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# 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.

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**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 broken.

- An abrasion of the surface is not sufficient
- fractures or internal injuries are not included if the overlying skin is intact.

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**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 دعامة مستديمة

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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.

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**B- Medico-legally**

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

**II- Incised or cut wounds**

**III- Stab or punctured wounds**

**IV-Firearm wounds**

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**- 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. It is helpful to take a photograph of the wound with an indication of dimension (eg a tape measure placed next to the wound)

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❖ The wound is ant-mortem or post- mortem in origin must be determined .

❖ The age of ante-mortem wound must be recognized.

❖ Numbers should be assigned to each wound that is described.

❖ Records of diagrams to chart the approximate situation of injuries found on examination during life or at autopsy are often of value.

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**For wound examination we have to answer the following questions**

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

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**1- Blunt wounds**

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

They are divided into three types:

- 1- Abrasions or scratches
- 2- Bruises or contusions
- 3- Lacerations

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**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.

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• **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.



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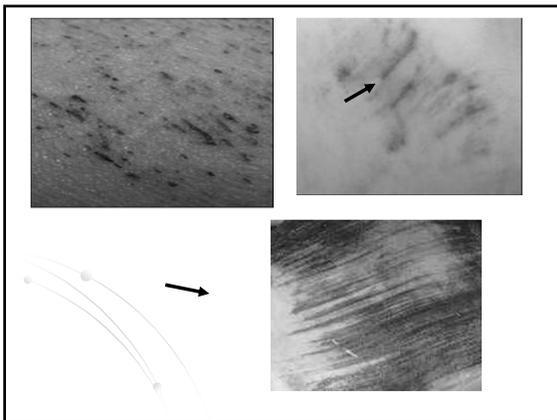
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**Abrasions**

- Surface injury
- Graze or scratch (خدش)
- rough surface striking the body.
- crushed epidermis, pressure or imprint abrasions
- examples: ligature mark, fingernail scratches, tyre marks, ground or gravel injuries e.g. grazed knees

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- **Cause**

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 bruises, fractures or internal injuries.



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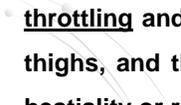
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2. **Finger nails:** they appear either crescentic marks or as relatively broad parallel grooves which tail away at their end.

❖ 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**.



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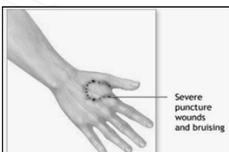
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3. **Bite wounds:** appear as 3 or 4 separate abrasions on a slightly curved line may be observed representing the teeth of the upper jaw and one or two marks in the opposite direction represent the teeth of the lower jaw. Ex. Animal or human bites

- Snake bite: two fangs (puncture) surrounded by abrasions



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✓**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.

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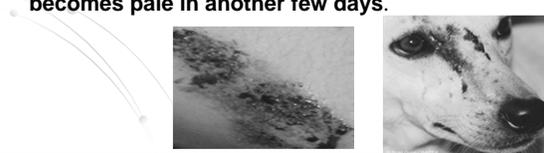
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**5- Age:** A recent abrasion is reddish and wet, It dries gradually, and in one to two days a soft scab (crust) covers it, this scab dries up acquiring a darker brown color in another two days and begins to separate in 2-3 weeks leaving a reddish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



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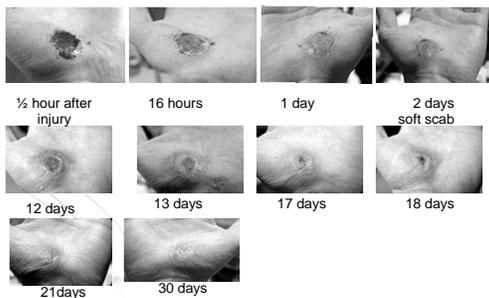
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**Healing process for an abrasion on the palm caused by sliding on concrete.**



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- **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.

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### **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.



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➤ **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.

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

**Causes of abrasions:**

- ❖ Due to blunt force trauma.
- ❖ 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.



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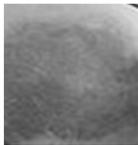
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**Shape**

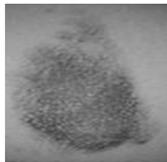
❖ The shape of bruise is round or oval but it may indicate the nature of the instrument used.

- ❖ A bruise from a strap leaves a definite imprint of the instrument used.
- ❖ Sometimes it is a poor indicator of causative object

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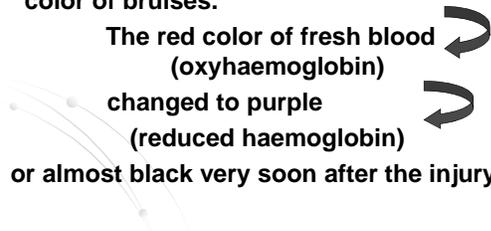
➤ **Color changes of bruises:**

- 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.



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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.

Colour changes are from dark blue or purple to blue,  
brown, green and yellow

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

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- 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.

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- 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 be obscured by patches of postmortem lividity.

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

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

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**Distinguishing between ✓  
hypostasis and bruises**

✓ This can be done by cutting into the discolored area:

- In case of hypostasis the blood is present in blood vessels, and easily washed away by a stream of water.
- On the other hand, 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.

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## Lacerated wounds

- **Definition**

They are wounds in which the tissues are torn 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.

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- **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.

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- **Shape**

- ▣ various shapes and differ in sizes, it is usually irregular in shape



- ▣ In most cases they take the shape of the underlying bone.



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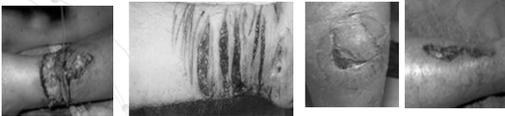
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**General features**

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



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- 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 results in a well-marked scar formation.

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**2- Incised (cut) wounds**

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



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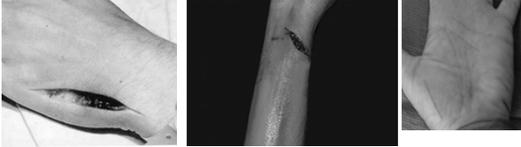
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➤ **Shape**

- 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.



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**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.

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- 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.

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- Within 12 hours it becomes red and 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.

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- 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.

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**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.

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- **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 with a single edge blade.



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**General features**

- **The diameter** of the external opening may be smaller than the diameter of the weapon due to the elasticity of the skin.
- On the other hand, the opening may be larger in cases where the weapon is withdrawn obliquely after penetration.



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- **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 breadth of the used weapon, because withdrawing the instrument may cause the wound to enlarge.

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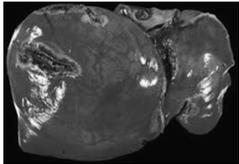
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- External haemorrhage is usually limited but serious internal haemorrhage may result from thorax or abdomen penetrations.
- It may be fatal if injuries of the internal organs occurred.



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**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 was determined depending upon the time of occurrence of the reactive changes of inflammation to an aseptic injury as following:

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➤ 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.

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➤ 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.

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➤ 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.

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Ante-mortem and post-mortem wounds		
	Ante-mortem	post-mortem
✓ Edges	gaping edges, everted, inflamed, hyperemic swollen edges	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)

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

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**Complications of wounds**

✓ Direct causes of death

**A- Shock**

**B- Injury to vital organs:** As heart, liver and lung.

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.

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### Traumatic shock

- It is either neurogenic or haematogenic.

#### 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.

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### II. Haematogenic (hemorrhagic) shock

- It is due to either external haemorrhage 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.

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### ❖ 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

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**B-Septic infection**

- As a result of microbial infection lead to septicemia.

**C- Scare formation**

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

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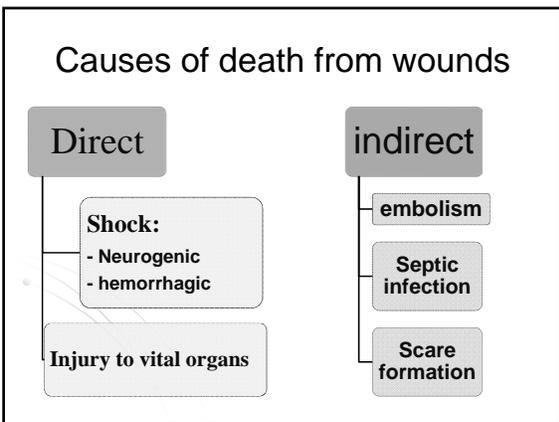
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**Firearm wounds**

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