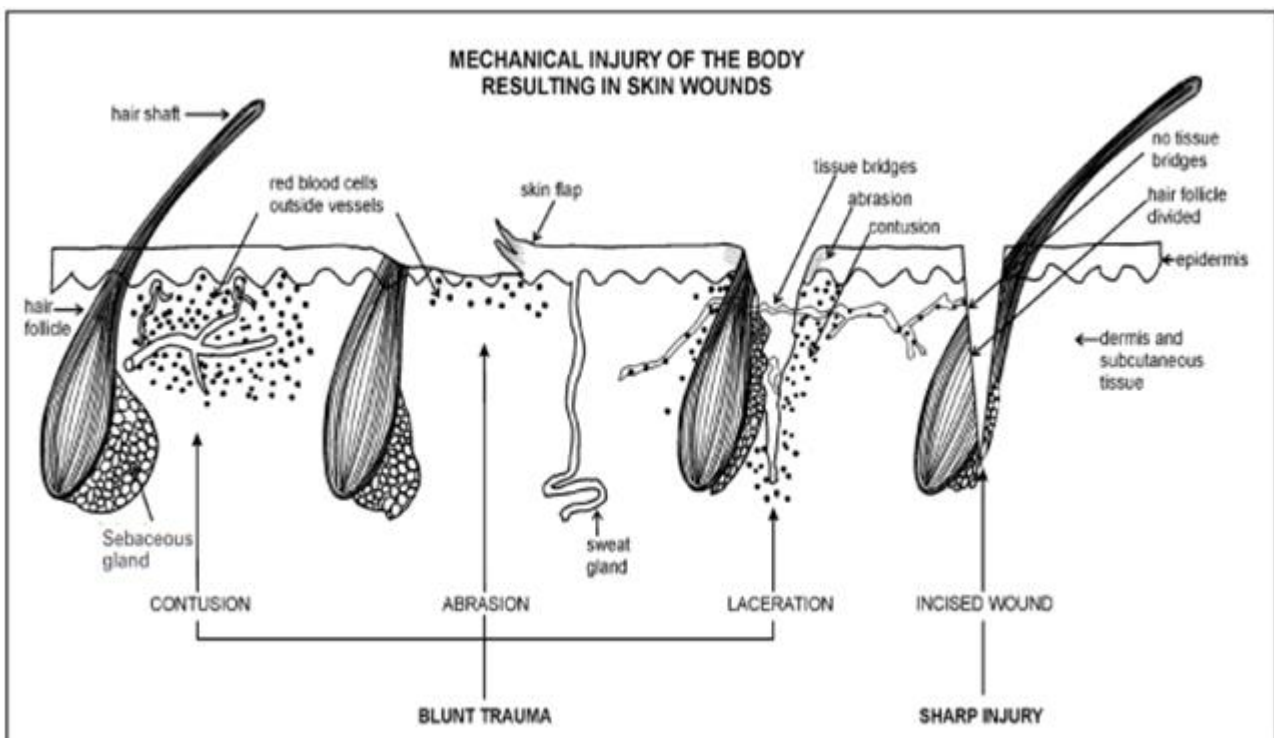
Person presents with linear wound to head - alleges to be hit with panga - also evidence of being hit on head with hard piece of wood (plank). **How will you differentiate between these 2 wounds? Plank vs Panga?**

## PLANK

- Blow with **hard object over head** tends to cause **skin splitting** - occurs because skin is caught between hard object on 1 side & skull bone on other
- Detailed **examination will show features of lacerated wound** – (NOT necessarily prominent) with **thin margin of abrasion & contusion surrounding wound** with **tissue bridges** in wound
- With **abrasion** there could also be **loss of hair** surrounding wound

## PANGA

- EDGES sharply outlined & smooth
- STRUCTURES in wound line transected
- FOREIGN MATERIAL in wound -
- NONE WOUND MARGIN –shows NO injury / hair loss



Trial victim elderly murdered female. Post-mortem report states numerous **bruises/contusions** present over **chest** & also **fractures of ribs & sternum**. **Fractures surrounded by fresh haemorrhages**.



Defence alleges that injuries were caused by attempts at resuscitation by assailant & not by assault itself. How can pathologist refute this allegation?

- When injuries occur while person is **still alive** - effective blood circulation present (**blood will leak from damaged vessels** as well as from **fractures** due to haemorrhaging into soft tissue)
- If resuscitation **unsuccessful** - blood circulation not reinstated - minimal leakage of blood from damaged vessels or fractures will occur - **post-mortem fractures will be without surrounding haemorrhage**
- If resuscitation **successful** - wounds will have appearance of contusions & fractures as seen in living person
- **In this specific case** - **resuscitation was unsuccessful** & contusions or fracture-associated haemorrhages are therefore not expected → **Statement most probably incorrect**

**Infarction:** obstruction of the blood supply to an organ or region of tissue, typically by a thrombus or embolus, causing local death of the tissue.

**Victim died of STAB WOUND. Discuss most important features regarding this wound in post-mortem report?**

**IMPORTANT to describe wounds in detail**

- (i) **photos** of wounds should be included
- (ii) **sketches** important - to be included
- (iii) **colour chart** to judge colour changes objectively

**Following must be indicated -**

- 1) **Number** of wounds
  - 2) **Time wound was inflicted** → assumed wounds occurred ante mortem
  - 3) **Precise location of every wound** → measured from fixed reference points
- \*\* Wounds always described with body in upright position with hand palms forward

- \*\* Wound tract NOT necessarily represent position of body at time of stabbing / bullet hit
- 4) **Shape of every wound** → abrasion / accumulation of skin on side / corners of stab wounds
  - 5) **Size of wound** → Abrasions & contusions have 2 dimensions – LENGTH & DEPTH  
→ Lacerated wounds + incised wounds have 1 dimension - LENGTH  
→ Stab wounds have DEPTH measurement
  - 6) **Any additional wounds** → abrasions or contusions surrounding laceration wound
  - 7) **Estimated age of wound** → whether wound fresh or whether it shows signs of healing
  - 8) **Any signs of complications** → inflammation / abscess formation
  - 9) **Any signs of medical treatment** → sutures

#### In case of a stab wound -

- **Direction of wound tract** + depth + any important structures involved, must be mentioned
- **Additional factors** of importance mentioned → i.e presence of **foreign material in wound**
- **NB examine entire body** + concealed areas → pathologists to indicate sections examined

#### **COMPLICATIONS of TRAUMA**

- » **2 Most important GENERAL COMPLICATIONS are shock & infection**

#### **CLASSIFICATION of SHOCK**

- (5) **DIFFERENT TYPES of SHOCK from which person may suffer**

- 1) **Cardiogenic Shock** → heart cannot contract effectively

**Cardiogenic shock** is a state where the heart has been damaged to the point where it is unable to supply enough blood to the organs of the body.

As a result of the failure of the heart to pump enough nutrients to the body, blood pressure begins to fall and organs may begin to fail.

- 2) **Hypovolemic shock** → caused by severe blood loss / other body fluids (vehicle accident / stab wounds)

**Hypovolemic shock** is an emergency condition in which severe blood and fluid loss make the heart unable to pump enough blood to the body. This type of **shock** can cause many organs to stop working.

- 3) **Neurogenic shock** → seen in spinal cord injuries & sometimes during anaesthetic procedures

**Neurogenic shock** is a distributive type of **shock** resulting in low blood pressure, occasionally with a slowed heart rate, **that is attributed to the disruption of the autonomic pathways within the spinal cord.**

- 4) **Septic shock** → caused by micro-organisms (bacteria)

**Septic shock** is a serious condition that occurs when a body-wide infection leads to dangerously low blood pressure

- 5) **Anaphylactic shock** → caused by highly allergic reactions to substances (penicillin / bee venom)

**Anaphylactic shock** an extreme, often life-threatening allergic reaction to an antigen to which the body has become hypersensitive.

**Neurogenic shock** Loss of the normal tone of blood vessels can result in dilatation of the vascular bed, which then increases dramatically in volume. **The circulating blood volume is not sufficient to fill the dilated vascular bed.** This type of shock is seen in spinal cord injuries, and sometimes during anaesthetic procedures.

**EMBOLISM** - obstruction of an artery, typically by a clot of blood or an air

**bubble**

- EMBOLUS is a foreign substance which forms in, or enters blood circulation
- (thrombo-embolus / blood clot / air / gas / fat / amniotic fluid / bullet)

**THROMBO-EMBOLISM**

- » Blood clots / Tromboli
- » Develop in veins of lower legs / bedridden person post-operation / genetic predisposition
- » Obstruction of a blood vessel by a blood clot that has become dislodged from another site in the circulation

**Embolism:** obstruction of an artery, typically by a clot of blood or an air bubble.

**FAT EMBOLISM**

- » When fat cells / bone-marrow tissue enter into blood circulation
- » Conditions where fat cells enter VENOUS circulation & become trapped in capillary vessels of lung
- » A **fat embolism** is a type of embolism that is often caused by physical trauma such as fracture of long bones, soft tissue trauma, and burns.

**CAUSES of FAT EMBOLISM**

- 1) fractures of shaft of long bones (femur)
- 2) soft tissue injuries
- 3) burn wounds

**AIR (GAS) EMBOLISM**

- » presence of air in blood circulation
- » Forms in ARTERIAL (most common) &/or VENOUS system → moves through systemic blood vessels of brain or pulmonary (lung) vessels
- » An **air embolism**, or more generally **gas embolism**, is a pathological condition caused by a **gas** bubble, or bubbles, in a vascular system although an **embolism**

in a medical context refers to any large moving mass or defect in the blood stream.

**Embolism:** obstruction of an artery, typically by a clot of blood or an air bubble.

### **PULMONARY EMBOLISM**

**Pulmonary embolism** is the sudden blockage of a major blood vessel (artery) in the **lung**, usually by a blood clot . In most cases, the clots are small and are not deadly, but they can damage the **lung**. But if the clot is large and stops blood flow to the **lung**, it can be deadly..

### **VENOUS AIR EMBOLISM**

Venous air embolism (VAE), a subset of gas embolism, is an entity with the potential for severe morbidity and mortality. Venous air embolism is a predominantly iatrogenic complication that occurs when atmospheric gas is introduced into the systemic venous system.

### **ARTERIAL AIR EMBOLISM**

Arterial gas embolism is a potentially catastrophic event that occurs when gas bubbles enter or form in the arterial vasculature and occlude blood flow, causing organ ischemia. Arterial gas embolism can cause CNS ischemia with rapid loss of consciousness, other CNS manifestations, or both; it also may affect other organs. Diagnosis is clinical and may be corroborated by imaging tests. Treatment is immediate recompression.

### **SCENARIO**

(30) Person **stabbed in neck - blade enters chest cavity.** Victim collapses shortly afterwards & dies. Discuss possible mechanisms which could have caused death & also procedure to be followed at post-mortem to confirm/exclude possible causes

- 1) **Certain types of death**
  - (i) stab wound in neck

(ii) young female dies suddenly & unexpectedly (criminal abortion))

→ presence or absence of air embolism must be established

2) **Advisable to take X-rays** to detect air in heart & blood vessels

3) **Cerebral arteries** needs inspection for air bubbles

→ Air sucked into cerebral veins during removal of skull

4) **Majority deaths**

→ caused by **venous air embolism** BUT **arterial air embolism** to brain to be considered

**Scenario** typical of **VENOUS AIR EMBOLISM** (most common type of embolism)

6) **Stab wound** / incised wound inflicted to neck → which **opens & injures jugular vein(s)**

7) **Especially when person remains in upright position** → **air will go via jugular vein to heart**

8) Person in **upright position** → **wound higher than heart** - **air sucked into vessel during inspiration**

9) **Blade entering chest cavity** - damage to lung tissue - cause blood vessels to come into contact with air

**Also possible is ARTERIAL AIR EMBOLISM** – when air (sometimes fat) is sucked into vessel through **Venturi-effect** during stab wound to neck

11) **During post-mortem procedure**

→ **air often found in tissues surrounding defect** & can **appear swollen**

## SCENARIO

(12) **List CAUSES of VENOUS & ARTERIAL AIR EMBOLISM**

**CAUSES of VENOUS AIR EMBOLISM** (most common type)

1) **Penetration of jugular vein in neck**

→ (**stab wound**) -especially when **person remains in upright position**

2) **Neurosurgical procedures**

→ **surgery types** with **patient in upright position**

3) **Criminal abortions**

→ when **air enters blood vessels in placenta bed of uterus**

4) **Doctor-associated causes**

→ **intravenous lines** & includes **defective dialysis** equipment

### **CAUSES of ARTERIAL AIR EMBOLISM**

**Embolism:** obstruction of an artery, typically by a clot of blood or an air bubble.

1) **Barotrauma** \* injury caused by a change in air pressure, affecting - ear or the lung.

→ lungs lacerate - air move from alveolar spaces into lung blood vessels

→ explosions in confined spaces

→ diving accidents - diver surfaces without exhaling while surfacing

2) **Stab wounds in lung**

→ where lung tissue is damaged & blood vessels come into contact with air

3) **Stab wounds in neck**

→ air (sometimes fat) may be sucked into vessel through Venturi-effect

4) **Open heart surgery**

5) **Paradoxical air embolism**

→ new-born babies & adults

**paradoxical embolism** Synonym(s): **crossed embolism**

1. obstruction of a systemic artery by an embolus originating in the venous system that passes through a septal defect, patent foramen ovale, or other shunt to the arterial system;

2. obstruction by a minute embolism that passes through the pulmonary capillaries from the venous to the arterial system.

### **GENERAL PRINCIPLE**

## HEART

- **ARTERY** (*away from heart*) - carries blood (*oxygen-rich blood*)
- **VEIN** (*towards heart*) - carries blood (*oxygen-poor blood*)

## LUNGS

- **PULMONARY ARTERY** distributes *oxygen-poor blood* away from **HEART** to **LUNGS**
- **PULMONARY VEIN** brings *oxygen-rich blood* from **LUNGS** to **HEART**

## SCENARIO

**Scuba diver surfaces - coughs blood & dies. What condition will pathologist have to consider? What other complications may also be caused by mechanism?**

### Scenario of pulmonary barotrauma with rupture of lung tissue

- **Develops when scuba diver surfaces *without exhaling while surfacing* & causes **ARTERIAL AIR EMBOLISM****
- **Extra volume air not exhaled**
  - **pressure lacerate lungs - air move from alveolar spaces into lung vessels**
- **Explosions in enclosed spaces** may also result in pulmonary barotrauma

**Barotrauma** \* injury caused by a change in air pressure, affecting - ear or the lung.

Caisson disease / Decompression sickness ("the bends)

## DIVERSE CONDITIONS

- 1) Caisson disease / Decompression sickness ("the bends)
  - » Seen in divers
  - » nitrogen gases in blood come out of solution & form minute air bubbles when decompression is too rapid
- 2) Amniotic fluid embolism
  - » Dangerous (but rare) complication of pregnancy & labour



- » amniotic fluid enters maternal circulation via mechanism similar to air embolism.

**Embolism:** obstruction of an artery, typically by a clot of blood or an air bubble.

**Vena cava:** either of two large veins discharging blood into the right atrium of the heart, one (**superior vena cava or pre-cava**) conveying blood from the head, chest, and upper extremities and the other (**inferior vena cava or post-cava**) conveying blood from all parts below the diaphragm. **Superior vena cava:** a large vein carrying deoxygenated blood into the heart. There are two in humans, the *inferior vena cava* (carrying blood from the lower body) and the *superior vena cava* (carrying blood from the head, arms, and upper body).

## HEAD INJURIES

- **Brain enclosed in rigid cranial cavity**
- **Size increase** will have **detrimental effects** on brain tissue
- Brain tissue** will be **forced** from one region to another by **process of herniation**

## TYPES of HEAD INJURIES

- |  |   |
|--|---|
| 1) <b>Skin injuries</b>                      | → <b>blunt &amp; sharp injuries</b>   |
| 2) <b>Fractures</b>                          |   |
| 3) <b>Brain swelling</b>                     | → <b>increase in size of brain</b>  |
| 4) <b>Brain contusions &amp; lacerations</b> |   |
| 5) <b>Herniations</b>                        | → <b>increased intracranial pressure</b>  |
| 6) <b>Diffuse axonal injury (DIA)</b>        | → condition occurs at moment of impact (varies from <b>concussion to coma</b> ) |

**Diffuse axonal injury (DAI)** is a brain **injury** in which damage in the form of extensive lesions in white matter tracts occurs over a widespread area. **DAI** is one of the most common and devastating types of traumatic brain **injury**, and

is a major cause of unconsciousness and persistent vegetative state after head trauma.

- 7) **Traumatic intracranial haemorrhage** → **non missile injury – blow to head**  
– associated with fracture

**Intracranial bleeding** (IB) is a common and **serious consequence** of **traumatic brain injury** (TBI). Classified according to the location into: **epidural haemorrhage** (EDH) **subdural haemorrhage** (SDH) **intraparenchymal haemorrhage** (IPH) and **subarachnoid haemorrhage** (SAH). IB can develop or expand in the 48 hours after injury.

**Injury on impact (contusion)** → **immediate injury**

**Injury at later stage (internal bleeding)** → **delayed injury - complications of head injury**

**INTRACRANIAL INJURY occurs at moment of impact**

→ **only have effect later** (bleeding to become sufficient to have effect on brain volume)

## **TRAUMATIC INTRACRANIAL HAEMORRHAGE**

(15) **Discuss traumatic intracranial haemorrhages**

- 1) Often result of non-missile injury → such as a blow to the head
- 2) Most common cause of deterioration in patient after lucid (“awake”) period
- 3) More than 35 ml is sufficient volume to act as a space-occupying lesion
- 4) These haemorrhages → often associated with fracture(s)
- 5) Often more than 1 type of haemorrhage
- 6) Of primary origin BUT often presents as complication (secondary phenomenon)

## **CLASSIFICATION OF TRAUMATIC INTRACRANIAL HAEMORRHAGE**

(6) **List different types of intracranial haemorrhages**

- 1) **Extra(epi)dural haemorrhage** → Fracture associated (Visible / Fast developing)

- 2) **Subdural haemorrhage** → condition often found in alcoholics with brain atrophy  
 (Slow developing) → shaking of baby as seen in cases of child abuse  
 → venous in origin  
 → take time to develop
- 3) **Sub-arachnoidal haemorrhage** (also seen with **rupture of berry aneurysm**)
- 4) **Intracerebral haemorrhage**
- 5) **Intraventricular haemorrhage**

### **SPONTANEOUS CAUSES OF HAEMORRHAGES**

- 1) **Hypertensive haemorrhages**
- 2) **Berry Aneurysm** → weakened arterial wall balloons - rupture spontaneously
- 3) **Stroke** → Arteries in brain undergo degenerative changes causing rupture

**SCENARIO:** Alcoholic falls & hits head while under influence of alcohol - admitted to local hospital. Discuss possible head injuries caused by such a fall + problems which may confront doctor in diagnosing condition

#### **HEAD RECEIVES BLOW**

- Force of blow may injure cause bruises in & beneath scalp + fracture skull
- Special investigations, such as a CT-scan, will be required to diagnose
- Many actions for negligence have arisen from failure to view head injuries with sufficient concern

#### **HOSPITAL PRACTICE**

- 1 of most important facts to be determined - whether patient was unconscious for any period of time – such patient to be admitted for at least 24 hours to allow observation of symptoms & signs of latent condition such as sub- or extradural

haemorrhage

## PRESENCE OF ALCOHOL

- Doctor often confronted with FACT that patient is under influence of alcohol - difficult to differentiate findings due to alcohol intoxication from possible head injury
- Effects of alcoholic intoxication - closely resemble POST-CONCUSSIONAL STATE & cannot be easily differentiated – therefore patient must be kept under observation
- Often a **higher incidence** of SUBDURAL HAEMORRHAGES in ALCOHOLICS - due to presence of **brain atrophy** & result in **increased mobility of brain in skull** - results in **rupture of bridging veins**
- Individual can be discharged only if placed in care of responsible & informed person

## PRESENCE OF FRACTURE OF SKULL

### WITHOUT FRACTURING SKULL

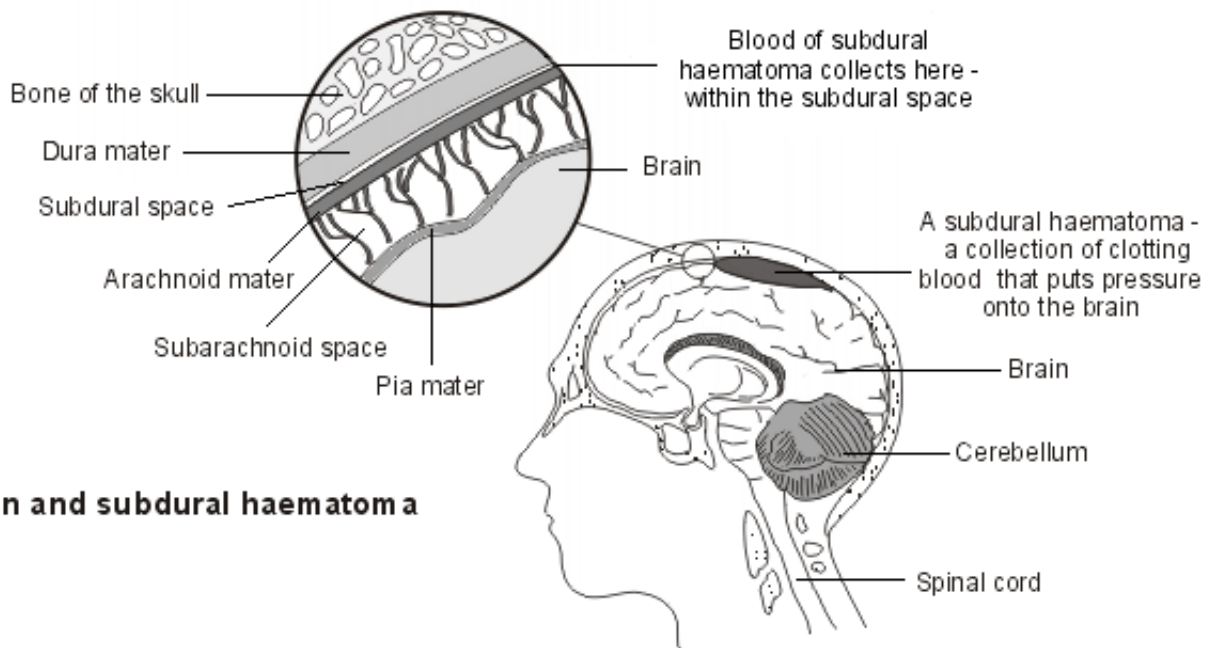
- **sudden rotation of head** - cause brain to swirl – bridging veins in subdural space are stretched to extent of tearing
- **SUBDURAL BLOOD CLOT can form without fracture of skull.** The clot can press on & distort brain with fatal outcome if condition is not relieved timeously
- **EXTRADURAL BLOOD CLOT (haematoma) lies outside dura mater** - Dura mater can tear off from inner surface of skull - Because it forms in rigid skull – will press on & distort brain often with fatal results

### WITH FRACTURING SKULL

- can involve groove in which arteries is contained - **artery can rupture & start bleeding**
- **SUBDURAL HAEMORRHAGE** due to **rupture of bridging vein** may result **from fracture of skull which involves subdural vessels**

**SCENARIO:** Patient with **skull fracture over temporal bone** initially normal, but over period of **12 hours becomes gradually more confused & drowsy**. **Dies before treatment** can be administered. **Discuss probable cause of death?**

- (a) Most probably indicates **extradural haemorrhage** - results of rupture of artery which lies on inside of temporal bone
- (b) **Intracranial haemorrhage** results in increased intracranial pressure.



**Brain and subdural haematoma**