



Medico-legal wounds

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Objectives

- 1- Different types of wounds
- 2- Medicolegal importance of wounds
- 3- Determination of the age of wounds
- 4- Antimortem and postmortem wounds.
- 5- Complications of wounds.

Definition of wound

- A wound is a **disruption** of the normal structure of tissues caused by the application of force to the body.
- Legal definition of a wound
a wound is where the whole skin is **broken**, the continuity of the skin is broken.
 - **An abrasion** of the surface is **not sufficient**
 - **fractures or internal injuries** are not included if the overlying skin is **intact**.

Wound classification

- Wounds or injuries may be classified according to their etiology and pathology into the following groups:

A- Legally (من الناحية القانونية)

- 1- **Slight or simple** wound in which the lesions are not serious and heal rapidly in less than 20 days without leaving **permanent infirmity** . عاهه مستديمه .

- 2- **Dangerous or serious** wound, it takes more than 20 days or less to heal but leaving a **permanent infirmity**.

- 3- **Mortal or fatal** wound which causes death either immediately or within a short time.

✓ B- Medico-legally

I- **Blunt wounds:** (abrasions, bruises, lacerations)

II- **Incised or cut wounds**

III- **Stab or punctured wounds**

IV- **Firearm wounds**

✓ - Description of wounds for medico-legal purposes

1. **The type and nature:** whether it is a bruise, abrasion or laceration etc,
2. **Position and direction.**
3. **Dimensions (length, width and depth).**
4. The probable **time** of its occurrence may be recorded.
5. Is the wound **ante-mortem** or **post-mortem**??

6. The **age of ante-mortem** wound must be recognized.
7. **Numbers** should be assigned to each wound that is described.
8. It is helpful to take a **photograph** of the wound with an indication of dimensions (e.g. a **tape** measure placed next to the wound).
9. Records of diagrams to chart the approximate situation of injuries found on examination during life or at autopsy are often of value.

For wound examination we have to answer the following questions

- 1- What is the **nature** of injury and the used **instrument** ???
- 2- Was the injury inflicted before or after death???
- 3- What was the cause of death??

1- Blunt wounds

Definition:

They are injuries caused by a **blunt force** (instrument).

They are divided into three types:

a- Abrasions or scratches (سحجات أو خدوش)

b- Bruises or contusions (كدمات)

c- Lacerations.

a- Abrasions

Definition

An abrasion is a destruction of the skin which usually involves the **superficial layers** of the **epidermis only**. Abrasions are caused by friction of the skin against rough or sharp surface resulting in scraping away the **superficial portions of the epidermis.**

Abrasions

- Surface injury
 - mild abrasions are called **Graze** (خدش) or **scrapes** (do not scar or bleed)
- rough surface striking the body.
- crushed epidermis, pressure or imprint abrasions
- **examples:** ligature mark, fingernail scratches, tyre marks, ground or gravel injuries.

● *Shape*

Abrasions often take the form of parallel furrows in the skin surface. These furrows may be broad at one end and tail away in the opposite direction. This appearance is usually indicative of the direction in which the force was applied.





○ ***Causes:***

- 1- **Blows** from blunt instruments and from falls. Such abrasions are commonly found on the head and face and over the bony prominences.

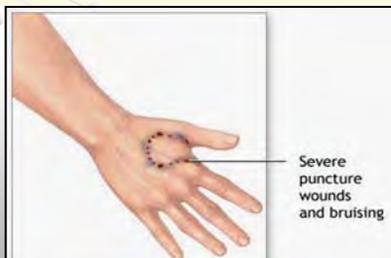
Abrasions are commonly accompanied by other injuries such as bruises, fractures or internal injuries.

2. Finger nails: they appear either **crescentic marks** or as relatively **broad parallel grooves** which tail away at their end.

- ❖ They are commonly found in the front or at the sides of the neck in the case of throttling and in the front of the neck, the thighs, and the vulva in the cases of the bestiality or rape.

3. Bite wounds: appear as **3 or 4 separate abrasions on a slightly curved line** may be observed representing the teeth of the upper jaw and one or two marks in the opposite direction represent the teeth of the lower jaw. Ex. Animal or human bites

Snake bite: two fangs (puncture) surrounded by abrasions



✓Medico-legal importance of abrasions:

1. They indicate that some force has been applied to the body.
2. The features of abrasions may indicate the **nature and direction of the applied force and possibly the purpose** for which it was applied.
3. The site of the abrasions may refer to the type of the crime.
4. The shape may refer to the used instrument.

5- Age: A recent abrasion is reddish and wet, It dries gradually, and in one to two days a **soft scab (crust)** covers it, this scab dries up acquiring a darker brown color in another two days and begins to **separate in 2-3 weeks** leaving a reddish surface which gradually becomes **pale** in another few days





Abrasions in buffaloes

- **6- In the dead body**; we have to differentiate between ante-mortem and post-mortem abrasions, so it is advisable to **excise the abrasions** and submit the tissue for histological examination.
- **On Microscopical examination:**
ante-mortem abrasions show signs of tissue reaction (hyperemia or extravasations of blood) while in **post-mortem abrasions** there is a white surface without any tissue reaction.

b- Bruises or contusions

Definition

- Contusions, bruises or ecchymosis are wounds which characterized by **infiltration of blood into the tissues following rupture of vessels as a result of application of blunt force.**
- The resulting discoloration is seen through the overlying intact skin.



➤ **The extent and the degree of bruising depend on:**

- 1-The force applied to the body.
- 2-The structure and vascularity of the affected tissue.
- 3- The thickness of the skin.
- 4- The texture of the subcutaneous tissues.
- 5- The relationship of these structures to the deeper tissues which vary in different parts of the body.

✓ **Site, shape, size, severity of bruising are variable.**

Causes of bruise (contusions):

- ❖ Due to **blunt force trauma (blunt instrument).**
- ❖ Moving **object** strikes the stationary body (blow with fist or weapon)
- ❖ Moving **body** strikes a stationary object (fall), pinching or squeezing
- ❖ other ways, e.g. by the pressure of the fingers in throttling.



Shape

- ❖ The shape of bruise is round or oval but it may indicate the nature of the instrument used.
- ❖ A bruise from a **strap** leaves a definite imprint of the instrument used.
- ❖ Sometimes it is a poor indicator of causative object

Early



Latter



➤ **Color changes of bruises:**

The blood in the tissues undergoes changes during its absorption and these changes are shown by differences in the color of bruises.

The **red** color of fresh blood
(oxyhaemoglobin)

changed to **purple**

(reduced haemoglobin)

or almost black very soon after the injury.



In 4 - 5 days the color changes to **green**
(biliverdin)



In 7 - 10 days it becomes **yellow**
(bilirubin)



, and gradually disappears in 14 to 15 days.

Bruises change color over time, because of the degradation of **hemoglobin** in the blood. However, the time scale of this degradation is **not fixed**, and it is therefore possible only to give a **rough** estimation of the age of the bruise???



- These changes depend on the severity of the case, size of bruises and the age of the animal.
- It is, therefore, possible to say whether a bruise is **recent or old** but it is **rarely** possible to say **how old**.

- **The differences between ante mortem & postmortem bruises:**

- ***Ante-mortem bruises:***

On external examination during life, bruises appear swollen, tender, discolored areas, damage to epithelium, extravasations, coagulation and infiltration of tissues with blood.

- ***Post-mortem bruises:***

Bruises may not readily detected at autopsy or they may obscured by patches of postmortem lividity.

📌 Differentiation between the ante-mortem and post-mortem bruises

	Ante -mortem	Post mortem
External examination	<ul style="list-style-type: none"> - Swollen, tender and discolored areas - Damage to epithelium - Extravasations - Coagulation - Infiltration of tissues with blood. 	Absence of all these sings
Microscopical examination	<p>The criteria of the disintegration rate of the red blood cells:</p> <ul style="list-style-type: none"> - lost their shape and staining - Iron containing pigment is found in the site of injury or in the lymph nodes, it indicate 12 hours after injury. - The presence of tissue reaction. 	-There is no tissue reaction or any signs of inflammation or healing process.

✓ - Distinguishing between hypostasis and bruises

- ✓ This can be done by cutting in the discolored area:
- In case of hypostasis the **blood is present in blood vessels**, and **easily** washed away by a stream of water.
- if the color is due to a bruises, **extravasated blood** will be seen **infiltrating** the tissues, this blood is **firmly clotted** that it **can not be washed away**.
- Also bruises are often accompanied by abrasions and /or signs of sepsis.

C- Lacerated wounds

- **Definition**

They are wounds in which the tissues are **orn** as a result of the application of **blunt force** to the body.

- The external lacerated wounds are caused by **splitting of soft tissues** against the underlying bone.

- **Cause**

The force may be produced by some **moving** instruments or object or by a fall.

They are caused by **kicks or blows** from blunt objects as sticks, iron bars, or stones. They are often associated with injuries to internal organs and fracture of bones.

- Car accidents may cause lacerated wounds in animals.



● *Shape*

■ various shapes and different sizes, it is usually **irregular** in shape



■ In most cases they take the shape of the underlying bone.



General features

- ❖ The **edges** of the lacerated wounds are **irregular**, their extremities are **orn**, the deeper tissues **unevenly divided**.
- ❖ The edges and surrounding parts are bruised and foreign bodies or hairs may be found in the wounds.



- If **hair- bulbs** are present they will be seen **crushed** instead of cut.
- **External bleeding** from laceration is **not pronounced (low)** because the blood vessels are usually **crushed**.
- **Healing** generally takes place by **second intention** and results in a **well-marked scar** formation.

II- Incised (cut) wounds

- Incised wounds are caused by **sharp instruments or objects such as knives, jagged portions of metal or pieces of broken glass.**



➤ Shape

- It is usually **linear or spindle** shaped. it may have a V-shaped appearance, the shape of the incised wound may depend on the shape of the of a weapon blade.



Horse limb



Donkey

General features

- ✓ The edges of incised wound are **regular, clean-cut and everted.**
- ✓ It is usually **longer** than **deep**, it is often **gaping.**
- ✓ In deep incised wounds, the degree of gaping is greater when the muscles are cut transversely than when they are cut in the longitudinal plane of their fibers.

- **Bleeding is profuse** especially if blood vessels are cut.
- **Bruising may or may not present.**
- **Infection is relatively uncommon and usually heals with first intention with minimal scar formation.**

Age:

- **Within 12 hours** the incised wound becomes red with swollen edges.
- **In about 24 hours**, the proliferation of vascular endothelium occurs.
- **After 36 hours**, incised wounds are covered with lymph.
- **After 3 days** their edges are strongly adhered.

- In about **7 days** healing takes place leaving a red linear scar.
- If **infection or sepsis** occurred, the wound may remain open for indefinite period and scars are larger and deeper.
- The usual incised wound is linear except in the regions of the **loose skin** it takes zigzag course e.g. wound in the neck or axilla.

III-Stab and Punctured wounds

- ❖ Punctured or stab wounds are caused by long narrow instruments with blunt or pointed ends.
- ❖ Punctured wounds are described as "penetrating" when they pierce deeply into tissues and as "perforating" when they transfix tissues and cause exit wounds.
- ❖ An incised wound becomes stab when it is deeper than broad.



Instruments that cause stab wounds

- **Cause**

They are caused by **sharp - pointed** objects as knives, daggers and spears.

- **Shape:** The shape of stab wounds can vary considerably, depending upon whether the incision is along the axis or perpendicular.

- Those **perpendicular wounds** will tend to gape open and become triangular or cruciate shape

- **while** those **parallel** to the lines of stress will tend to remain slit-like.

This is a stab wound in dog head with a single edge blade.





General features

- **The diameter** of the external opening may be **smaller** than the diameter of the weapon **due to the elasticity** of the skin.



- The opening (inlet) may be **larger** in cases where the weapon is withdrawn **obliquely** after penetration.



- The depth may be greater than the total length of the penetrating object because the tissues deep to the skin are often **compressed** during the process of penetration.
- The size of the wound doesn't necessarily correspond to the width of the used weapon, because withdrawing the instrument may cause the wound to enlarged.

- External haemorrhage is usually **limited** but serious internal hemorrhage may result from thorax or abdomen penetrations.
- It may be **fatal** if injuries of the **internal organs** occurred.



The estimation of the approximate age of an ante-mortem wound

- The age of the ante-mortem wound has to be determined for medico-legal purposes.
- The age of the ante-mortem wound is determined depending upon **the time** of occurrence of the **reactive changes** of inflammation to an aseptic injury as following:

- Dilatation of the capillaries and migration of the **leucocytes** may be seen within few **minutes** of injury.
- Emigration of leucocytes is usually observed within **an hour**, the first type of leucocytes is **polymorph nuclear neutrophils**.
- **Monocytes** appear later after **12 hours**.

- The **exudates** reach the maximum intensity within **48 hours**.
- **Fibroblasts** present at the site of injury in few hours and the cells begin **mitotic division** through **15 hours**.
- The proliferation of the **fibroblasts** and **vascularized granulation tissue** takes **72 hours** to develop the **collagen formation**.

- The new **fibrilin** may be seen within **4 to 5 days** of the injury.
- The **fibrous scar** tissue may be appear at the end of the **week**.

Note

- Infection may lead to delay and modification of the time of these changes. And be difficult to determine accurately the age of the wound.

Ante-mortem and post-mortem wounds

	Ante-mortem	post-mortem
✓ Edges	gaping edges, everted, inflamed, hyperemic and swollen.	No gaping No inflammatory signs
✓ Bleeding	Profuse and extensive, Infiltrate the deeper tissues, resist washing Marks of arterial spouting may be found externally	There may be hemorrhage from cut veins but it is never extensive No arterial spouting
✓ Blood clot	It is clearly appeared infiltrating the edges	Completely absent It is easily washed under the tap (liquid blood)

✓ Vital reactions	Vital reaction can be shown in the form of healing or sepsis.	never seen
✓ Microscopical examination	Showed infiltration of leukocytes and fibrin threads Granulation tissues may appear as early changes of healing	never seen

❖ Complications of wounds

✓ Direct causes of death

A- Injury to vital organs: as heart, brain, liver and lungs.

B- Shock

Shock is a severe lowering of the effective blood pressure, caused by either acute failure of cardiac action resulting from disturbance of **nervous control of heart** or from severe **loss of blood volume**.

Types of traumatic shock

● It is either neurogenic or hematogenic.

I- Neurogenic shock: Two types:

A- Parasympathetic or vagus nerve leads to acute circulatory failure.

The PM: tissues and organs are pale; the **right side of the heart** is empty and collapsed.

B- Sympathetic nerves lead to ventricular fibrillation. It accompanied with painful wounds.

The PM showing congestion of organs and pulmonary edema.

II. Hematogenic (hemorrhagic) shock

- It is due to either external hemorrhage or increases the capillary permeability and loss the capillary tone as a result of toxic histamine like substances absorbed from the site of trauma.
- The PM showing engorgement of the capillaries and veins, petechial haemorrhage in the tissue, empty heart and contraction of spleen.

❖ Indirect causes of death

A-Embolism

- It is a detached intravascular physical mass that is carried by the blood to a site distant from its point of origin it may be:
 - Arterial embolism
 - Pulmonary embolism
 - Fat embolism
 - Air embolism
 - Foreign body embolism

B-Septic infection

- Due to microbial infection of wounds lead to septicemia.

C- Scare formation

- Scare formation in the intestinal lumen lead to obstruction and death.

Causes of death from wounds

Direct

Shock:

- Neurogenic
- hemorrhagic

Injury to vital organs

indirect

embolism

Septic infection

Scare formation

تقرير طبي شرعي

بناءً على الإشارة الواردة بتاريخ 16/12/2010م من السيد وكيل النائب العام لنيابة ديروط بشأن فحص فرس مصاب في القضية رقم 6564 لسنة 2010م والمتواجدة في المستشفى البيطري التعليمي بجامعة أسيوط، قمت أنا الدكتور/ عادل شحاتة محمود - أستاذ ورئيس قسم الطب الشرعي والسموم بكلية الطب البيطري جامعة أسيوط بفحص الحالة بتاريخ 18/12/2010م الساعة الحادية عشرة صباحاً وتبين الآتي: الحيوان المفحوص فرس (أنثى حصان) حمراء اللون وتوجد بها جبهة بيضاء وكذلك علامات بيضاء على الجزء الأسفل للقائمة اليسرى الأمامية وكذلك القانتين الخلفيتين وعمرها حوالي سبعة عشر عاماً ، وبالكشف الظاهري وجد جرح قطره حوالي واحد سنتيمتر خلف الركن الوحشي للعين اليسرى وكذلك التهابات ونزيف وتهتك شديد وتلف بالعين اليسرى. وبفحص الفم وجد به جروح قطعية متعددة باللسان وكذا الجانب الأيسر للشفة السفلى. وبفحص باقي الجسم وجد جرح غائر بالقائمة اليمنى الخلفية في منطقة أعلى الفخذ من الخلف متهتك الحواف متعفن الرائحة وبفحصه من الداخل وجد بداخله مقذوف ناري مصنوع من النحاس ومفرغ من الداخل قطره حوالي خمسة ملليمتر ومحطم في جزئه الأعلى. ونظراً لتأخر الفحص الطبي لم تكن آثار الإطلاق واضحة. وقد تم تحريز المقذوف وتسليمه مع التقرير لمنسوب النيابة. وقد تم عمل أشعة سينية على منطقتي الرأس والفخذ ولم يتبين وجود أي مقذوفات أخرى داخل المنطقتين. وقد تم علاج الحيوان محل الفحص بعمل خياطة جراحية للسان والشفة وتم تنظيف جرح الفخذ بالمطهرات وأعطى الحيوان مضاد حيوي ومصل التيتانوس.

كما سبق يتضح أن الحيوان محل الفحص أصيب بطلق ناري من الجهة الخلفية للحيوان في منطقة الفخذ وقد تعزى إصابة العين اليسرى إلى دخول مقذوف ناري من الجرح المجاور وخروجه من فتحة العين مما أدى إلى تلفها وتعزى إصابات الفم إلى سقوط الحيوان أرضاً. كتب هذا التقرير من ثلاث نسخ أحداها للسيد وكيل النائب العام بديروط والثانية سلمت للسيد الأستاذ الدكتور مدير المستشفى البيطري بجامعة أسيوط وحفظت النسخة الثالثة طرف السيد الأستاذ الدكتور كاتب التقرير.

تحريراً في يوم السبت الموافق 18/12/2010م

دكتور/ عادل شحاتة محمود

أستاذ ورئيس قسم الطب الشرعي والسموم
كلية الطب البيطري - جامعة أسيوط

