Wounds

Objectives

Knowledge: To know about:

1-Definition of wounds.

2-Classification of wounds

3- types of wounds ,under each one we have to know:

-Definition& causative instrument.

- Mechanism of infliction.

- Characters& subtypes

-Wound dating.

- Medico-legal importance

4- Difference between hypostasis and bruises.

5- Difference between ante-mortem& postmortem wound.

6- Complications and mechanism of death in case of wounds.

Acquired skills

1-Diagnose different types of wounds.

2-Interpret wound pattern regards causative objective or weapon, manner of death, manner of infliction(self- inflicted, accidental or assault).

3- Diagnose differentially cut &contused wound

4- Diagnose differentially suicidal & homicidal wound.

5- diagnose differentially ant-mortem & postmortem wound.

6- Diagnose the cause (s) of death.

7- Give an opinion about the direct relation between wounds and cause(s) of death.

Clinical application

Writing a proper medico-legal report.

1

FORENSIC MEDICINE

Work Smarter, Not Harder.

Definition:

Wound: is disruption of the natural continuity of any tissue produced by external mechanical force.

Classification of wounds

I- Legal classification:

According to the duration of healing and weather or not the wound leads to permanent infirmity:

a- **Simple wound**: It is a wound that heals within 20 days.

b- **Dangerous wound**: It is a wound that heals in more than 20 days (may be associated with permanent infirmity).

c- **Fatal wounds:** It is a wound that leads to death.

Permanent infirmity: is loss of a functioning organ or loss (or impairment) of a function of an organ.

II-Medico-legal classification:

According to the causative instruments as follows:

1- Blunt force wounds due to:

- Moving object striking the body as in a blow.

- Moving body striking a fixed object or surface as in a fall.

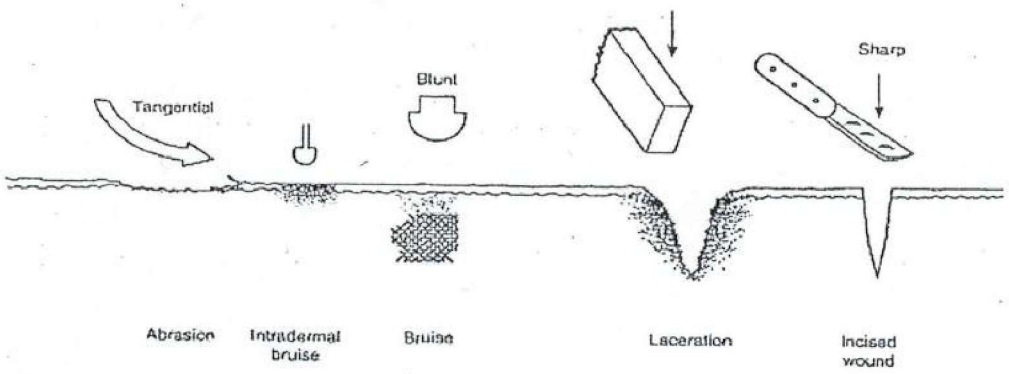
They may be abrasions, bruises and contused wounds.

2- Sharp force wounds:

- Caused by knife tip or edge, broken glass or jagged metal.
- The applied force is concentrated over a small area, so it requires little force to cut tissues.
- **They may be incised or stab wounds.**

3- Firearm wounds:

- Caused by small projectile with high velocity.



Types of skin wounds

1- ABRASIONS سحجات

Abrasion: is a superficial injury to the skin including the epidermis and may be the superficial layer of the dermis. It may only oozes serous fluid which may be blood tinged when superficial layer of the dermis is involved.

A scratch: is a linear abrasion produced by drawing a pointed instrument over the surface.

Causative instrument:

Blunt instrument with rough surface or pointed instrument.

Mechanism & types:

Types	Tangential abrasions	Imprint (Crush) abrasions
Mechanism	• Tangential impact → loss or scraping of epidermis/dermis by: a. Tangential friction on rough surface → grazing, sliding or brush abrasion. b. Drawing a pointed instrument over the surface → scratch abrasion	• Direct vertical impact → crushing of epidermis • The causative object may stamp its shape or surface pattern on the skin → imprint or patterned abrasion as: - Ligature mark in hanging or strangulation. - Tire treads in road traffic accidents. - Bite mark - Fingernail abrasions on neck in throttling and around thighs & vulva in rape.
Medico-legal importance	• May reflect direction of impact	• May reflect pattern of causative surface

N.B. Many abrasions have both a vertical and tangential component.

Medico-legal importance of abrasions:

1- They indicate violence.

2- Their shape gives an idea about the causative instrument as:

- Fingernail abrasions
- Teeth abrasions in bites.
- Abrasions that take the shape of the radiator in car accidents.

3- Their site in the body may give an idea about the type of the crime as:

- Fingernail abrasions on the neck suggest throttling
- Fingernail abrasions on the inner sides of the thighs suggest rape.

4- The age of the abrasion gives an idea about the time of crime as:

- **In the first 2 days**: it is covered with dry serum or a soft scab.
- **After 3 days**: a dry brown scab is formed.

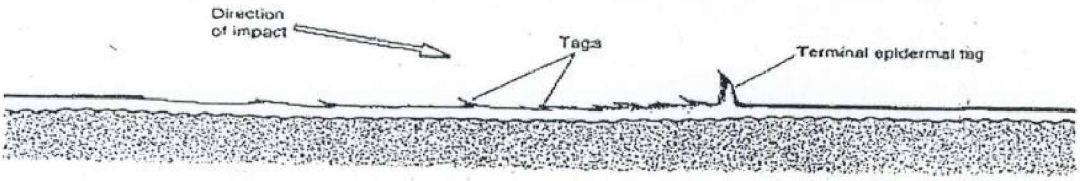
- **After one week**: the scab falls leaving a red colored area which disappears.
- **After 2 weeks**: it leaves no scar.

5- An abrasion may rarely cause death except if it is infected by tetanus or erysipelas.

6- Abrasions differentiate:

- Cut wounds from contused wounds in skin stretched over bone (e.g. skull & shin of tibia).
- Hypostasis from bruises.
- Homicidal from suicidal injuries.

7- It indicates direction of tangential impact: starting edge has beveled descent; a series of parallel furrows indicate direction of sliding motion; finishing edge has tags of heaped epidermis.



Determination of the direction of impact in an abrasion caused by a tangential force. The epidermal tags raised by the impact tend to pile up at the distal end

2- BRUISES (CONTUSION) كدمات

Definition:

Bruise: is leakage of blood from ruptured small vessels (veins or arterioles) into the surrounding tissues as a result of trauma. They may be seen in skin, muscle or any internal organ.

N.B. Bruise is called when the lesion is visible through the skin.

Contusion can be anywhere in the body as muscles or internal organ.

Causative instrument:

Heavy blunt instrument.

Mechanism:

Bruises occur due to:

- A moving object strikes a stationary body (**blow** with fist or weapon).

- A moving body strikes a stationary object (fall).
- Pinching or squeezing.
- Skin has greater elastic limit than underlying fat and blood vessels so:

  - When the force applied exceeds the elasticity of subcutaneous blood vessels → rupture → bruising.

  - When the force applied exceeds the elasticity of the skin → contused wound

Types

I- According to the amount of extravasated blood:

A- Haematoma: large bruise B- Ecchymosis: Small bruise.

C- Petechial haemorrhage : the size of a pin head (bruise less than 2mm).

II- According to its site:

A- External bruises:

Superficial bruise rapidly appears at the site of impact.

B- Internal bruises:

Deeper bruise in muscle or internal organs are not visible through overlying fat and skin e.g. neck in strangulation, fatal brain injuries, blows to chest & abdomen

Factors affecting the appearance of a bruise:

(1) Anatomical site:

- Areas over bony prominence (e.g. shin, cheeks), lax vascular tissue (e.g. eyelid, orbit) and fatty tissue (e.g. buttocks) will bruise easily.
- Resilient muscles of anterior abdominal wall rarely bruise (although there may be severe underlying visceral injury).
- Dense tough tissue (e.g. palms, soles) rarely bruises

(2) Age:

- Infants have loose, delicate, fatty tissues which bruise easily.
- Elderly: atherosclerosis of blood vessels allows easy bruising

(3) Obesity & Sex:

- Obese individuals bruise more easily than lean due to a greater proportion of subcutaneous fat

- Females generally bruise more easily due to having a greater proportion of subcutaneous fat than males

(4) Disorders of clotting:

- Hemophilia, leukemia and platelet disorders
- Liver disease (including alcoholism).
- Vitamin C deficiency (scurvy).
- Medications e.g. salicylates.

(5) Skin color

- Black skin may mask bruising. Examination under UV light is needed to show up the bruises.

(6) Effect of gravity:

A bruise usually occurs at the site of violence, but sometimes extravasated blood tracks along natural/traumatic planes of least resistance, influenced by gravity and body movement **(migrating bruises)** as:

- Blow to the forehead → bruise on eye lid, giving a black eye **(D.D)**
- Blow to the calf gives → bruise on the heel.
- Blow on temple → bruise on cheek.
- Fractured jaw → bruising on neck.
- Fractured hip → bruise on thigh.
- Blow on the abdomen → bruise on scrotum or labia.

(7) Site of bruise:

Deep bruising may take **up 24 hours to appear** at surface **(come out).** So, re-examination of a body or live victim after a time must be done to reveal bruises not initially apparent. Ultraviolet light may disclose an otherwise unidentifiable bruise.

(8) Onset of death:

Rapid death will limit the extension of leaked blood and its appearance as a bruise usually occur under circulatory blood pressure

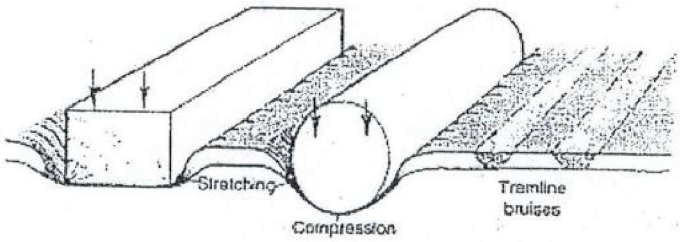
e.g. blow to the pericardium may lead to sudden death without any apparent bruises.(An associated imprint abrasion is more useful in this case).

Medico-legal importance of bruises:

1- They indicate violence.

2- Their shape gives an idea about the instrument used as they take its shape as:

- Longitudinal bruise is caused by a hard stick, having the same width.
- 2 Parallel lines of bruises are caused by a rubber stick.
- 2 Parallel lines of bruises going around body curvature are caused by a whip.
- Tram-line bruises caused by rectangular or cylindrical objects.
- 2 curved rows of bruises in case of human bite.
- 2 Parallel lines of bruises in case of animal bite.
- Clusters of small discoid bruises of about one cm in diameter are characteristic of finger tip pressure.



Trame-line bruises

3- Their site in the body gives an idea about the type of the crime as:

- discoid bruises of about 1cm in diameter around nose and mouth indicate smothering and those at the neck indicate throttling.

4- The Age of bruises gives an idea about the date of the crime as:

- 1st day: red in color (oxy Hb)
- After 1-3 days: blue (reduced Hb).
- After 4-5 days: green (biliverdin)
- After 5-10 days: yellow (bilirubin)
- Bruises fade away (heal) in 2-3 weeks.

N.B. Color changes occur gradually from the periphery to the center so; you can see two colors in the same day.

5- They usually occur at the same site of the blow but may gravitate downwards.

6- They may be dangerous if:

- They occur in a trigger zone.
- They are extensive.
- They become infected
- They hide a more serious injury: e.g. rupture organ.
- They cause an internal hemorrhage (if it occurs in mesentery).

7- They differentiate between:

- Cut from contused wounds in skin stretched over bone (e.g. skull)
- Homicidal from suicidal injuries.

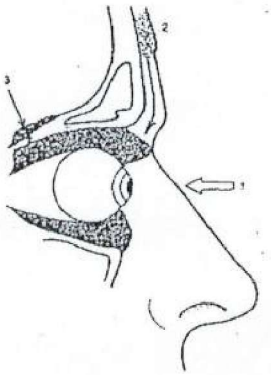
8- Bruises must be differentiated from hypostasis.

D.D of black eye (periorbital haematoma**):**

1- Direct blow to orbit.

2- Tracking from forehead bruises (migrating).

3- Fractured anterior cranial fossa of the skull (gunshot)



Mechanisms of black eye

Differences between hypostasis and bruises

	Hypostasis	**Bruises**
A.M or P.M	Post-mortem change	Ante-mortem wound
Skin	Intact	Associated with abrasions
Swelling	Absent	Present
Site	In the dependent parts	In any part of the body
Cellular infiltration	Absent	May be present
Color	No color changes Color disappear with applying pressure over it .	Color changes may be present Color doesn't disappear by pressure
Cutting over it	Small amount of blood (intravascular) oozing from the cut capillaries, Blood can be easily washed away.	Blood is extravascular in the surrounding tissues; It is not washable (fixed by tissue histocytes).
edges	Ill-defined edges	well marked edges

3- CONTUSED WOUND جرح رضي

Definition:

Full thickness tearing of the skin caused by blunt trauma with force more than the elasticity of the skin.

Mechanism:

It is due to blunt force trauma by a moving object or fall → crushing and stretching forces → splitting and tearing of tissues.

Causative instrument:

Heavy blunt instrument

Characters: See table

Types:

1- **Ordinary** contused wound

2- **Torn wound (Flap wound):** wound produced by the running belt of a machine.

3- **Crushed wound:** produced by passage of a vehicle.

4- **Lacerated wound**: contused wound with severe damage of the tissue.

5- **Cut lacerated wound**: The instrument is heavy and sharp e.g. butcher knife or axe.

Medico-legal importance:

1. Not related to object shape
2. Trace evidence may be found in the wound
3. Relatively little blood loss (except scalp)
4. Rarely suicidal.
5. Dangers of contused wounds:

a) Great liability to sepsis.

b) Disfiguring scar.

c) Injury to internal organs and internal hemorrhage.

6. It simulates incised wound if it occurs in skin stretched over bones as scalp, forehead & shin of tibia. It is distinguished from incised wound by:

a) Adjacent abrasions and bruises.

b) Ragged edges.

c) Compressed base with tissue bridges in depth.

d) Surrounding hairs are crushed.

Differences between characters of incised (cut) and contused wounds

	Incised (cut) wounds	Contused wounds
1. Shape	- Linear or elliptical often deeper at starting end.	- Any shape
2.Edges & angles	-Sharply, cleanly cut & gapping with acute angles except in redundant skin or if irregular &jagged instrument	- Ragged with no angles except when skin stretched over bone.(as scalp)
3.Abrasions	-No abrasions and bruises.	- Surrounded by abrasions.
4.Base	- Sharply & cleanly cut No bridging of tissues	- Compressed with bridging of tissues across the edges(e.g nerves , vessels , tendons) - May contain foreign bodies
5.Surrounding hairs	- Sharply & cleanly cut.	- Crushed or irregularly cut.
6. Bleeding	- Profuse bleeding due to cutting of the blood vessels.	- Minimal bleeding due to crushing and retraction of the blood vessels except in the scalp.
7. Liability to sepsis	- Less liable to sepsis due to washing of contaminations by profuse bleeding.	- Great liability to sepsis due to severe tissue destruction with minimal bleeding.
8. Healing	- Rapid healing with thin scar (primary intension).	- Delayed healing with thick scar (secondary intension).

4- INCISED (CUT) WOUNDS جرح قطعي

Definition:

Clean division of the full thickness of skin (or other tissue) under the pressure of a sharp-edged instrument.

Mechanism: Drawing of a sharp instrument along the skin, therefore an incised wound is longer than it is deep.

Causative instrument: Sharp-edged, such as: knife (linear, clean), jagged metal (irregular, jagged), broken glass.

Characters: (see table before)

Medico-legal importance:

1- Reflect sharp edge instrument, not weapon type.

2- No trace evidence except if done by broken glass, glass particles may be found.

3- Profuse external hemorrhage and air embolism may occur in incised wound in the neck.

4- Danger to life depends on site and depth.

5- Its age can be determined to know the time of its infliction by histological examination of the wound.

6- May give an idea about the direction of cut (it is deeper at the start).

7- Incised wound simulates contused wound if:

- The cut occurs in areas with redundant skin (axilla, scrotum, abdomen in obese persons).

- The wound is caused by irregular jagged sharp instrument (e.g. the edge of a broken glass).

8- Incised wounds may be **Self inflected, homicidal or accidental** as follows:

A) Self inflected:

i-Suicidal:

- At sites of election (wrists, neck, cubital fossae, chest, abdomen, and groin)
- Associated with tentative marks.

ii- Fabricated: seen later

iii- Para suicidal mutilation: Of face, arms, trunk ... (low self-esteem)

B) Homicidal incisions (assault) characterized by:

- Occur at any site.
- Not associated with tentative cuts, all are forceful and deepen rapidly
- No repetition in same track
- Usually slope backwards and downwards
- Associated with 'defense injuries' to hands and arms.

C) Accidental incisions:

- Random pattern. - Usually single. - Often deep and forceful.

5- FABRICATED WOUNDS

Definition:

They are self inflicted wounds to support a false charge or to afford suspicion from oneself.

Causative instrument:

Usually sharp or pointed.

Characters:

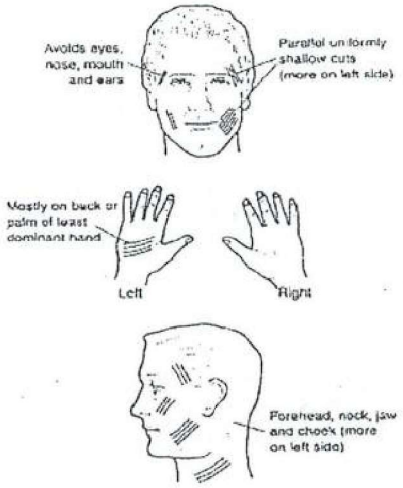
1- They are parallel lines or incisions.

2- The wound is usually superficial

3- Within the reach of the person unless another person helps him.

4- The tears in the clothes don't correspond to those in the body.

5- Age of wound doesn't coincide with the history given by the person.



Characteristics of fabricated injuries

6- STAB WOUNDS جرح طعني

Definition:

Stab wounds are injuries whose depth within the body is much greater than the dimensions of the wound on the body surface.

Mechanism:

- Thrusts with a weapon
- Falling upon pointed objects.

Causative instrument:

(a) Sharp with pointed end, e.g. a knife (uni-bladed), sward (bi-bladed).

(b) Blunt with pointed end, e.g. needle (long, thin)

(c) Long with blunted end, e.g. wooden stake, poker, closed scissor, animal tooth, hayfork, protruding part of machinery or motor vehicle and broken ends of bone (as in puncture wounds of the lungs from fractured ribs)

Types:

- **Puncture wound:** a small hole made with a blunt pointed instrument.
- **Stab wound** is: a piercing made by driving in a sharp pointed instrument.
- **A perforating or transfixing stab wound**: is one which passes through the whole thickness of a tissue or organ (through and through injury).
- **A penetrating wound**: is one which reaches a body cavity as pleura, peritoneum, pericardium, dura and synovial membranes.

Characters:

1- More deep than long so the stab wound has external wound on the skin and a track inside the underlying tissue. There may be one wound and several tracks (how?)

2- The edges of the wound are affected by the character of the instrument.

a. If the instrument is sharp pointed, it may be either bi- or uni-bladed:

- **Bi-bladed weapon:**
  - The edges of the wound are sharply cut.
  - No bruises or abrasions.
  - The wound is elliptical with 2 acute angles.
- **Uni-bladed weapon:**
  - The wound has one acute angle while the other angle is rounded.

b. If the instrument is blunt pointed:

- The edges of the wound are irregularly split and lacerated surrounded by abrasions and contusions.

3- Shape of the wound may indicate:

A- The cross section of the causative instrument:

- Closed scissor will produce a rhomboid wound.
- Poker will produce Satellite laceration.
- A nail will produce a circular wound.

B- Movement of instrument on withdrawal:

- Twisting → crescentic wound.

4- The direction of stabbing affects the wound length:

- A straight in and out stab → wound slightly shorter than the width of the blade (due to the elastic recoil of the skin and subcutaneous tissues).
- Entry and withdrawal of the blade at angle → wound length is longer than the width of the blade.
- When the blade passes through bone, e.g. skull or sternum → wound length is equal to the width of the blade (the cross section of the instrument can be accurately identified).

5- Wound track length:

- If the blade is not fully inserted → wound track is less than length of blade
- If the blade is fully inserted and body surface is compressed e.g. abdomen → wound track is more than the length of blade

N.B. In order to trace the wound track it is better to fill it with radio-opaque contrast material followed by X-ray.

6- A broken tip of the weapon may be found in the wound helping in the identification of the weapon.

Medico-legal importance:

1- There may be little or no external blood loss. Internal blood loss may be profuse; stab wound may hide serious damage to vital organ.

2- Examination of the wound gives an idea about:

- Weapon size. - Shape and width. - Direction of thrust.

3. Manner of injury:

- **Homicide stab wounds**: multiple, scattered, with different directions, potentially fatal and associated with defense wounds.
- **Suicide stab wounds**: single at elective sites, surrounded by tentative wounds, not involving clothes. There is only one fatal wound.

7- DEFENCE WOUNDS

Definition:

Homicidal wounds sustained by the victim during defending himself against an attack by trying either to grasp the weapon by hands or raise the arms towards off an attack to protect the face and the head from injury.

Mechanism:

1- Injuries sustained by grasping the weapon:

- Such injuries are usually found on the palms of the hand and on the opposing bends of the fingers or thumb
- As grapping the knife will loosen the skin tension → cuts produced are usually irregular and ragged.
- Grasping the knife → cuts corresponding with the position of the edges of the weapon.

2- Injuries sustained during raising the hand or arm towards off an attack to protect his face and head:

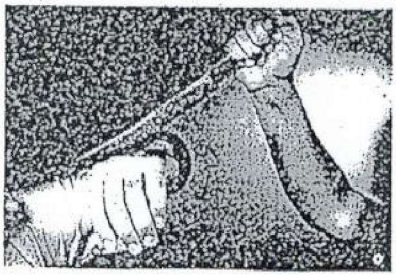
- In the form of cut wounds, contused wounds or contusions according to the causative instruments.

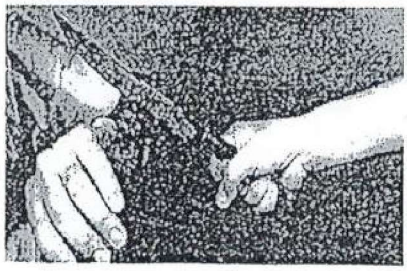
Medico-legal importance:

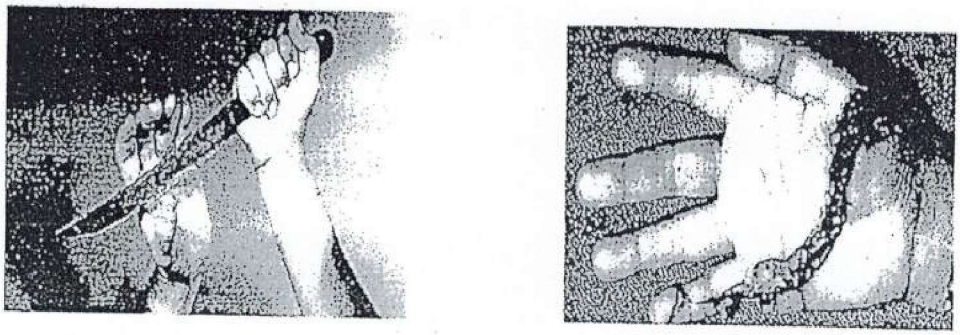
1- They indicate violence.

2- They indicate that the victim was conscious, at least partly mobile and

3- They indicate that the victim not taken completely by surprise.







Defense wounds

Role of physician in case of wounds

Do:

- Take good history.
- Examine the clothes carefully.
- Cut the clothes if necessary away from the tear due to trauma.
- Make good notes of the original appearances of the injuries before any surgical cleaning or operative interference.
- Draw the site (in relation to anatomical part), dimensions and appearance of the wound.
- Photograph of each injury (if available).
- Examine hair with a magnifying lens to differentiate cut wound from contused one when the differentiation become difficult by necked eyes.
- Photograph, take swab and cast from any bite mark (for identification).

Don't:

- Forget that deep contusion needs time to be apparent on the skin.
- Forget that contusion may appear far from site of trauma.
- Forget to search for components of the instrument such as broken glass or tip of knife in the wound base.
- Forget to seek for surgical consultation in cases of abdominal or chest trauma for fear of internal haemorrhage.
- Push probes through loose tissue in stab or puncture wound because this may create artifactual tracks with incorrect directionality.

Complications of Wounds

A- SHOCK: **1- Neurogenic or primary shock**

2- Hematogenic shock or secondary shock

3- Hemorrhagic or oligaemic

B- Embolism: **1- Air embolism**

2- Fat embolism

3- Thromboembolism

C- Infection.

D- Crush syndrome.

A- SHOCK

1- Neurogenic or primary shock:

Definition: It is a reflex neurovascular disturbance which follows immediately after an injury.

Types: A- Parasympathetic Shock B- Sympathetic Shock

Differences between parasympathetic and sympathetic shock

	Parasympathetic Shock	Sympathetic Shock
Mechanism	Parasympathetic (vagal) stimulation → inhibition of the heart & circulation	Sympathetic stimulation → stimulation of the heart & circulation
Causes	1- Severe emotions 2- Rise of pressure in carotid sinuses. 3- Stimulation of trigger areas (ear, larynx, pericardium, epigastrium, testis, cervix and urethra) as in: - Application of pressure on the neck - Unexpected blows to trigger areas - Foreign bodies in the air passages. - Cervical dilatation as criminal abortion or dilatation and curettage. - Immersion in icy water	1- Severe pain. 2- Severe fright.

Clinical picture	- Pallor - Bradycardia - Sudden hypotension - Sweating - Nausea - Vertigo	-Anxiety - Tachycardia - Hypertension - Sweating - Tremors - Abdominal discomfort -Dilatation of pupil.
Cause of death	Usually death doesn't occur because; ventricles escape the shock state as they don't have vagal innervation. If ventricular escape does not occur → rapid death from acute circulatory failure.	Ventricular fibrillation particularly if the patient suffers from cardiac disease.

3- Hemorrhagic (oligaemic shock):

Factors affecting the gravity of hemorrhage:

a- Amount of blood lost:

The loss of 2 liters (one third of the total blood volume) is dangerous to life.

b- Rate of hemorrhage:

Rapid loss of blood is more serious because no time is allowed for compensation → shock)

c- Site of hemorrhage:

Internal hemorrhage is more serious than external due to pressure over the organs:

- 1/2 liter of blood in the pleural or peritoneal cavities is fatal.
- 1/4 liter of blood in the pericardial sac is fatal.
- 100 ccs in extradural space is fatal.
- Few ccs in the brain substance is fatal.

d- General condition of the patient:

Healthy adults can tolerate hemorrhage more than children and old people.

e- Sex: Females tolerate hemorrhage than males.

Types of hemorrhage:

1- Primary hemorrhage:

It is directly due to the wound, it is either internal or external.

2- Secondary hemorrhage:

- It is due to sepsis of the wound → dissolve the blood clot by the lytic enzymes of the organisms → patent blood vessels → bleeding
- It occurs after a time of wound infliction (days, weeks; commonly at 10-16 days)

3-Reactionary hemorrhage:

- There is minimal bleeding at the time of injury due to associated shock state.
- After about 10 hours, the person starts to bleed again (due to rise of blood pressure after recovery from the shock stage) → dislodgement of the blood clot that has been formed to close the cut vessel.

Clinical picture: The same as Hematogenic shock

B- EMBOLISM

1- Thromboembolism:

Causes:

Prolonged recumbency in bed.

Mechanism of death

Prolonged recumbency in bed → deep vein thrombosis → detached → pulmonary embolism after about 10 days of the injury or may be earlier (2-3 days).

2- Fat embolism:

Causes:

- Fracture of a long bone with torn vein.
- Burns in a fatty area
- Trauma to a fatty area.

Mechanism of death:

Acute heart failure is due to obstruction of the right side of the heart and pulmonary artery with fat.

3- Air embolism:

a- Venous air embolism

b- Arterial air embolism

Differences between venous and arterial air embolism

	Venous air embolism	Arterial air embolism
Causes	- Cut throat (cut jugular vein → suction of air due to the negativity of intrathoracic pressure) - I.V. infusion. - Tubal insufflation. - Criminal abortion.	- During artificial pneumothorax, if the needle is passed in a pulmonary vein. - Stab transfixing wound connecting a bronchus with a pulmonary vein.
Fatal amount	100-200 ccs	few ccs
Mechanism of death	Air fills right side of the heart and pulmonary arteries → obstruction of pulmonary circulation → acute heart failure.	Occlusion of coronary and cerebral arteries by air

N.B.

- **To save a case of** venous air embolism, put the patient in left lateral position, so the level of pulmonary artery will be lower than right ventricle → air will be absorbed from the heart gradually.
- In case of arterial air embolism put the patient in left lateral position with head down.

C- INFECTION.

Contused and lacerated wounds are the most liable to severe infection particularly, tetanus and gangrene due to devitalized tissue of the wounds.

D- CRUSH SYNDROME:

Severe crushing of muscles → liberation of myoglobin → blocking of renal tubules → acute renal failure.

Differences between homicidal and suicidal injuries

	Homicidal	Suicidal
1- Circumstantial evidence	- History of: threatening by an enemy, quarrel or vengeance	- History of financial trouble, recent failure, a previous attempt of suicide or psychological disturbance
2. Scene of the crime.	- Anywhere - Signs of struggle at the scene in the form of disarranged furniture. No suicide note. - Trace evidences (blood stains, finger prints, hair) are related to the assailant	-Usually indoors, the door locked from inside. - No signs of struggle, a suicide note may be present. - Related to the victim
3- Examination of the victim: **a. Sex** **b. Age** **c. Clothes** **d. Cadaveric spasm** **e- Signs of resistance**	 - May be male or female. - Any age. - Tears of clothes or loss of buttons may be found. - On hair, fiber or clothes of the assailant - Present	 - Usually male. - After puberty. - No tear of clothes or loss of buttons. - Grasping the weapon - Absent
3- Examination of the wound: **a. Site** **b. Number** **c. Direction**	 -Any site - Multiple - Any direction	 -Within reach of the victim's hand and against a vital organ. - One fatal wound - Special direction according to the type of the injury
4- Examination of the weapon: **a- Present or absent at the scene** **b. Type** **c. Presence of finger print and blood stain**	 - Usually not present - Sharp or heavy blunt - May be present and related to the assailant.	 - Present beside the body of the victim or clenched in his hand. - Available and less painful such as sharp weapons. - Related to the victim
5- Examination of the suspected assailant: a. For signs of struggle **b. His blood grouping and finger prints**	 - Present and coincide, with the date of the crime - Coincided with that present at the scene of crime, or on suspected instrument.	 - Absent - Not coincided with that present at the scene of crime (because it related to the victim)

Differences between ante-mortem and postmortem wounds

	Ante-mortem wound	Postmortem wound
1.Hemorrhage	-Usually severe. -Arterial spurting. -Blood clots at the base	- Usually slight. - Oozing of venous blood. -No blood clots
2. Edges of wound	- Gapping between edges. -The edges are everted	-No gapping. -No eversion
3.Vital reactions (redness-swelling-healing-sepsis)	present	absent
4.Microscopically (cellular infiltration)	present	absent
5.Serotonin& histamine	- Increase the serotonin and histamine content in the wound.	- No increase in both.