

Forensic Medicine

# Wounds and Regional Injuries

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# Outline - Wounds & Regional Injuries



- **Definition**
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  - Forensic anatomy of the skin
  - Tissue repair & wound healing
  - Classification of injuries
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  - Bruises & Contusions
  - Lacerations
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  - Causes of death
  - Management of acute wounds
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# Definition



## Medical Definition

**A wound or injury can best be defined as damage to any part of the body due the application of mechanical force**



## Legal Definition

**✓ Wound : is breach of natural continuity of the skin or mucous membranes.(requires the integrity of the body surface to be breached).**

**✓ Injury : causing bodily harm.**

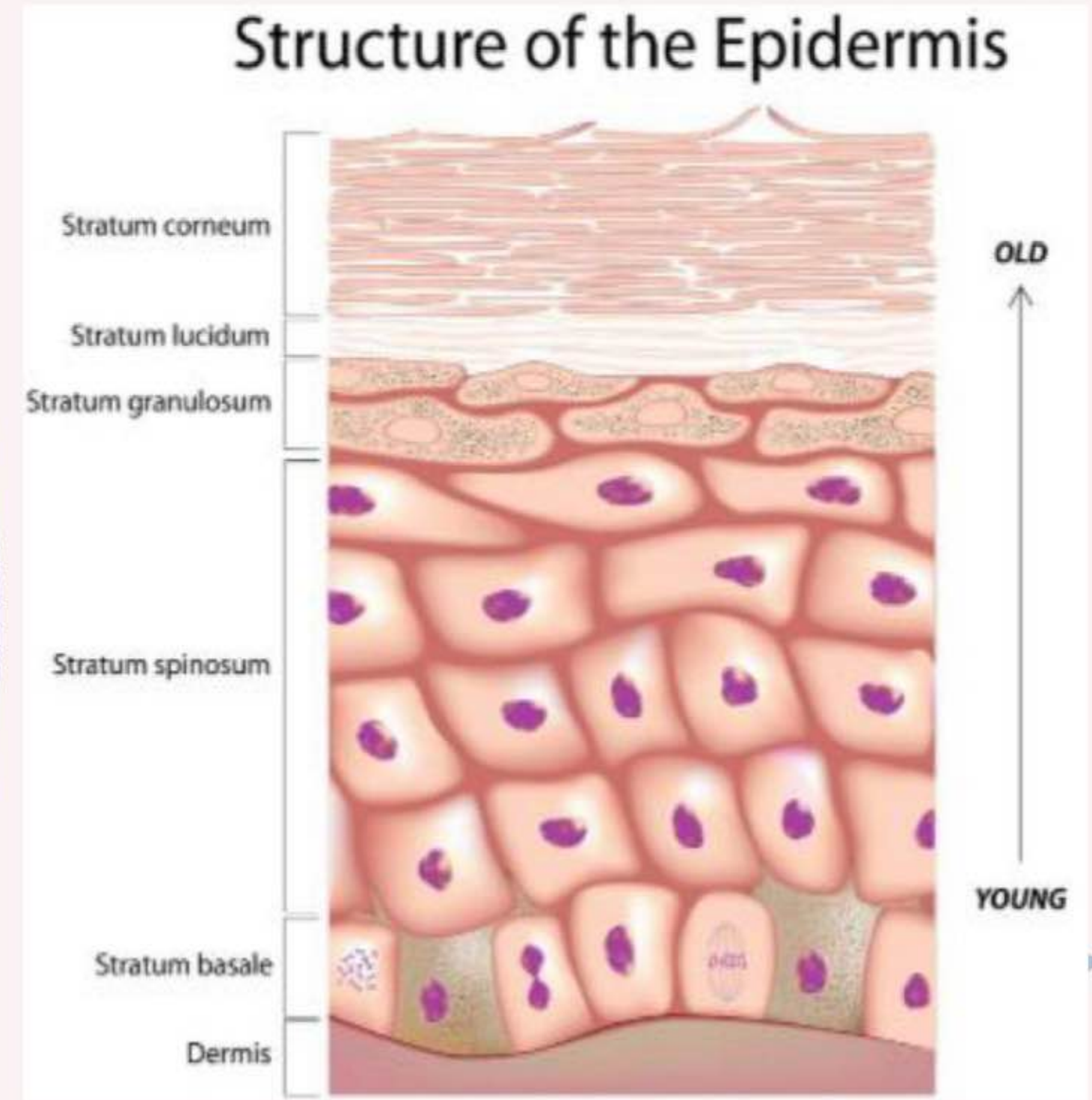
# Mechanism of Wounding

- When the intensity of the applied force exceeds the capability of the tissues to adapt or resist then a wound or injury occurs
  - The severity, extent, and appearance of blunt trauma injuries depend on:
    - 1-The amount of force delivered to the body
    - 2-The time over which the force is delivered.
    - 3-The region struck.
    - 4-The extent of body surface over which the force is delivered.
    - 5-The nature of the weapon
- $\text{kinetic energy} = \frac{1}{2} \text{ mass} \times \text{velocity}^2$
- All mechanical trauma depends on the transfer of energy from an external moving object to the tissues

# Forensic Anatomy of the Skin

## 1- Stratum Corneum (Horny Layer) :

- ✓ the most superficial keratinized dead layer of
- ✓ varies greatly in thickness from one part of the body to another.(palms & soles vs. eyelids & scrotum)cells.
- ✓ This has forensic relevance in the amount of injury that is needed to penetrate the skin and allow bleeding from the underlying tissues.

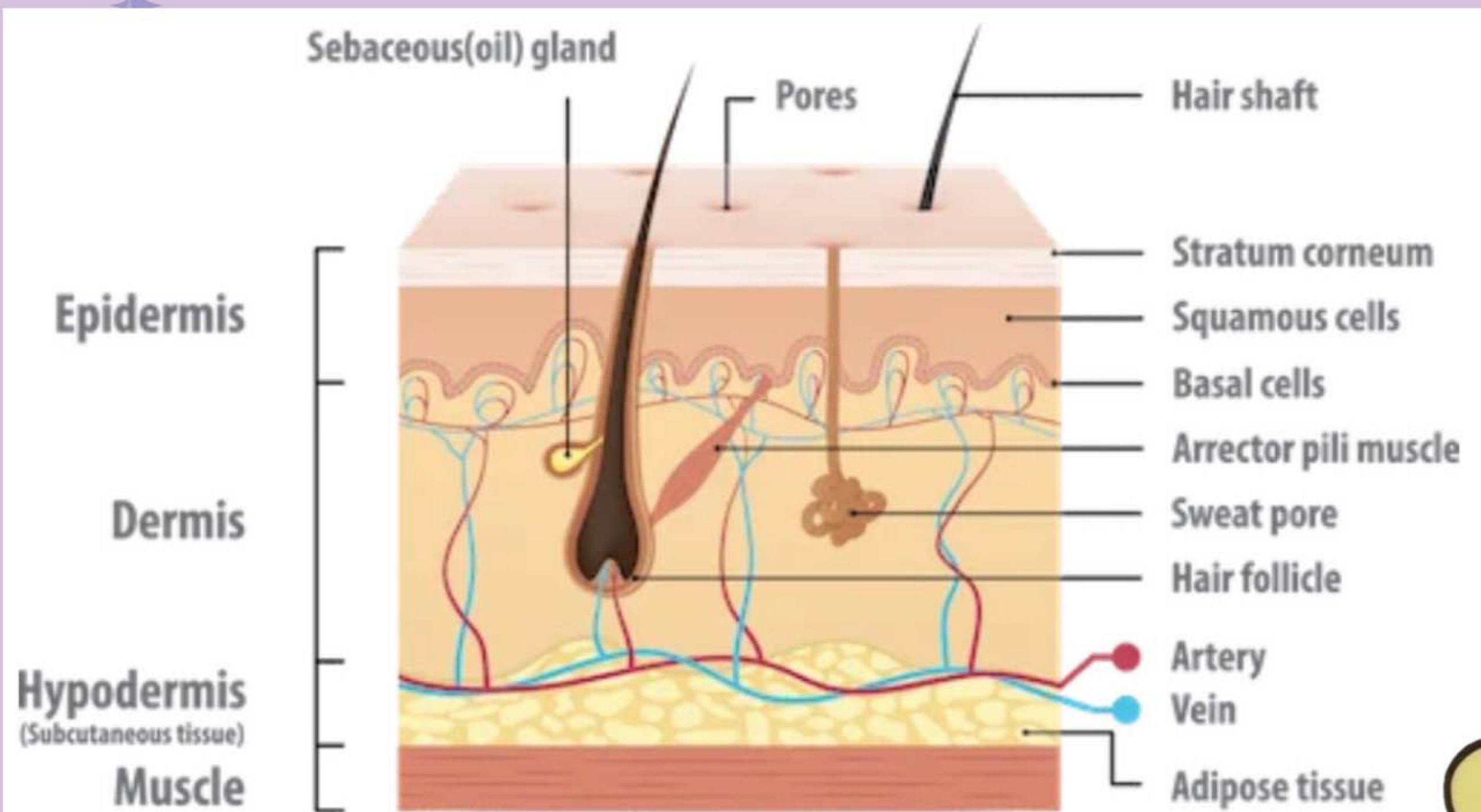


## 2. Epidermis:

- ✓ The living layers of the skin combine with the horny layer, it doesn't contain blood vessels in its thickness.
- ✓ The epidermis is generally corrugated, the undersurface by papillae that dip into the dermis.
- ✓ the thinner skin tending to have a flatter junction between dermis and epidermis.

## 3. Dermis:

- ✓ mixed connective tissue carrying the skin adnexa, such as hair follicles, sweat glands and sebaceous glands.
- ✓ The Dermis has a rich network of blood vessels, nerves and lymphatics.
- ✓ The lower zone of the dermis has adipose tissue
  - Depending on the site in the body:
    1. Deep fascia .
    2. Fatty tissue .
    3. Muscle.
  - Will form strata below the skin itself



# Tissue Repair & Wound Healing

● There are three main types of tissue according to proliferative capacity:

## (1) Labile tissue:

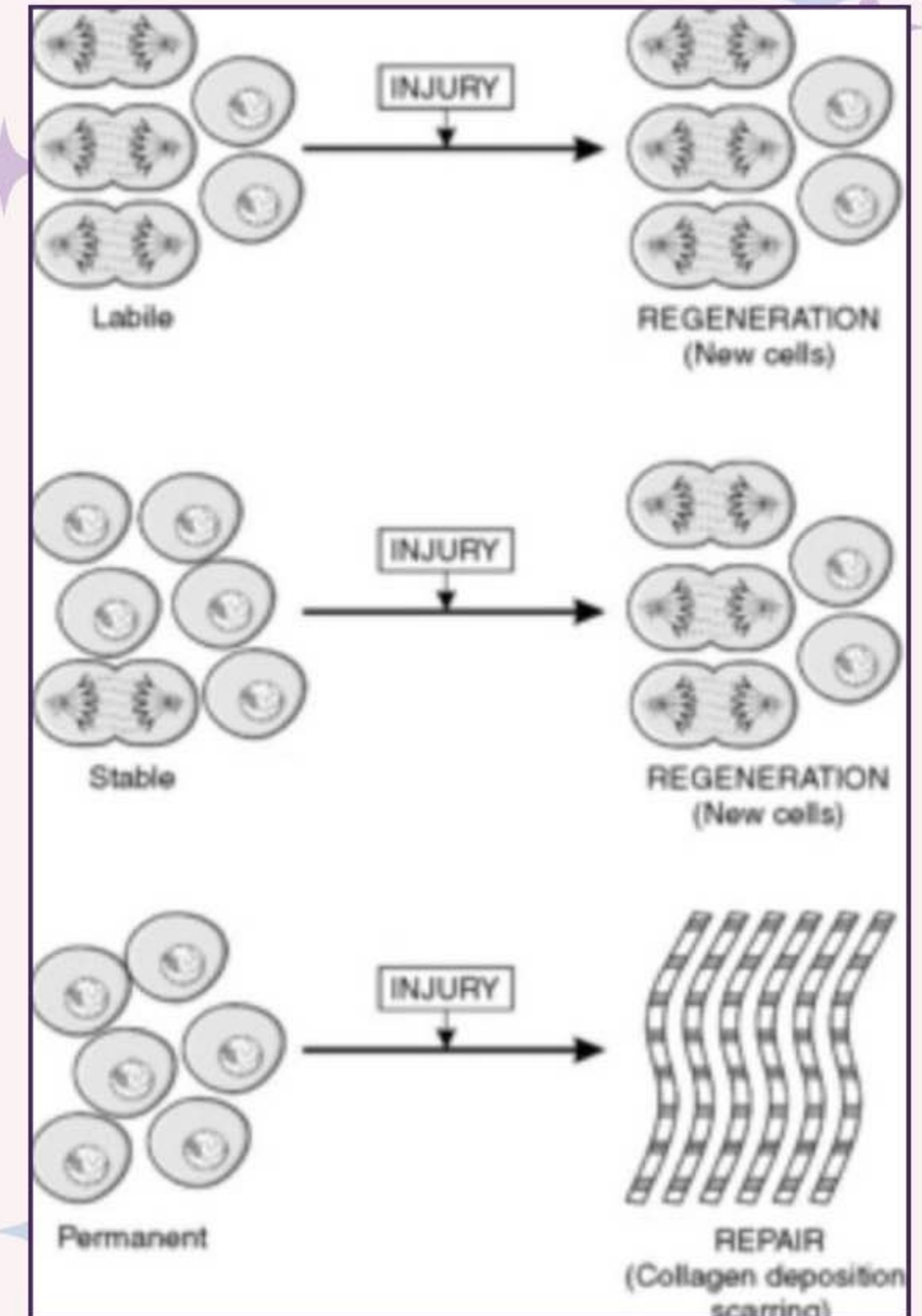
✓ cells are constantly being lost and must be continually replaced.(e.g. hematopoietic cells, skin epithelium, intestine ... etc.)

## (2) Stable tissue:

✓ cells are quiescent and capable of dividing in response to injury or loss of tissue mass.(e.g. liver, kidney, pancreas ... etc)

## (3) Permanent tissue:

✓ terminally differentiated non-proliferative cells.(e.g. neurons, skeletal muscle cells, myocardium ... etc) .



● *Repair of damaged tissues occurs by two types of reactions:*

**(1) Regeneration: this occurs by;**

- A. Proliferation of residual (uninjured) cells.*
- B. Maturation of tissue stem cells.*

**(2) Connective Tissue Deposition (Scar Formation)  
Occurs when:**

- A. Regenerative stem cells are lost (e.g., deep skin cut).*
- B. Tissue lacks regenerative capacity (permanent tissue) .*

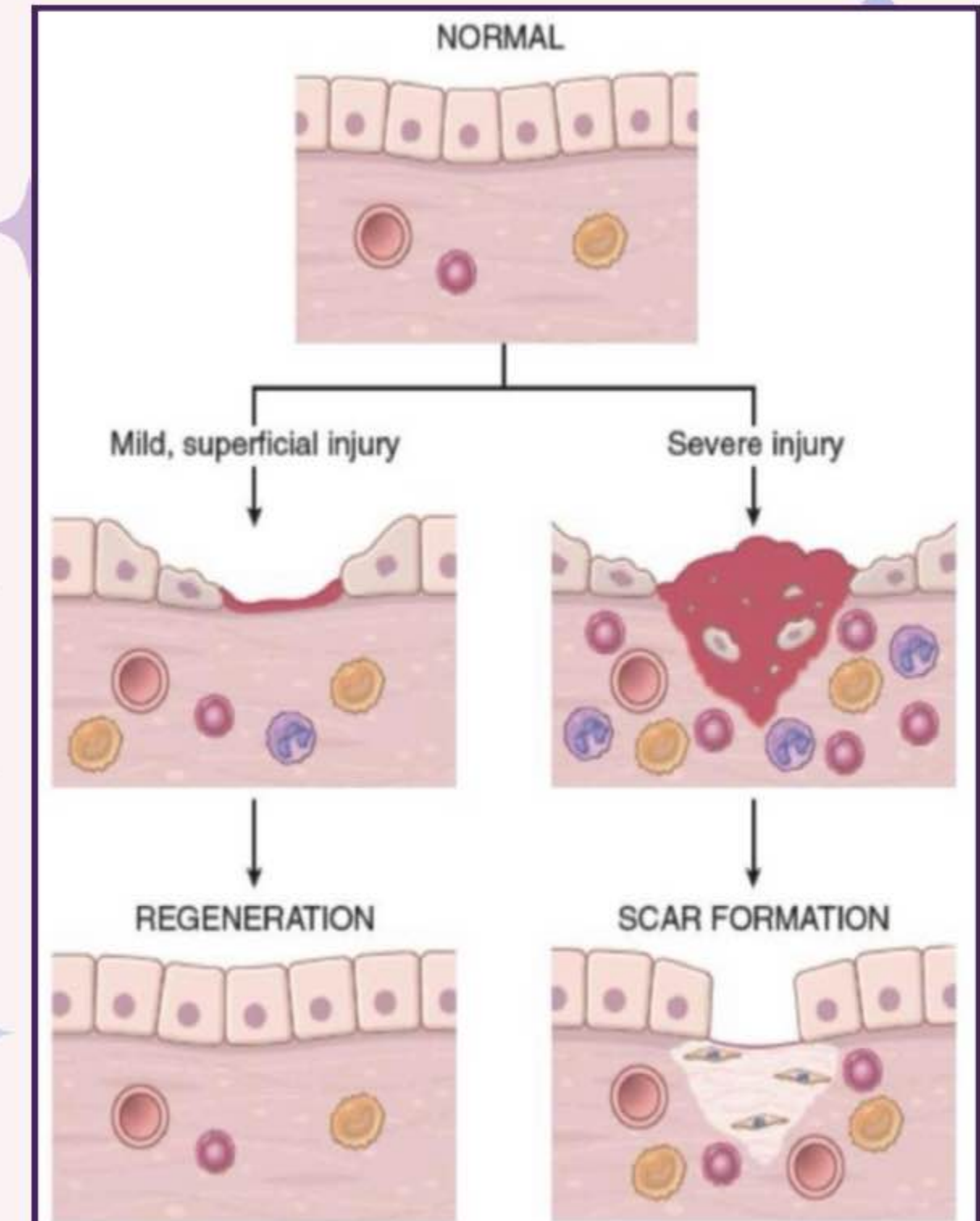


Fig. 3.23 Mechanisms of tissue repair: regeneration and scar formation. Following mild injury, which damages the epithelium but not the underlying tissue, resolution occurs by regeneration, but after more severe injury with damage to the connective tissue, repair is by scar formation.

## ● *Connective Tissue Deposition (Scar Formation):*

### **(1) Inflammatory phase:**

*hemostatic plug formation and inflammation.*

### **(2) Proliferative phase:**

*granulation tissue formation, which consists of:*

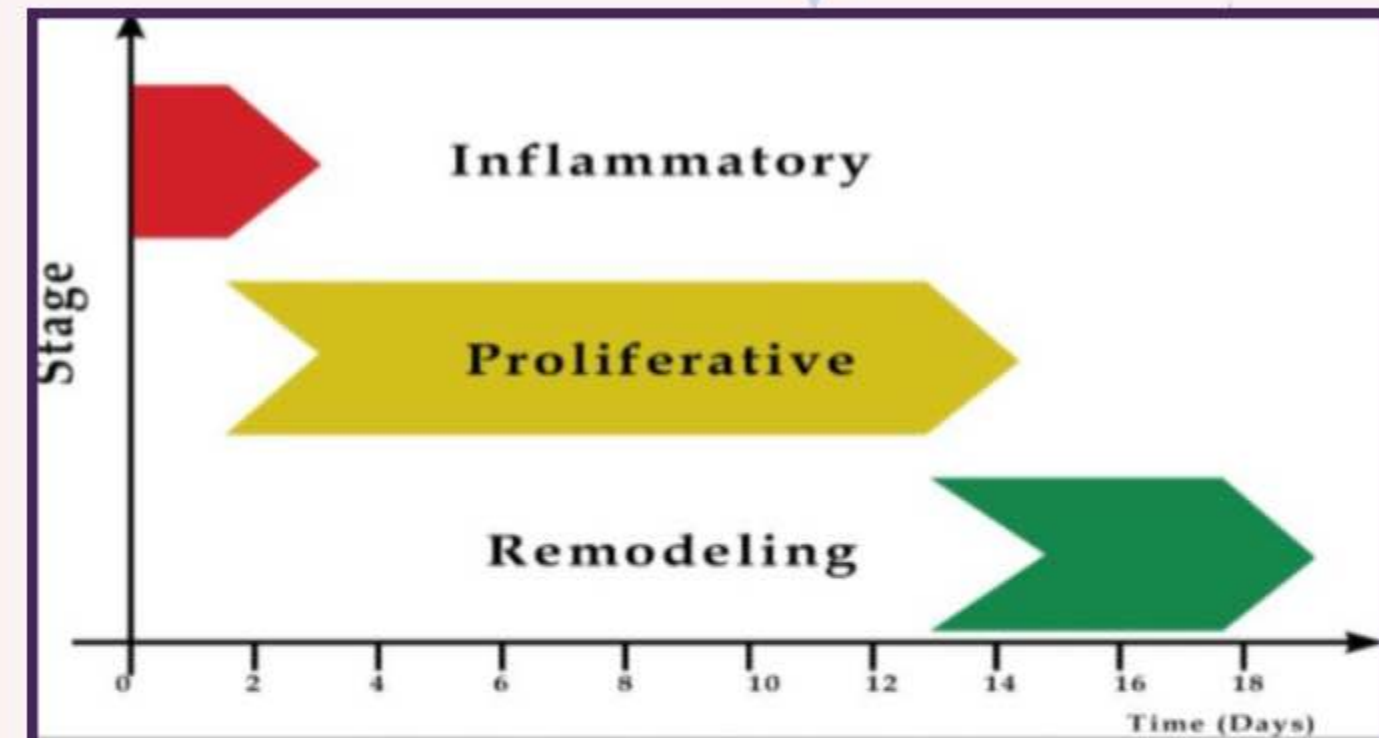
*A. Fibroblasts (deposit type III collagen).*

*B. Capillaries (provide nutrients).*

*C. Myofibroblasts (contract wound).*

### **(3) Remodeling phase:**

*type III collagen is replaced with type I collagen*



● **Cutaneous healing occurs via primary or secondary intention:**

**(1).Primary intention:**

✓ **Wound edges are brought together (e.g., suturing of a surgical incision); leads to minimal scar formation.**

**2. Secondary intention:**

✓ **Edges are not approximated. Granulation tissue fills the defect; myofibroblasts then contract the wound, forming a scar**



# Classifications of Injuries

## 1. Causative Factors

Mechanical (Kinetic)  
or Non-Mechanical  
(Non-Kinetic)

## 2. Severity of Injury

(Simple or Grievous or Fatal)

## 3. Manner of Injury

(Homicidal , Suicidal ,  
Accidental , Defensive or  
Self-inflicted)

## 4. Time of Infliction

(Ante-mortem or Post-  
mortem) .



## Non-Mechanical/Non-Kinetic Injuries

1. Thermal : (Heat or Cold)
2. Chemical: (Irritation or Corrosion)
3. Radiational :Light Waves or RadioactiveSubstances)
4. Electrical and Lightning



## Mechanical/Kinetic Injuries

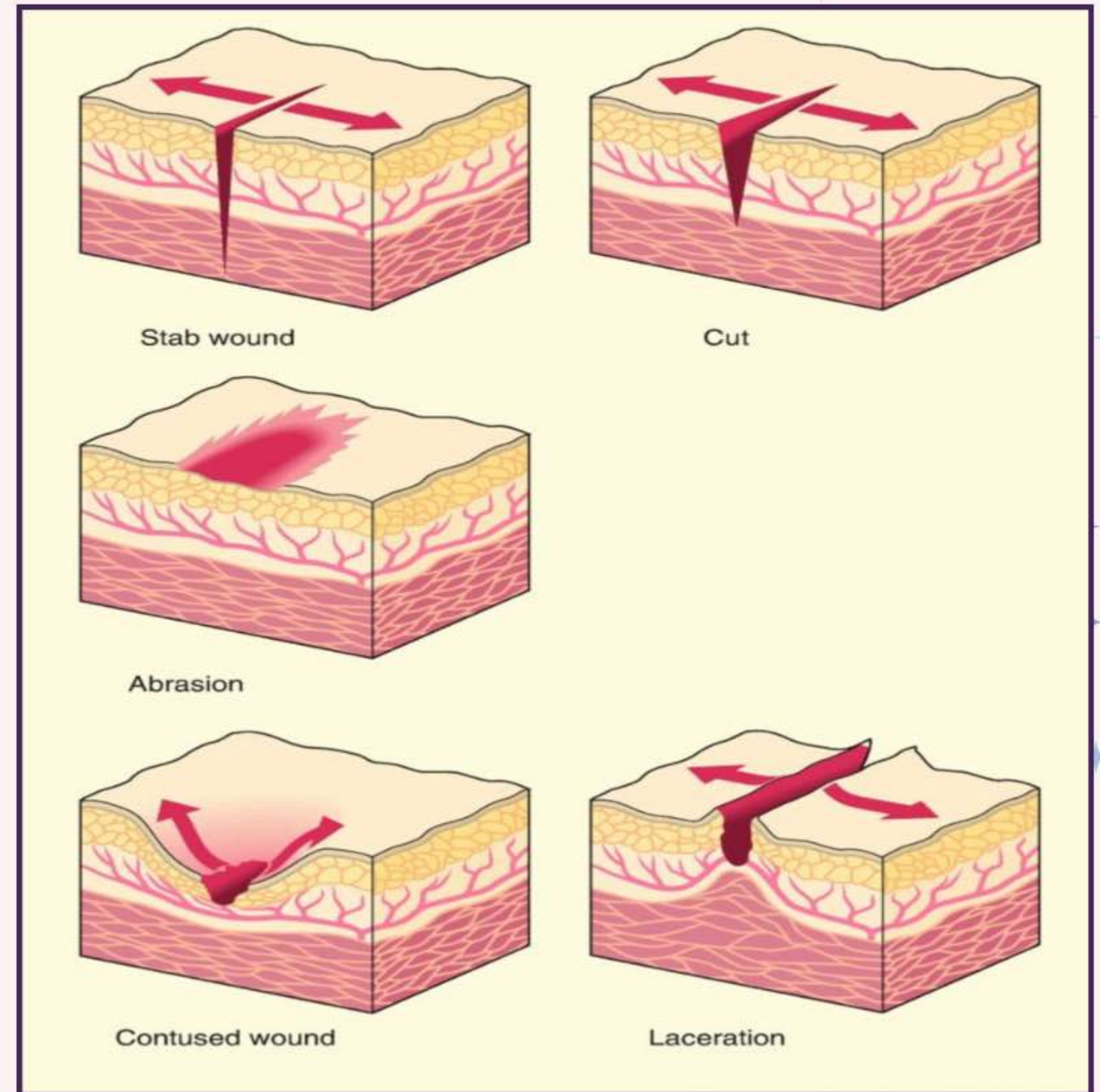
1. Sharp-Force : caused by objects with a sharp or cutting edge. E.g. (Incised wounds, Stab wounds, Puncture wounds)
2. Blunt-Force : caused by objects or surfaces without a sharp or cutting edge. E.g. (Abrasions, Contusions, Lacerations, Fractures)
3. Firearm : Rifled or Shotgun

# Blunt Force Trauma Injuries

**1. Abrasions.**

**2. Contusions and bruises.**

**3. Lacerations.**



# Abrasions



- **It's a superficial injury to the skin.**
- **Abrasions by definition do not penetrate the full thickness of the epidermis and thus do not bleed, this is known as a (Pure Abrasion).**
- **But many abrasions reach the papillary dermis thus causing bleeding**
- **Abrasions are caused by any contact that rubs across the epidermis and removes the keratinized layer and underlying cells causing that area to become discolored and moistened by exuded tissue fluid.**

# There are two main categories of abrasions:

## **A. Tangential Abrasions:**

- ✓ *More common*
- ✓ *Caused by horizontal rubbing action*
- ✓ *Include Linear and Brush abrasions*

## **B. Pressure Abrasions (Compression):**

- ✓ *Less common*
- ✓ *Caused by vertical pressure*
- ✓ *Include Patterned and Non-Patterned abrasions*

# Tangential abrasions

## **1- Linear Abrasions (Scratches):**

- finger Nails
- Tip of sharp objects.
- Frequent in: Sexual assault. Child Abuse. Strangulation.
- They are more commonly caused by Females. They are usually : Multiple , Parallel , Few mm in width , 1-2 cm apart .



## **2- Brush Abrasions (Grazes):**

- Particles of glass, gravel or dirt may be embedded.
- Most common type of abrasions.
- Commonly seen in Road Traffic Accidents.



# Pressure abrasions. (compression or crushing)

- ✓ The impact is vertical.
- ✓ No scraping or tangential force.
- ✓ The epidermis is crushed.
- ✓ The lesion may be slightly depressed below the surface.
- ✓ They mostly produce the pattern of the impacting object resulting in an Imprint or Patterned Abrasion.



# Patterned abrasions (imprint)

✓ Results from impact or contact with a patterned object or surface.

✓ follows the ridges of the object if it has a profile of varying height.

✓ Examples : Tire Marks , Ligature Mark , BiteMark , Muzzle Mark.



# Post-mortem abrasions (imprint)

✓ *Inflicted after death from a variety of causes.*

✓ *Examples:*

*1-Dragging the corpse.*

*2-Post-mortem handling and autopsy.*

*3-Buffering in moving water.*

✓ *They can be differentiated from Ante-mortem abrasions by many characteristics.*



**Antemortem Abrasion**

- Red to purple
- Wet, "weeping"
- Inflamed



**Postmortem Abrasion**

- Yellow to brown
- Dry

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**Postmortem Abrasion**

- Yellow to brown
- Dry

# Ante-mortem vs. Post-mortem

Differentiation 11.1: Antemortem and postmortem abrasion

| S.No. | Feature         | Antemortem abrasion        | Postmortem abrasion                       |
|-------|-----------------|----------------------------|-------------------------------------------|
| 1.    | Site            | Anywhere on the body       | Usually, over bony prominences            |
| 2.    | Color           | Bright red                 | Yellowish, translucent and parchment-like |
| 3.    | Exudation       | More, scab slightly raised | Less, no scab                             |
| 4.    | Vital reaction  | Present                    | Absent                                    |
| 5.    | Healing process | May be evident             | Not seen                                  |

**Note:** Abrasions produced slightly before or after death cannot be differentiated even by microscopic examination.



# Healing of Abrasions

- ✓ Heals rapidly.
- ✓ Heals by the formation of a scab.
- ✓ Do not leave a permanent scar.
- ✓ Age of abrasions can be estimated by their healing process.

Table 11.1: Age of abrasion

| Duration        | Features                                                                                                                                                                                        |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fresh<br>2–24 h | Bright red, oozing of serum and some blood. Exudation dries to form a reddish scab, comprising blood, lymph and epithelial cells. Polymorphonuclear cells infiltrate ( <i>scab formation</i> ). |
| 2–3 days        | Reddish-brown scab, less tender. <sup>10</sup>                                                                                                                                                  |
| 4–5 days        | Scab is dark brown in color.                                                                                                                                                                    |
| 5–7 days        | Scab is brownish black and starts falling off from the margins. Epithelium grows and covers defect under the scab ( <i>epithelial regeneration</i> ).                                           |
| 7–12 days       | Scab dries, shrinks and falls off, leaving depigmented area underneath. It gradually gets pigmented in due course of time ( <i>subepidermal granulation</i> ).                                  |
| > 12 days       | Epithelium becomes thinner and atrophic. New collagen fibers are prominent. Basement membrane is present and vascularity of the dermis decreases ( <i>regression</i> ).                         |

# Medico-legal Aspects of Abrasions

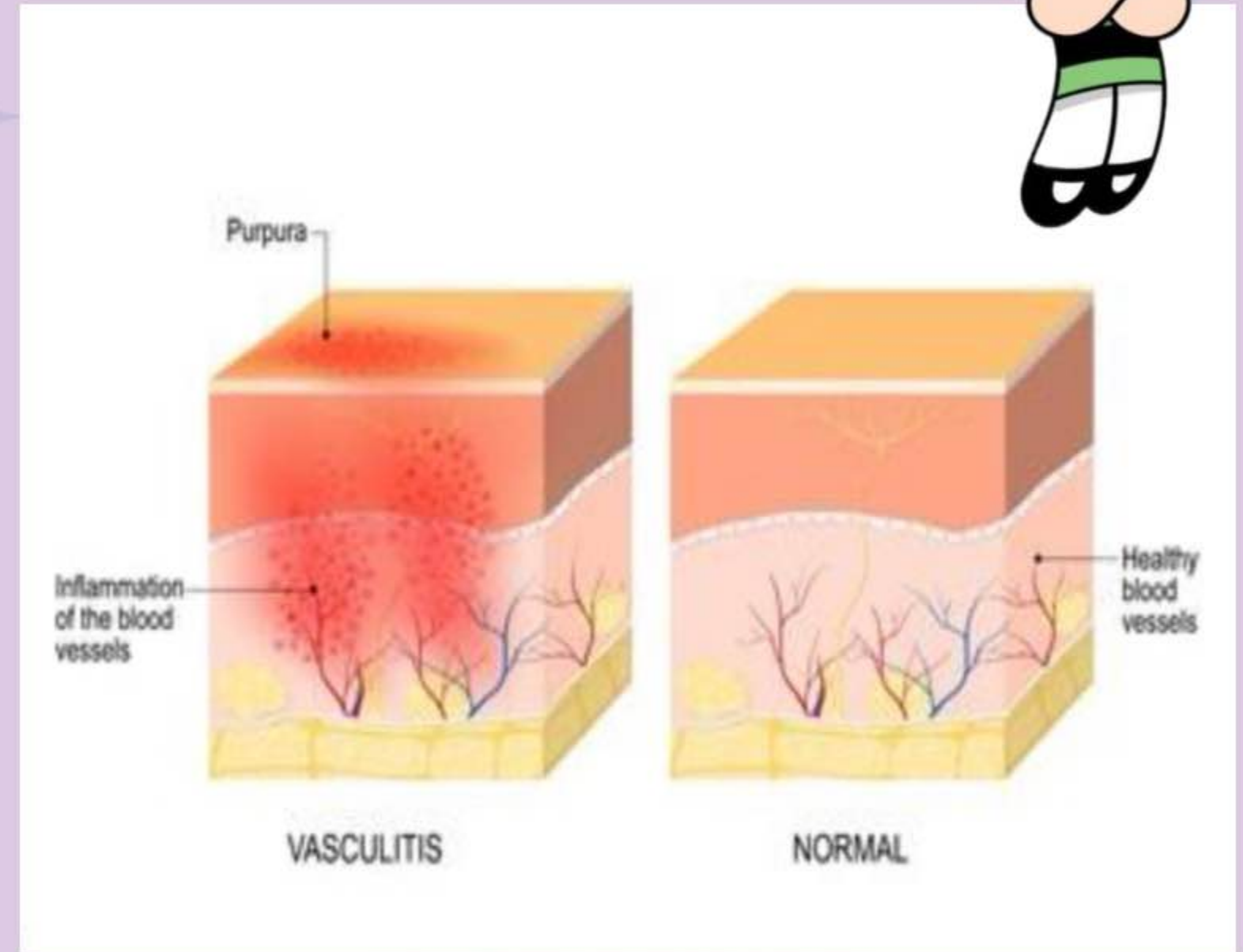
- **Reveal the site of impact.**
- **Reveal the direction of force.**
- **They are mostly simple in severity except in rare cases they may be grievous.**  
*E.g. (abrasions infected by tetanus /abrasion over the cornea).*
- **Patterned abrasions may reveal the causative weapon or object.**
- **The healing process may help with determining the age of the injury or incident.**
- **Embedded dirt or sand or grass or glass in graze abrasions may be linked to the crime or death scene.**
  
- **May reveal the manner of injury :**
  - ✓ **Abrasions on the neck >>throttling**
  - ✓ **Abrasions around the mouth and nose >>smothering.**
  - ✓ **Abrasions on the breasts, genitals on inner thighs >>sexual assault**



# Contusions and Bruises



- Extravascular collection of blood that lies beneath an intact epidermis.
- Caused by extravasation of blood from damaged small blood vessels (arterioles and venules).
- Bruise : visible through the skin (in the Subcutaneous Tissue).
- Contusion : anywhere in the body including internal organs (Brain, Lungs, Muscles).



# Types of Bruises:

## **(1) Intradermal bruise:**

- ✓ Lies in the immediate subepidermal layer.
- ✓ It is made by impact with a patterned object.
- ✓ Hemorrhage is sharply defined.
- ✓ Mostly seen with patterned abrasions.

## **2) Subcutaneous bruise:**

- ✓ It is situated in subcutaneous tissue often in the fatty layer.
- ✓ The edges are blurred The Most common type of bruises Caused by a blunt object.
- ✓ Appears soon after injury as dark red swelling.

## **(3) Deep bruise:**

- ✓ • Deeper to subcutaneous tissues.
- ✓ It may take hours to 1-2days to appear at the surface (delayed bruising)
- ✓ Infrared photography may demonstrate such bruises, if suspected initially



# Patterned injuries

- **Most patterned injuries are a mixture of patterned abrasions and intradermal bruises.**
- **They both result from blunt-force trauma.**
- **The mechanism is similar for both of them and depends on the varying height (ridges and grooves) of the surface of the causative object.**



**Figure 4.11** Abrasions and intradermal bruising on the forehead of a swimming bath attendant. He was found drowned when there were no witnesses, but the spacing of the marks exactly matched the ridged tiles at the edge of the bath, so it was presumed that he had slipped and struck his head before falling unconscious into the water.

# Factors that affect the size and prominence of Bruises

## Increase

1. Soft Lax Tissue (eyelid and scrotum)
2. Tissue with underlying Bone
3. Superficial Tissue
4. Vascular Tissue
5. Female / Obese <15 and > 65 years old
6. Decreased Coagulability of Blood increased
7. Age of Bruise
8. Fair Skin Color



## Decrease

1. Firm Fibrous Tissue (palms and soles)
2. Boneless Tissue
3. Deep Tissue
4. Non-Vascular Tissue
5. Male / Muscular
6. 15- 65 years old
7. Increased Coagulability of Blood
8. Decreased Age of Bruise
9. Dark Skin Color

# Movement of Bruises (Shifting)

✓ A bruise may appear at a different place on the surface from the point of impact.

✓ There are two main causes:

1. In deep bruises the extravasated blood moves through fascial plains and anatomical structures and it may be deflected or obstructed.

2. Bruises may move under gravity as the extravasated blood slides down.

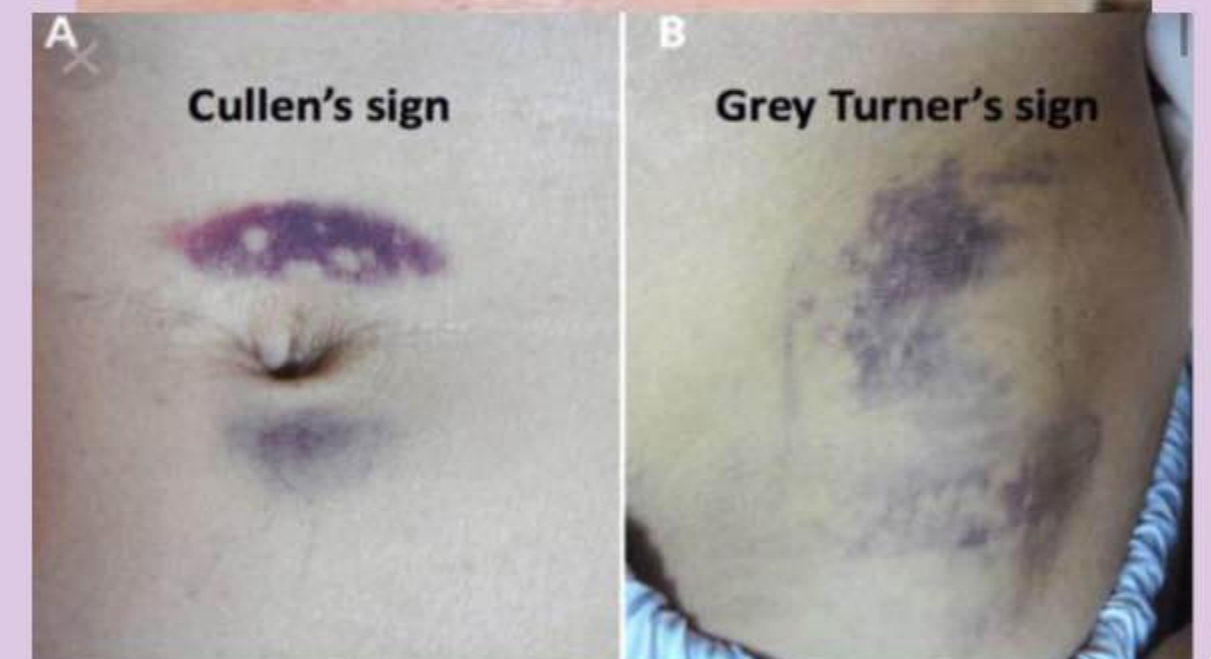
✓ Examples:

(1) Bruise on the knee after trauma to the thigh .

(2) Bruise on the elbow after trauma to the upper arm .

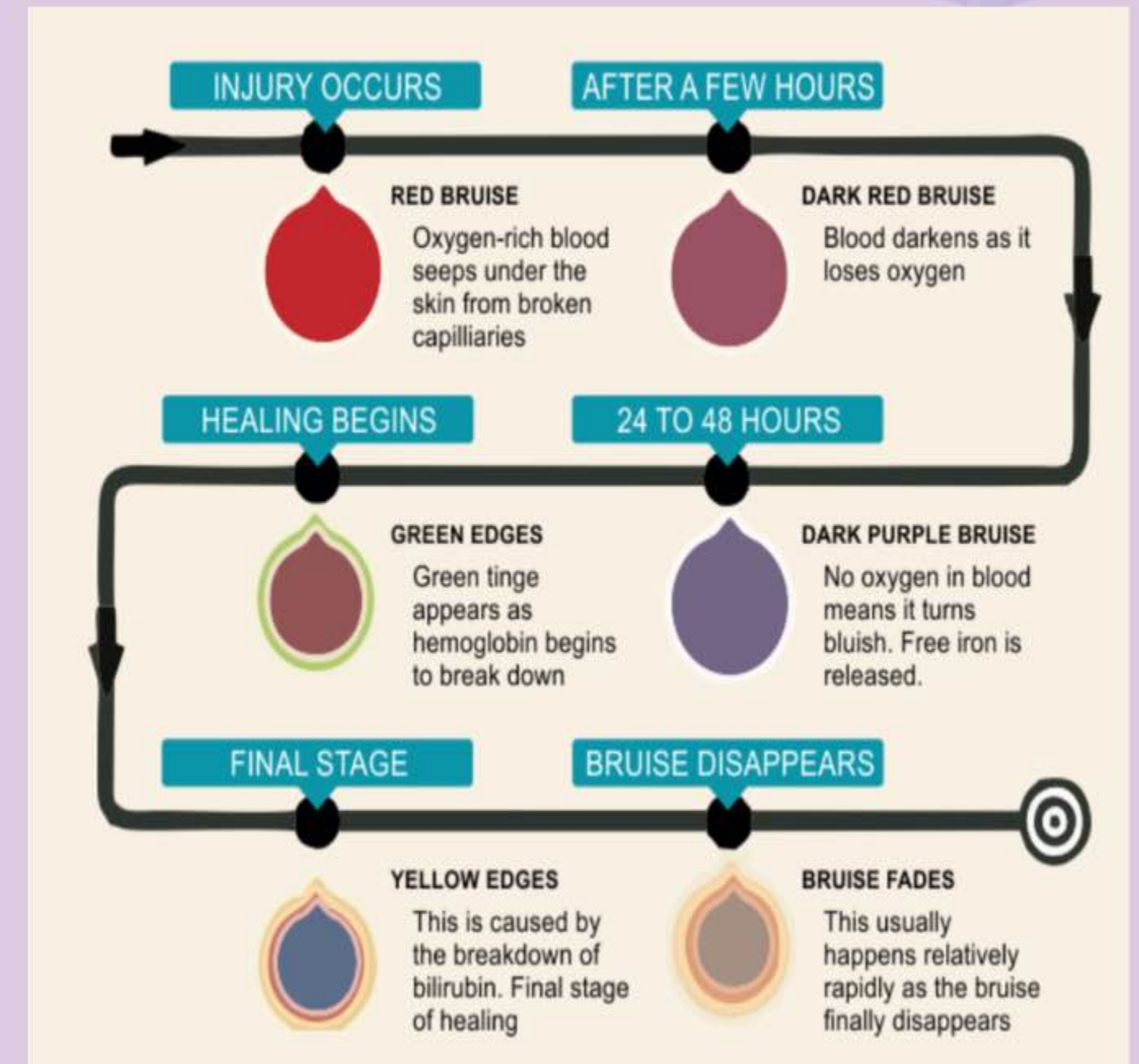
(3) Cullen and Grey Turner signs .

(4) Black eye



# Healing of Bruises (Aging)

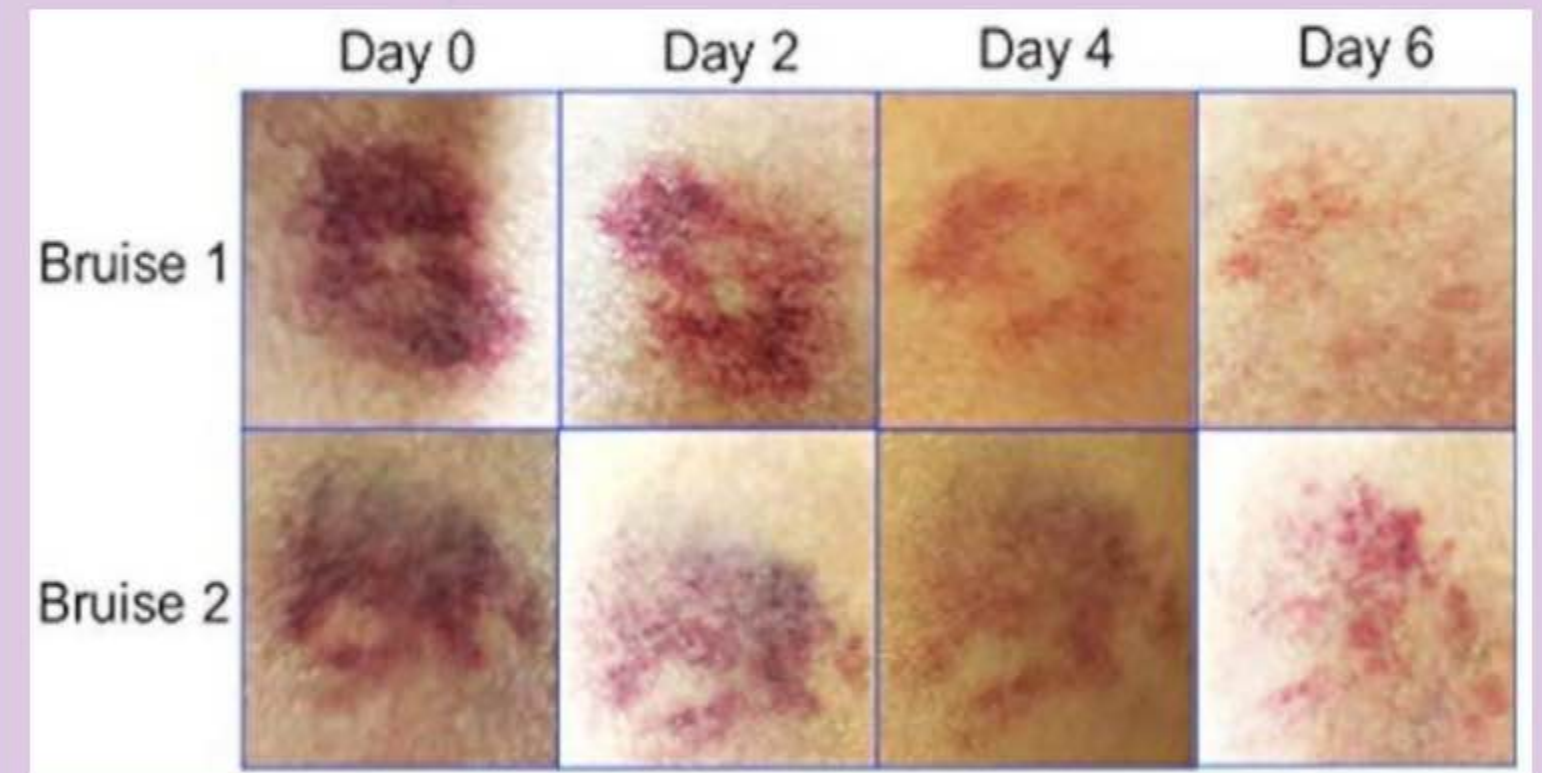
- **Color change starts at the periphery and extends inwards to the center.**
- **If several bruises (of roughly comparable size and site) are present and are of markedly different colors, then they could not have been inflicted at the same time. This is particularly important in suspected child abuse, where intermittent episodes of injury have important diagnostic significance.**



# Healing of Bruises (Aging)

Table 11.2: Age of bruise

| Duration                              | Color                                                |
|---------------------------------------|------------------------------------------------------|
| Fresh                                 | Red (oxygenated blood)                               |
| Few hours to 3 days                   | Blue (deoxyhemoglobin) <sup>15</sup>                 |
| 4-5 days <i>release free iron</i>     | Bluish black to brown (hemosiderin) <sup>16,17</sup> |
| 5-6 days <i>HG begin to breakdown</i> | Green (biliverdin) <sup>18</sup>                     |
| 7-12 days <i>breakdown</i>            | Yellow (bilirubin)                                   |
| 2 weeks                               | Normal                                               |



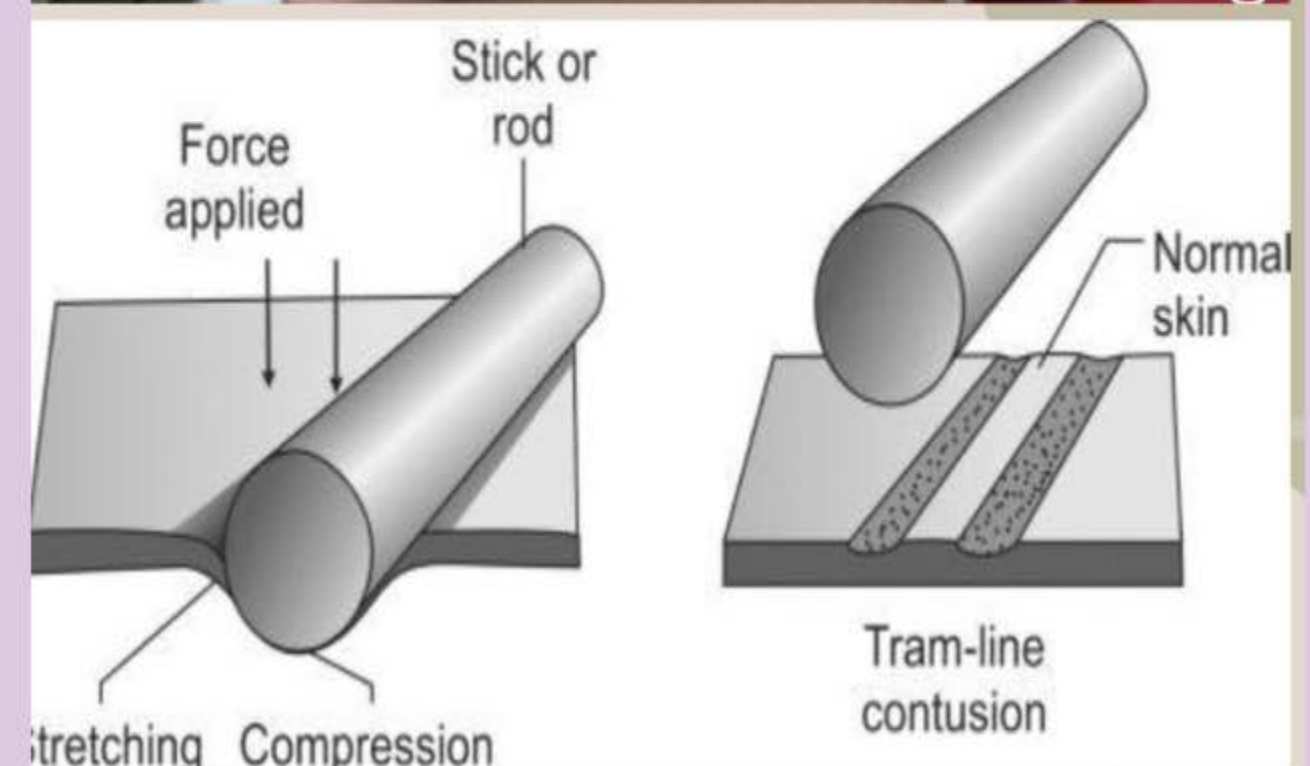
# Fingertip Bruises

- **Clusters of small discoid bruises of about 1 cm in diameter.**
- **These groups are often seen in child abuse.**
- **They are mostly a result of gripping.**
- **Most commonly seen on:**
  - 1. Upper arms and Forearms.**
  - 2. Wrists and Ankles.**
  - 3. Abdomen .**
  - 4. Neck (in strangulation).**



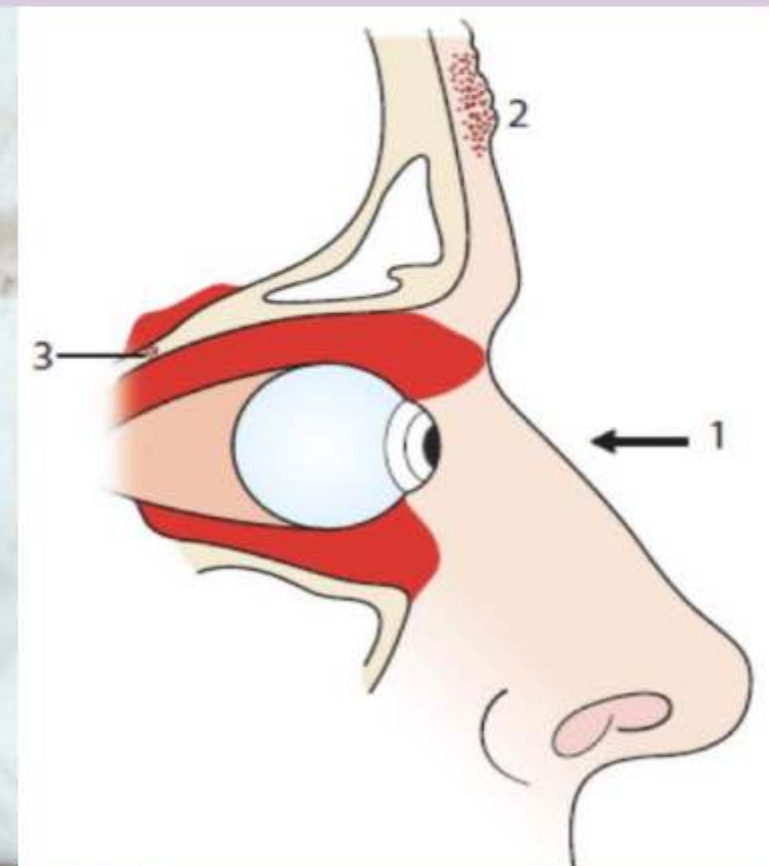
# Tram-Line Bruise (Railway Line)

- **Caused by a rod or rectangular sectioned object.**
- **Appears as two parallel lines of bruising with an undamaged zone in the center.**
- **Mechanism:**
  - ✓ **The weapon sinks into the skin on impact.**
  - ✓ **The edges drag the skin downwards and the traction tears the marginal blood vessels.**
  - ✓ **The center compresses the skin, which, in the absence of underlying bone, causes little or no damage to the vessels**



# Black Eye

- **Periorbital hematoma.**
- **It results from:**
  - 1. Direct trauma to the orbit.**
  - 2. Gravitational seepage of extravasated blood from the scalp on or above the eyebrow level (The Forehead).**
  - 3. Draining of blood into the orbit from a fracture of the anterior fossa of the skull (Basilar skull fractures and Raccoon Eyes)**



# Love Bites

- ***Elliptical patterned bruises.***
- ***It is not actually a true bite.***
- ***It is caused by firm application of the lips against the skin, forming an air-tight seal.***
- ***Oral suctioning will cause a shower of petechial bruises from rupture of numerous small vessels.***
- ***Mostly seen in cases of Sexual Assaults***



# Hypostasis (Livor Mortis) vs. Bruises



Differentiation 11.3: PM staining and bruise<sup>21</sup>

| S.No. | Feature               | PM staining                                                                                   | Bruise                                                                                                                      |
|-------|-----------------------|-----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| 1.    | Cause                 | Distension of vessels with blood in dermis                                                    | Rupture of vessels which may be superficial or deep                                                                         |
| 2.    | Cuticle               | Not abraded                                                                                   | May be abraded                                                                                                              |
| 3.    | Site                  | Occurs over extensive area of the most dependent parts                                        | Occurs at the site of and surrounding the injury, may appear anywhere on the body                                           |
| 4.    | Appearance            | No elevation of involved area                                                                 | Often swollen, because of extravasated blood and edema                                                                      |
| 5.    | Margins               | Clearly defined                                                                               | Merge with the surrounding area                                                                                             |
| 6.    | Color                 | Uniform bluish-purple color                                                                   | Different colors, depending on the age of bruise                                                                            |
| 7.    | On incision           | Blood is seen in blood vessels which can be easily washed away, subcutaneous tissues are pale | Extravasation of blood into the surrounding tissues, cannot be washed by water, subcutaneous tissues are deep reddish-black |
| 8.    | Effect of pressure    | Absent in areas of the body which are under even slight pressure                              | Lighter over the area of pressure or support                                                                                |
| 9.    | Superimposed abrasion | Not present                                                                                   | May be present                                                                                                              |
| 10.   | Microscopically       | Blood cells are found within the blood vessels and there is no evidence of inflammation       | Blood cells are found outside the blood vessels, evidence of inflammation present                                           |

# Contusions and Bruises

Both of Bruises and Abrasions result from blunt force trauma and thus they are usually seen together



# Medico-legal Aspects of Bruises

- They are mostly simple in severity except cases of deep tissue and organ contusions they may be grievous or fatal.
- E.g. (Brain contusion / Lung Contusion) .
- Patterned Bruises may reveal the causative weapon or object .
- The healing process may help with determining the age of the injury or incident.
- May reveal the manner of injury :
  1. Bruising of the arms → restraining.
  2. Bruising of the shoulders → firm pressure against the ground.
  3. Multiple bruises in various stages of healing → abuse .



# Bruises vs. Abrasions

**Bruises are of lesser value than abrasions because:**

- Their size may not correspond to the size of the weapon.\*
- They do not indicate the direction in which the force was applied.
- They may become visible after few hours or even 1–2 days after injury.
- They may appear at a distance away from the actual site of injury. It may not indicate the point of trauma.

# Wounds and Injuries

## المادة 333

### 2. اىذاء الاشخاص:

كل من اقدم قصدا على ضرب شخص او جرحه او اىذاؤه باي فعل مؤثر من وسائل العنف والاعتداء نجم عنه مرض او تعطيل عن العمل مدة تزيد على عشرين يوما، عوقب بالحبس من ثلاثة اشهر الى ثلاث سنوات.

## المادة 334

1. اذا لم ينجم عن الافعال المبينة في المادة السابقة اي مرض او تعطيل عن العمل او نجم عنها مرض او تعطيل ولكن مدته لم تزيد على العشرين يوما عوقب الفاعل بالحبس مدة لا تزيد على سنة او بغرامة لا تزيد على مائة دينار او بكلا هاتين العقوبتين .

2. اذا لم ينجم عن الافعال المبينة في المادة السابقة مرض او تعطيل عن العمل تزيد مدته على عشرة ايام ، فلا يجوز تعقب الدعوى بدون شكوى المتضرر كتابة او شفويا وفي هذه الحالة يحق للشاكي ان يتنازل عن شكواه الى ان يكتسب الحكم الدرجة القطعية ، وعندئذ تسقط دعوى الحق العام .

# LACERATION

- It's full thickness tearing of the skin (or other tissue) due to stretching, pinning and crushing of tissues by blunt force trauma (by moving object or fall).
- Typically over **bony prominence** (scalp, eyebrows, cheek, chin).
- Characteristics :
  1. Ragged edges (torn apart).
  2. Associated bruising and abrasions of skin edges and adjacent tissues.
  3. Heals with scarring.
- Medico-legal importance :
  1. Shape and size not usually related to causal agent.
  2. Rarely self-inflicted.
  3. Trace evidenced in wound (dust or dirt).



# Incised Wounds



- Definition : Clean division of the full thickness of skin and underlying tissues so that the margins are almost free from any damage, usually caused by a sharp-edged instrument (knives or broken glass). It's longer than deeper due to swipe action.
- Types :
  1. **Hesitation cuts**: hollow cuts made by people considering a suicide attempt. They are often non-lethal, multiple parallel cuts.
  2. **Chop wounds**: The presence of an incised wound of the skin, with an underlying comminuted fracture or deep groove in the bone, indicates that one is dealing with a chopping weapon.

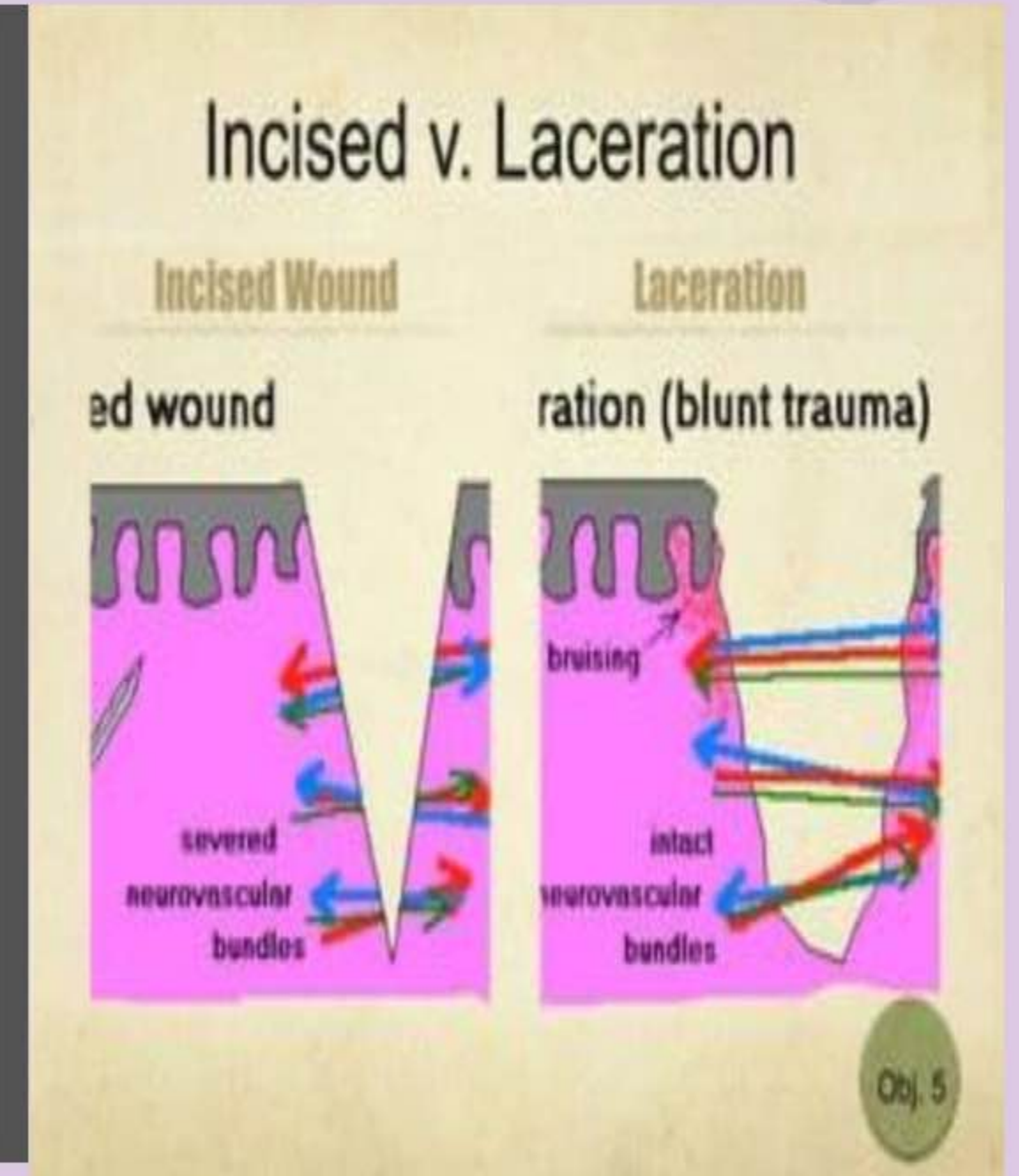
# Incised Wounds

## ● Characteristics :

1. They are caused by **sharp edged weapons**.
2. Shape of injury is **linear shaped**.
3. Margins are slightly **everted**, **clear-cut, smooth & clean**.
4. **Surrounding skin is clear**.
5. Blood vessels are cut hence **bleeding is profuse**.
6. Hair, hair bulb, muscles, bones are cut.
7. **Nerves are cut** hence paralysis may result.
8. Liability to **sepsis is minimal** (any contamination will be washed by the profuse bleeding).
9. Healing is usually by **scarring**.



|                                           | <u>Incised</u>              | <u>Lacerated</u>                                                      |
|-------------------------------------------|-----------------------------|-----------------------------------------------------------------------|
| <i>Instrument</i>                         | Sharp                       | Blunt                                                                 |
| <i>Shape</i>                              | Shape is according to cause | Associated bruising and abrasions of skin edges and adjacent tissues. |
| <i>Associated other types of wounds</i>   | Clear                       | Associated bruising and abrasions of skin edges and adjacent tissues. |
| <i>Edge</i>                               | Everted edge                | خشنة / سرقعة Ragged edge                                              |
| <i>Self-inflicted</i>                     | May be self-inflicted       | Rarely self-inflicted                                                 |
| <i>Bleeding</i>                           | Larger amount               | Lesser amount                                                         |
| CT Skin ← <i>Bridge fibers</i><br>healing | Absent                      | Present                                                               |



# Homicidal incised neck wounds from behind

- Present two different pictures, depending on whether they are produced from the back or the front.
- **Most commonly**, a person's throat is cut from **behind**. Often, the victim is face down on the floor or ground at the time the wound is inflicted.
- The knife is drawn across the neck, from **left to right** by a **right-handed** assailant and from **right to left** by a **left-handed** individual.
- shallow>>> deep centrally>>> shallow.
- The wound generally starts below the ear; runs downward and medially at an angle, then straight across the midline of the neck, and then upward, ending on the opposite side of the neck, lower than its point of initiation.

# Homicidal incised neck wounds from behind



# **Homicidal incised neck wounds from Front**

- Homicidal incised wounds of the neck inflicted from the front tend to be short and angled.
- A right-handed individual typically inflicts incised wounds on the left side of the victim's neck, with the slashes running downward and medially at an oblique angle.
- If the wounds are inflicted on the right side, they tend to be fewer in number.
- Horizontally incised wounds inflicted from the front of the neck are the least common.
- Instead of the neck's being cut with one long, continuous motion, these wounds are inflicted by "swipes" or slashes made while facing the individual.

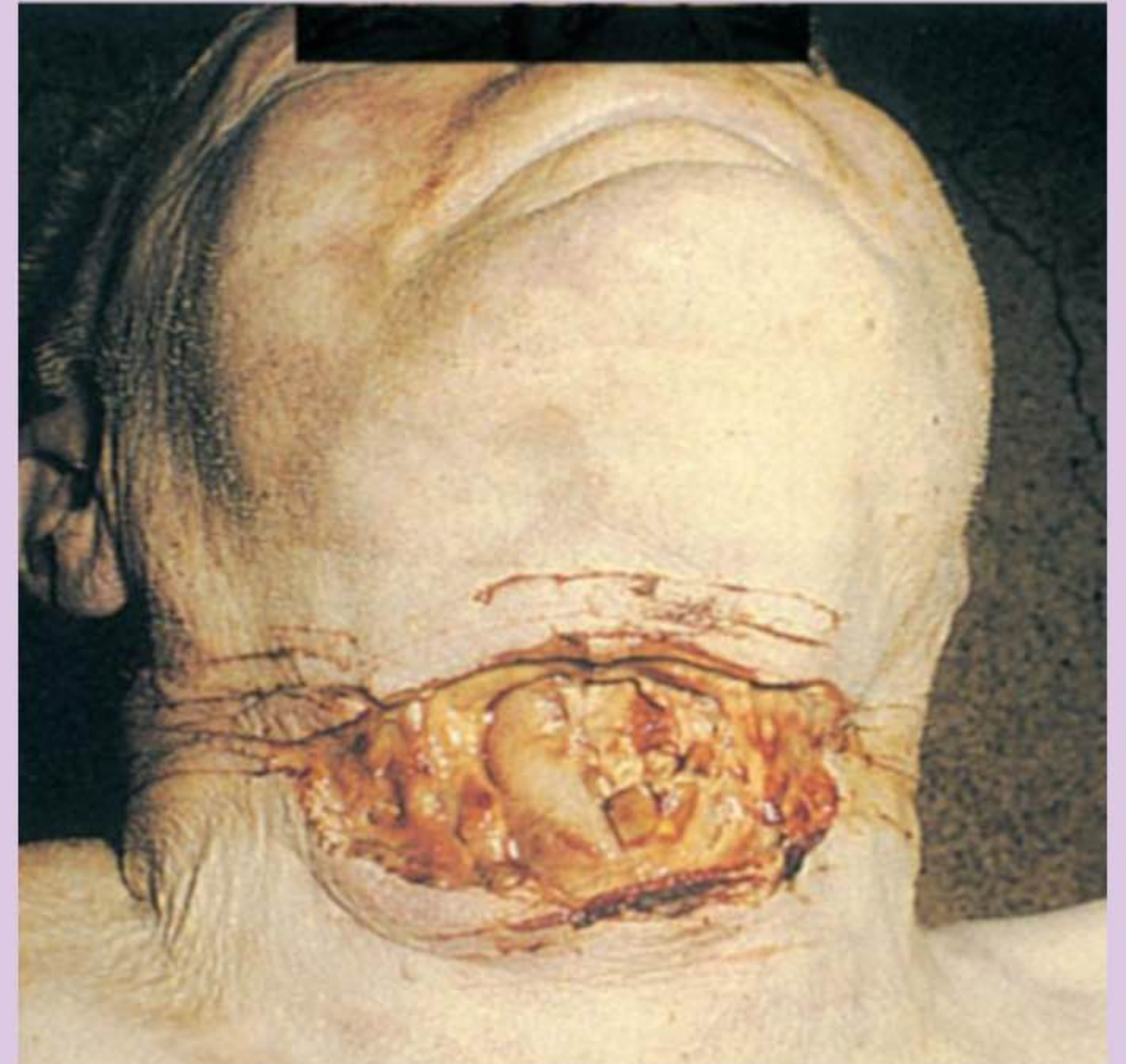
# Homicidal incised neck wounds from behind



# Self inflicted

## ● Suicidal cut Throat:

- ✓ In self-inflicted wounds of the neck, the same general pattern holds as for a homicidal assault from the behind.
- ✓ The wound usually begins higher on the neck on the side opposite to where it terminates.
- ✓ Suicidal incised wounds of the neck are usually, but not always, accompanied by hesitation marks.
- ✓ Incision is usually through level of thyrohyoid ligament and may be down to spine!
- ✓ In rare instances, it may be accompanied by cadaveric spasm with the knife found firmly clenched in the victim's hand — unequivocal proof of suicide.



# Self inflicted

## ● Medico-legal aspect :

1. Reflect sharp edge, not weapon type.
2. No trace evidence.
3. Profuse external haemorrhage and air embolism.
4. Danger to life depends on site and depth.
5. Incised wounds are usually homicidal or suicidal & rarely accidental in nature.
6. Post mortem incised wounds may be caused by criminal to hide crime & identity.



Active defensive wound



Passive defensive wound

# Incised Wounds

- IN HOMICIDAL INCISED WOUND, DEFENSE INCISIONS ARE PRESENT ON DORSUM OF HAND, ULNAR ASPECT, FOREARM OR ON PALM.



✓ Typical defense injuries in a victim of a knife attack . In grasping the blade to deflect it, there have been cuts across the palmar surfaces of the finger joints and a slash between the thumb and forefinger, together with cut at the base of the thumb.



✓ Defense wound on the back of the hand trying to ward off the knife .



|                                         | <u>Incised</u>              | <u>Lacerated</u>                                                      |
|-----------------------------------------|-----------------------------|-----------------------------------------------------------------------|
| <i>Instrument</i>                       | Sharp                       | Blunt                                                                 |
| <i>Shape</i>                            | Shape is according to cause | Associated bruising and abrasions of skin edges and adjacent tissues. |
| <i>Associated other types of wounds</i> | Clear                       | Associated bruising and abrasions of skin edges and adjacent tissues. |
| <i>Edge</i>                             | Everted edge                | خشنة / معرقة Ragged edge                                              |
| <i>Self-inflicted</i>                   | May be self-inflicted       | Rarely self-inflicted                                                 |
| <i>Bleeding</i>                         | Larger amount               | Lesser amount                                                         |
| Bridge fibers ← جسور الكولاجين          | Absent                      | Present                                                               |

# Stab & puncture wound

- A stab wound is deeper than it is long and it is the depth of the injury that makes it so often fatal and hence of such forensic interest.
- Stabbing is the commonest method of homicide in Britain and accounts for over 50 per cent of all murders, many of which are domestic in type.
- Often appear trivial externally (short incision or laceration) BUT often causes internal trauma and haemorrhage .
  1. PENETRATING : passes into but not through organ.
  2. PERFORATING :OR TRANSFIXING:passes through an organ



# Stab & puncture wound

## ● Shape of wound may indicate:

### 1. Cross-sectional shape of knife blade:

- ✓ Double-edged blade: Slit with two sharp ends.
- ✓ Single-bladed: wound with one acute angle while the other angle is rounded.
- ✓ Closed scissor: rhomboid wound (both are rounded)



FIGURE 4.36 Two knife wounds in the back. The wounds have a sharper lower edge compared to a rounder upper edge, due to a one-edged blade.



# Stab & puncture wound

## 2. Direction of insertion :

✓ N.B. The direction of the wound track through the tissues is assessed at post mortem, with the body lying flat on its back.

The position of the internal organs is different in life, when standing, sitting and breathing.

## 3. Movement of instrument on withdrawal :

✓ Small change in angle>>>notch.

✓ Twisting >>>crescentic wound

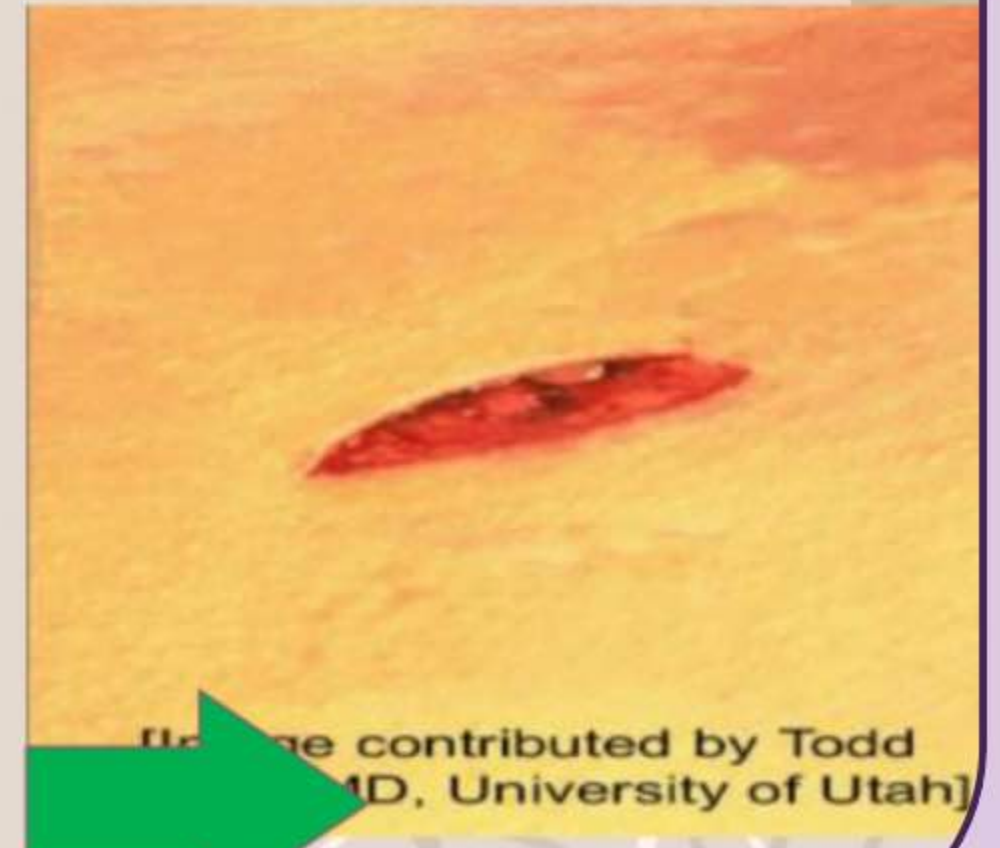


Irregular configuration of stab wounds caused by knife's being twisted or movement of victim as blade is withdrawn

# Stab & puncture wound

- ✓ This is a stab wound with a single edge blade. Note the sharp point of the blade at the left and the notch of the opposite side of the knife at the right.
- ✓ This is a single-edge blade stab wound in which there is a "hilt" mark at the left. The sharp blade edge is at the right.
- ✓ Irregular configuration of stab wounds caused by knife's being twisted or movement of victim as blade is withdrawn.

[Image contributed by Todd Grey, MD, University of Utah]



[Image contributed by Todd Grey, MD, University of Utah]

# Stab & puncture wound

## ● Degree of force :

- ✓ Wound depth is a poor indicator of force applied.
- ✓ Bony damage is useful indicator of depth and implies significant force.
- ✓ Most resistance offered by CLOTHES AND SKIN
- ✓ Once the skin has been penetrated, the blade slips easily through the underlying muscle, internal organs and uncalcified cartilage, without the need for further application of force.

## ● Adequate description may provide vital information about:

- 1) Type of weapon: usually a knife.
- 2) Dimensions of the weapon .
- 3) Taper of blade .
- 4) Movement of knife in wound .
- 5) Direction of thrust .
- 6) Depth of thrust .
- 7) Amount of force used.
- 8) Likely effect on victim.



# Stab & puncture wound

## ● Descriptors of penetrating wounds :

- Damage to clothing (slashes, stabs through folds ,blood flow & drip patterns, trace evidence)
- Site in relation to anatomical landmarks.
- Shape.
- Alignment (horizontal, vertical, oblique).
- Size : length & width with edges opposed.
- Direction: in 3 planes.
- Depth.
- Damage to tissues along track.
- Effects: external & internal haemorrhage ,pneumothorax , air embolism.



FIGURE 4.38 Multiple stabs on the back from the same knife, showing differing shapes and sizes.

# Stab & puncture wound

**Stab wounds are usually homicidal, sometime suicidal & rarely accidental.**

## ● **Classification medico-legally:**

### 1. Suicidal injuries :

- ✓ Suicide is usually done at calm, quite & lonely place.
- ✓ Surrounding are not disturbed.
- ✓ No signs of struggle , No defense wounds.
- ✓ Sometimes hesitation wounds may be present.
- ✓ Weapon usually present on or near the body.
- ✓ Injury is usually single, Common injuries: incised, firearm wound
- ✓ Site & direction of injury is explainable with handedness of person & with self infliction.
- ✓ There may be evidence of other methods attempted for suicide.



# Stab & puncture wound

## 2. Homicidal injuries:

- ✓ May be caused at any place.
- ✓ Surrounding usually disturbed.
- ✓ Signs of struggle usually present on clothes & body.
- ✓ Defense wounds may be present.
- ✓ There may be evidence of sexual assault on female victim.
- ✓ Weapon is usually missing.
- ✓ Injuries are multiple & on any body part.
- ✓ Common injuries are lacerated, stab, firearm.

## 3. Accidental injuries:

- ✓ Injuries due to impact of the vehicle depends upon the part of vehicle that hits (primary impact injuries).
- ✓ The victim may be thrown forward or on top of the vehicle & may again impact the vehicle & may get injured (secondary impact injuries).
- ✓ Due to impact of vehicle, person may fall, hence injuries received depends upon the surface on which he falls (secondary injuries).
- ✓ Common injuries are lacerated, stab, firearm.



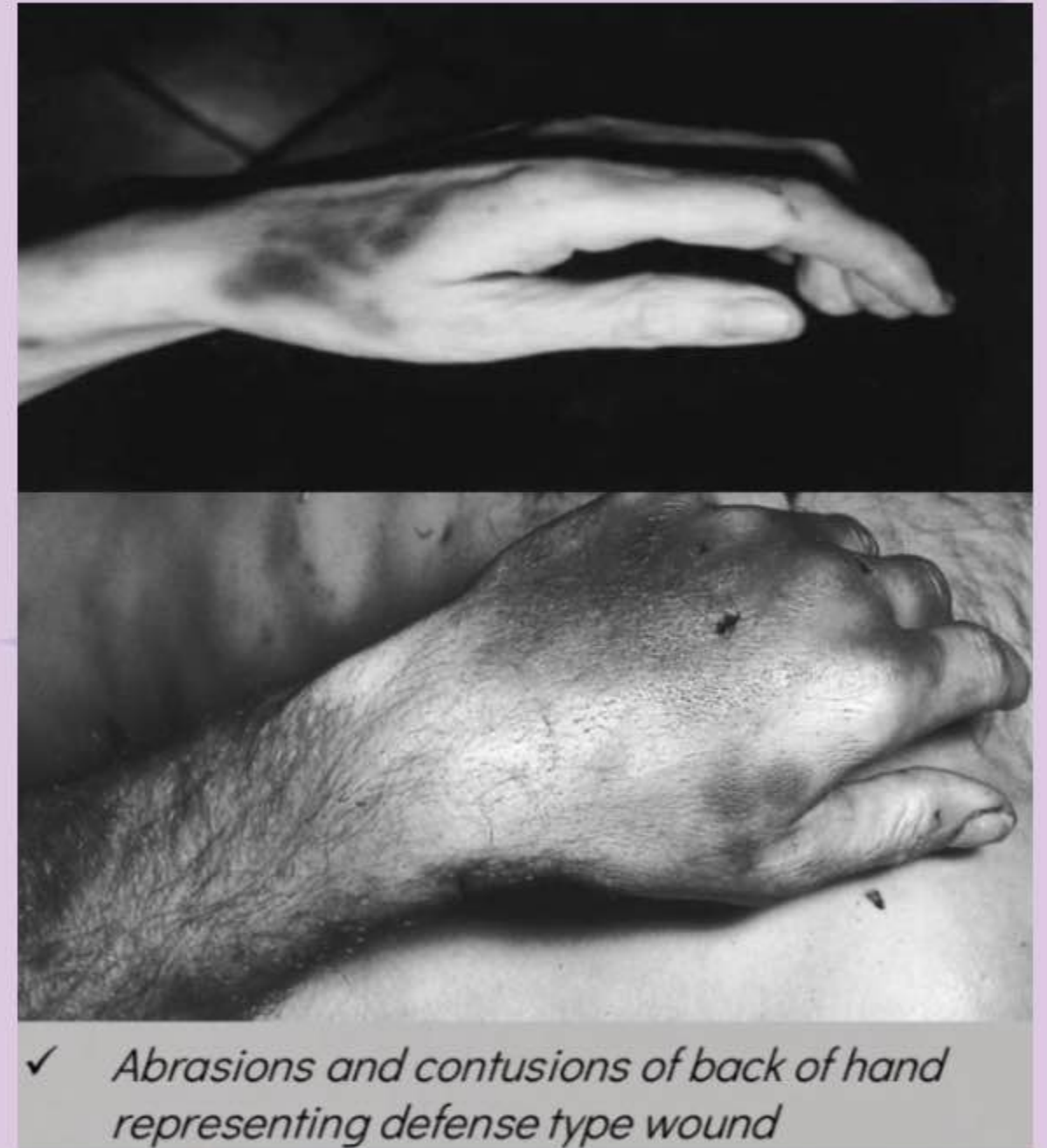
# Stab & puncture wound

## 2. Self inflicted injuries:

- ✓ Cuts are usually superficial, multiple and parallel.
- ✓ In right handed people most of injuries are on the left side.
- ✓ Features :
  1. certain sites : throats, wrists and the front of the chest.
  2. they are often multiple .
  3. suicidal injury of the chest are almost always stab wounds.
  4. stab wounds of the neck are uncommon in suicide.

## 5. Defense wounds:

- ✓ When punching, kicking or attack with a blunt instrument takes place, the outer side of the forearm, back of the hand maybe abraded, bruised or even lacerated.
- Finger may be broken



# Complications of wounds

1. Neurogenic (primary shock).
2. Traumatic (secondary shock).
3. Hemorrhage.
4. Embolism (air, thrombus, fat) .
5. Injury to internal organs.
6. Formation of scar.
7. Infection.

## ● **Crush syndrome :**

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



# Causes of death



## 2. Secondary/Remote causes:

- ✓ Infection.
- ✓ Thromboembolism.
- ✓ Acceleration of pre existing disease .
- ✓ Professional medical negligence.
- ✓ Renal failure due to crush syn.

## 1. Primary/Immediate causes:

- ✓ Neurogenic shock.
- ✓ Injury to vital organs.
- ✓ Hemorrhage.

# Management of acute wounds

- **Prehospital : direct pressure and elevation.**
- **Call for help -Emergency medical services.**
- **ABCDE : primary aid**
- **History taking**
- **Wound care:Inspection, exploration ,debridement , irrigation .**
- **Protection of vessels, nerves and tendons during debridement ( as much as u can ).**
- **Skin grafts to cover exposed areas**



# **Duty of the doctors in wounding cases**

- ✓ **Treat the injuries and support the pt.**
- ✓ **The injuries are examined and evaluated , then described in writing , photographs with measurement included.**
- ✓ **Examine the whole body**
- ✓ **Any FB recovered from the wounds should be retained & labelled .**
- ✓ **Radiographs.**
- ✓ **The clothing of the victim should be preserved.**
- ✓ **Blood samples for grouping, DNA analysis , alcohol or drug estimation.**



## المادة 334 مكررة :

كل من أقدم قصداً على :

1. ضرب شخصٍ على وجهه أو عنقه باستخدام الشفرات أو المشارط أو الأمواس أو ما شابهها من أدوات حادة يعاقب بالأشغال المؤقتة مدة لا تزيد على سبع سنوات مهما كانت مدة التعطيل .
2. القاء مواد حارقة أو كاوية أو مشوهة على وجه شخصٍ أو عنقه يعاقب بالأشغال المؤقتة مدة لا تقل عن سبع سنوات.



**Thank you for  
your attention**

