

Introduction to wounds

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** *Classification of injury*

□ Medically

1. Mechanical

A) DUE TO BLUNT FORCE

Abrasion

Contusion

Laceration

Fracture and dislocation

B) DUE TO SHARP FORCE

Incised wound

Stab wound

C) FIREARM WOUNDS

2. Thermal

DUE TO COLD - eg. frost bite

DUE TO HEAT - eg. Scald burns

3. Chemical: corrosive acid ,corrosive alkali

4. Physical : electricity , lightning , X ray.

5. explosions



- Legally

- 1.SIMPLE

- 2.GREVIOUS (offensive , intended)

- Medicolegally

- 1.SUICIDE

- 2.HOMICIDE

- 3.ACCIDENT

- 4.FABRICATED

- 5.DEFENCE


Abrasion

- destruction of only the superficial layer of epidermis , a thickness of 1.6 mm.
- Bleed very slightly
- Heal very rapidly
- Leave no scar
- Types of abrasion :

Scratch or linear abrasion :has length but no significant width .eg by pin, nail etc. ... very sharp objects

Graze (sliding , grinding) abrasion : longitudinal parallel lines , by rough surface In contact with a broader surface of skin. eg. RTA

Patterned abrasion (pressure and Impact) : thumb mark In Strangulation , ligature mark in hanging, wheel mark of tyre , teethbite mark.

- 
- Age of abrasion by color change: exact age can't be determined
 - Red color- fresh
 - Red scab- 12-24 hours-by drying of blood and lymph
 - Reddish brown scab- 2 to 4 days
 - Healing from periphery-4 to 7 days , dark brown
 - Complete healing-10 to 14 days
 - Separation of scab- 10 to 14 days

** Medicolegal Importance:

- Identification of object
- Direction of Injury
- Time since injury
- Possibility of internal injury
- Sometimes erosion by ants look like abrasion . d/d ants produce abrasions that are brown,irregular margin,commonly at mucocutaneous junction at eyelids,nostril,mouth,axilla. By a hand lens: show multiple crescent shaped,sand like bite marks.



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• ***Difference:***

• **Antemortem abrasion**

- has Moist surface
- Bleeding present
- On drying scab formation , scab slightly raised
- Blurred margin
- Inflammation present
- Intravital reaction and congestion seen

• **Postmortem abrasion**

- Dry surface (you may find a dark leathery appearance, which is due to post-mortem drying of the damaged areas of skin) .
- No bleeding
- No scab
- Sharply defined margin
- Inflammation absent
- Not seen



Contusion

- Surface Injury to the skin and sub-cutaneous tissue , which leads to an effusion of blood into tissues
- usually caused by blunt trauma.
- Appears 1-2 hours after injury.
- may take the shape of weapon eg: railway track appearance.
- Children, old, obese women bruise easily.
- Mongolian spot shouldn't be confused with bruise.
- Contusion may be also in the internal organs and muscle.
- Gravity shifting of bruise may occur in bruises occurring late after death happens.

** Mongolian spot, also known as "Mongolian blue spot", "congenital dermal melanocytosis", and "dermal melanocytosis" is a benign flat, congenital birthmark with wavy borders and irregular shape.



- Color changes In a bruise:
- 1st day- red
- 2nd day- 3rd day -bluish
- 4th day- brown (haemosiderin)
- 5th-6th day- green(haematoidin)
- 7th-12th day- yellow(bilirubin)
- 13th-15th day ,2 weeks- normal
- Subconjunctival Hemorrhage do not undergo colour change.

- ML aspect of contusion:
- Patterned bruise-Identification of weapon , ligature , vehicle .
- Degree of violence from size
- Time since injury
- Purpose of injury
- Homicidal, suicidal, accidental . Position of assailant where his arms grasp the victim.

• Difference between antemortem and postmortem bruise:

• **Antemortem contusion**

- Swelling present
- Color changes present
- Epithelium abraded
- Clotted blood in tissue present

• **Postmortem contusion**

- Not present
- Not present
- Not present
- Not present

- Difference b/n artificial and true bruise

- **Artificial bruise**

- By Juice of marking nut, calotropis or plumbago
- At exposed accessible site
- Shape Irregular
regular
- Itching present
- Dark brown color
- Margins well defined and
- Positive chemical test

- **True bruise**

- Trauma
- Anywhere
- Usually rounded
- Absent
- Typical colour changes
- Not well defined,diffuse,no vesicles
- negative

Patterned intradermal bruise on the forehead due to a fall onto ribbed ceramic tiles.



Bruising of the upper arm. The pattern of these bruises is typical of forceful gripping. Small abrasions from fingernails are also seen.



Typical 'railway-line' bruises caused by a wooden rod.
Note that the centre of the parallel contusions is unmarked.



Recent bruising of the abdominal wall and scrotum due to kicking.



Laceration

- Lacerations are the blunt force injuries in which the skin and the underlying tissues are torn apart due to application of force.
- Characteristics :
- The edges of wound are irregular, ragged and often bruised
- Margins are often abraded due to impact of weapon
- Strands of the tissues **bridge** across the deeper parts of a laceration
- As the blood vessels are crushed usually external hemorrhages may not be marked
- Foreign material may be found as well

• Types of Lacerations

1. Split Lacerations : Crushing of the skin and subcutaneous tissues between two hard objects, splits them, producing split lacerations (perpendicular Impact).

Example Includes on the face, scalp, hands and lower legs.

2. Stretch Lacerations : Overstretching of the skin may tear it, producing a flap of skin in the direction of *Injury* . *It results due to tangential impact.*

Example is of a laceration on scalp when it hits windscreen in an accident or a laceration due to *kicks by a hard boot which raises a skin flap.*

3. Avulsions : separation of skin due to some grinding compression of the tissues, e.g. a wheel passing over a limb (*de-gloving of skin*).

4. *Tears* : Irregularly directed impact with some blunt object can cause actual tearing of the skin. It is the flaying off. E.g. blows from broken bottles .

5. Chop Lacerations : These are the lacerations produced by a weapon with sharp heavy edge, such as an axe , or a hatchet . Margins show abrasions and bruising, these are usually homicidal.



- Forensic Importance of Lacerations

- Lacerations are generally accidental or Homicidal
- Distribution and shape may help in forensic reconstruction of events
- Trace matter may be found in lacerations

Multiple lacerations from a blunt steel bar. These were initially mistaken by the police for axe wounds. The abraded or crushed margins can be easily seen.



Laceration of an arm of a pedestrian struck by a car.
The impact has been oblique, causing a flap of skin to
tear away to the right.



□ Differences between lacerated and incised wounds :

* lacerations :

hair and hair bulbs are crushed , edges are bruised
base of wound has bridging across muscle fibers .

* incised wounds :

hair and hair bulbs are not crushed , edges are not
bruised , no bridging .

Incised wounds

- Incised wound:(cut,slash,slice)
Clean cut through tissues ,usually skin and subcut. , By sharp edged or cutting weapon, eg. knife, sword, glass.
- Edges are smooth, clean cut and everted and no bruising along the edges.
- linear wound.
- Broader than the edge of weapon
- Length is greater than depth and breadth.
- Edges may be Inverted In case of underlying muscle attached to skin, eg. scrotum.
- All tissues are clearly divided and there is no tissue bridging
- As the vessels are cut, bleeding is profuse even in small incised wounds
- At the commencement, the tissues are more deeply cut and tails off at the end. This indicates the direction of the wound.
- If sharp weapon enters obliquely. one margin of wound is beveled and the other overhangs, indicating the direction .

** ML importance : to find homicidal , accidental or suicidal

- Homicidal, anywhere in the body, deep
- Suicidal- multiple, superficially, usually in the left hand
- Accidental- anywhere
- Edges of the wound indicate: antemortem or postmortem, sharp or blunt weapon.

** Difference between A.M , P.M Incised wounds :

Antemortem

Bleed freely and profusely

Arterial spouting present

Blood is clotted

Edges gape

Inflammation present

Serum serotonin and histamine Increased

Postmortem

Very slight or no hemorrhage

Not present

Not clotted

Edges closely

Not present

Not raised

• Difference between suicidal and homicidal cut-throat wounds :

• **Suicidal**

- Left side of neck, passing across the throat, usu , In rt handed
- Level above thyroid cartilage
- Multiple ,superflcial,rarely single
- Edges usually ragged ,due to overlapping
- Hesitation cuts present
- Defense wound absent
- Weapon usually present
- Clothes not torn or damaged
- Circumstantial evidence, quite place

• **Homicidal wounds**

- Usually on both sides
- On or below thyroid cartilage
- Multiple .cross each other at a deep level
- Sharp and clean cut , bevelling may be seen

Incised wound to the flank; it is clearly longer than it's depth .



Stab (puncture wounds)

- A stab wound is produced by thrusting of any pointed (sharp or blunt) object into the body so that the depth is the greatest dimension of the wound.
- Examples include knives, ice pick, dagger, iron bar, scissors, etc.



- Types :

1. Perforating Stab Wounds: When the stab wound also makes an exit
2. penetrating Stab Wounds : When a body cavity, like abdomen or thorax, is penetrated .
3. Concealed Punctured wounds : Especially in the cases of Infanticide, i.e. by inserting needles in the anterior fontanellae or nape of neck.

* Characteristics of Stab Wounds

1. Entry Wound

Generally it is bigger than the exit. It may be:

Wedge shaped

Elliptical

Rounded

Cruciate

Irregular

Repetition of a stab wound without complete withdrawal, may show different pattern.

2. Margins

Margins may show effects of hilt.

3. Depth and Direction

4. Exit Wound

If any, It corresponds to the tip of the weapon

5. Scissors stabs

Z shaped injuries are seen

6. Gaping of Wound

Wound is slightly shorter than the weapon width, only when wound is inflicted across Langer's lines.

7. Scrimmage Enlargement

Extension of the wound due to motion of the weapon or body against the cutting edge

Continue Features of stab wound:

- Aperture is usually smaller than the weapon due to elasticity of the skin
- Depth is greater than breadth and length.
- Very little external hemorrhage but profuse internal hemorrhage
- Shape- Wedge shaped with knife, elliptical with dagger, rounded with needle, slit-like opening with screw driver,
- Margins of entry wound are clean and inverted
- Margins of exit wound are small and everted
- Direction determined by line joining entry and exit wounds or X-ray after radio-opaque dyes.

A complex stab wound where all three injuries are caused by a single action. The first entry is in the right breast; there is an exit wound in the middle and a re-entry wound over the centre of the chest.





ML(medical legal) Importance:

- Nature of weapon
- Direction of wound
- to find Suicidal, homicidal or accidental

GUNSHOT WOUNDS






□ Types of firearms :

1. smooth barrel ~ shotguns



2. Grooved barrel ~ rifled weapons





The factors that can affect the amount and distribution of gunshot on skin include:

1. firing distance
2. length and diameter of the firearm barrel
3. characteristics of the gunpowder
4. angle between the firearm barrel and target
5. the environment (wind)
6. type of clothing
7. characteristics of the target (tissue type)

- Firearm injuries can be classified according to range into:
 1. Firm Contact ~ muzzle is pressed against the skin when fired
 2. Loose contact ~ muzzle of *the gun is held a short* distance from the skin , approx. 0- 4 inches away from handguns)
 3. Near contact~ defined by the presence of stippling “powder tattooing” on the skin surrounding the entry wound
 4. Intermediate
 5. Distant

* Basic features of firearm wounds :

First, Entrance wound

- Round or oval central defect with an abrasion collar, caused by unburned powder and small metal fragments striking the skin . [If the bullet impact is perpendicular to the skin surface, it will be round, but if it hits at an angle, the abrasion collar will be as an eccentric hole]
- Diameter of the wound is usually smaller than the bullet. This is because the skin is elastic and it retracts after the bullet enters the skin.
- Underlying tissues will not protrude.



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A. Firm Contact wound

- Muzzle imprint (Retrograde gas pressure forcing the skin against the muzzle)
- no powder tattoo
- cherry-red discoloration of wound track tissues caused by the release of carbon monoxide from the muzzle that causes the formation of carboxyhaemoglobin

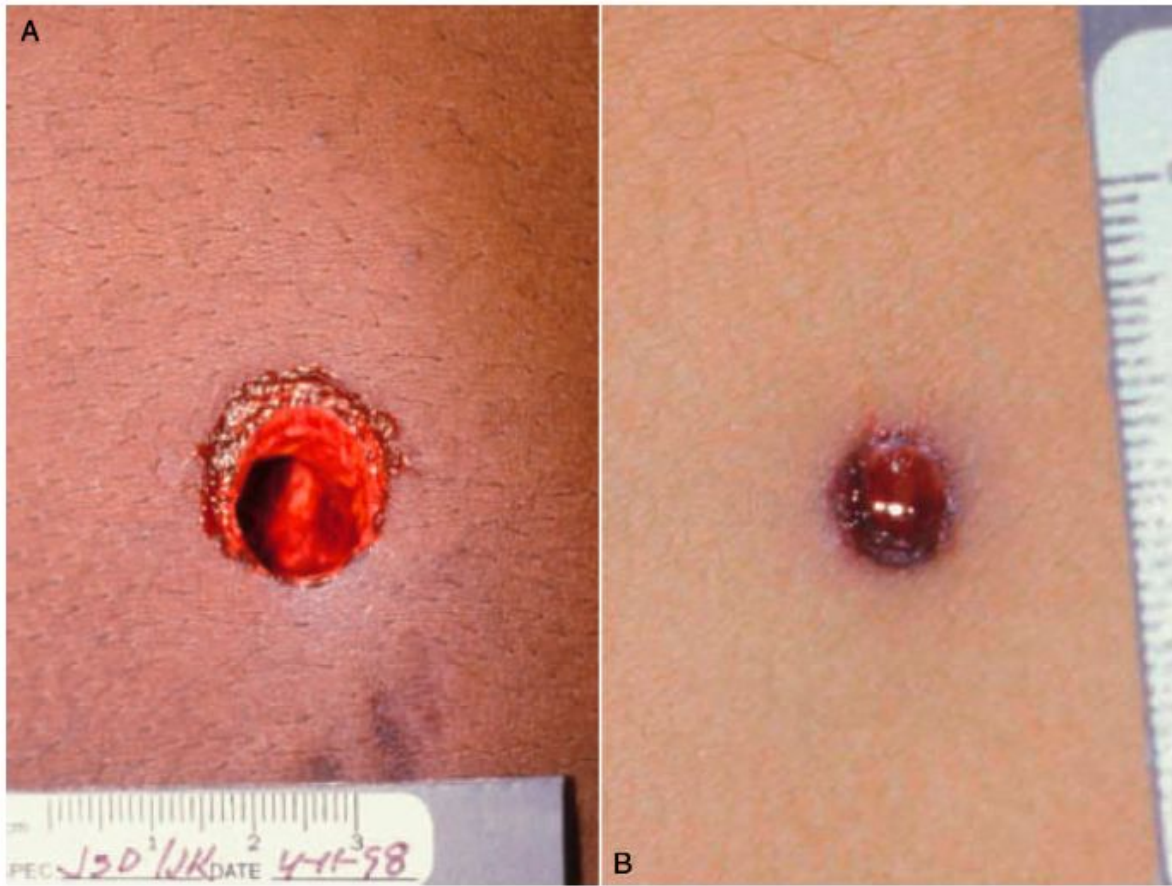


Figure 1. A, Entrance wound from a large-caliber .45 handgun. B, Entrance wound from a medium-caliber 9 mm. Both wounds show typical entrance characteristics with round defects in the skin and marginal rims of abrasion.

B. Loose contact wound

Wide zone of powder stippling , but lack a muzzle imprint . Entrance site is somewhat irregular .



C. Near wound

- Approximately 4 - 6 Inches from body
- Powder Tattooing possible
- Circular pattern of powder distribution around bullet hole

D. Intermediate Range Wounds

- Approximately 6 - 24 Inches from body
- No visible sooting
- Dispersed powder particles
- As soon as one sees Individual tattooing marks, one is dealing with Intermediate range wounds .



E. Zone V: Distant Range Wounds

- Approximately 2-3 feet or greater
- The only marks on the body are those produced by mechanical action of bullet perforating the skin .

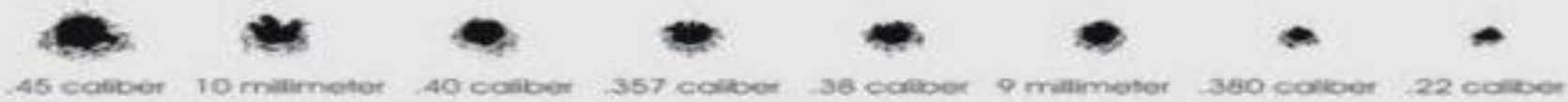


2nd, exit wound

In general;

- exit wounds are larger than entrance wounds.
- irregular in outline, and their edges are everted.
- Absence of abrasion collar and powder tattooing
- Muzzle velocity is of vital importance when considering the characteristics of an exit wound

e.g. high velocity rifles can pass straight through the body unless they strike bone, and if the projectile has not been deformed, the defect can be rounded !



ENTRY HOLES

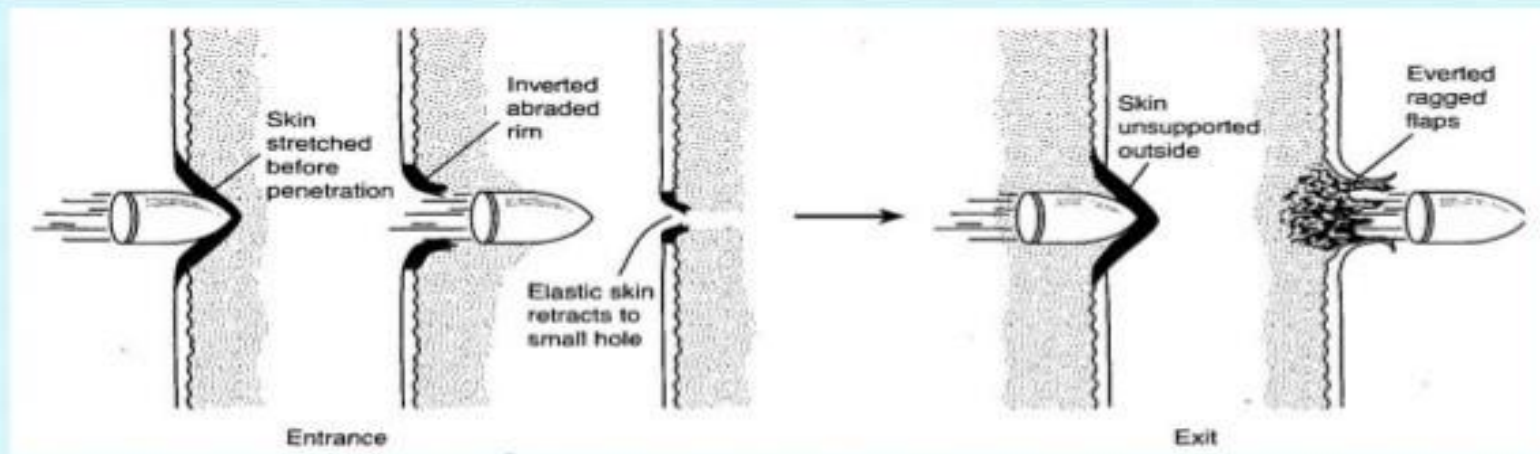


EXIT HOLES



Differences between Inlet & Exit :

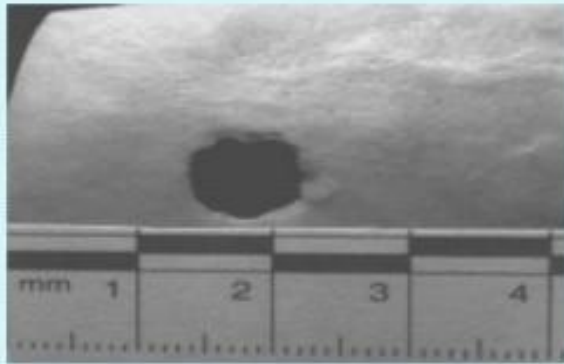
	INLET	EXIT
SIZE	SMALL	LARGE
EDGES	INVERTED	EVERTED
REGULARITY	MORE REGULAR	LESS REGULAR
POWDER MARKS	PRESENT	ABSENT
BEVELING	INTERNAL	EXTERNAL



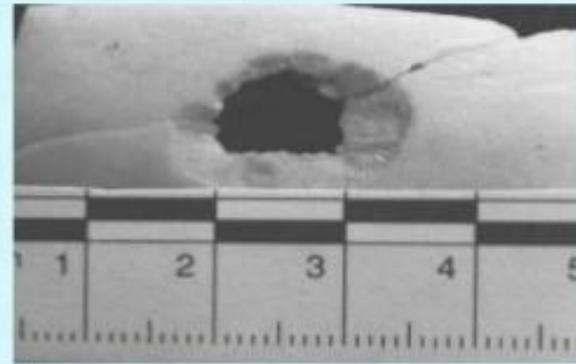
Gunshot wounds In bone :

- In flat bones (i.e. skull) entrance wounds are round with sharp margins and show Internal beveling: the Inner table of the skull is more eroded than the outer table, producing a cone shape In the direction of the bullet path .
- Exit wounds may be more irregular and show external beveling (outer table of the skull Is more eroded than the Inner table, producing a cone shape facing outward)
- In the skull, gunshot wounds often produce numerous fractures due to rapidly increasing pressure as the bullet travels through the skull .

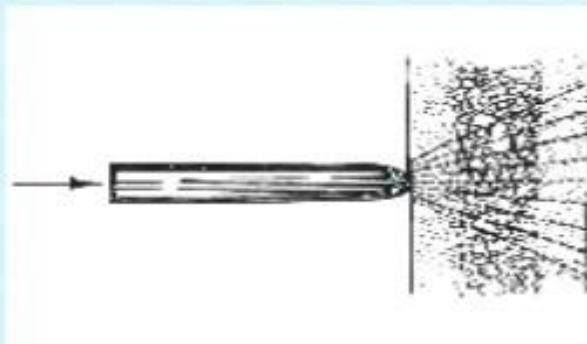
Beveling of Flat Bones :



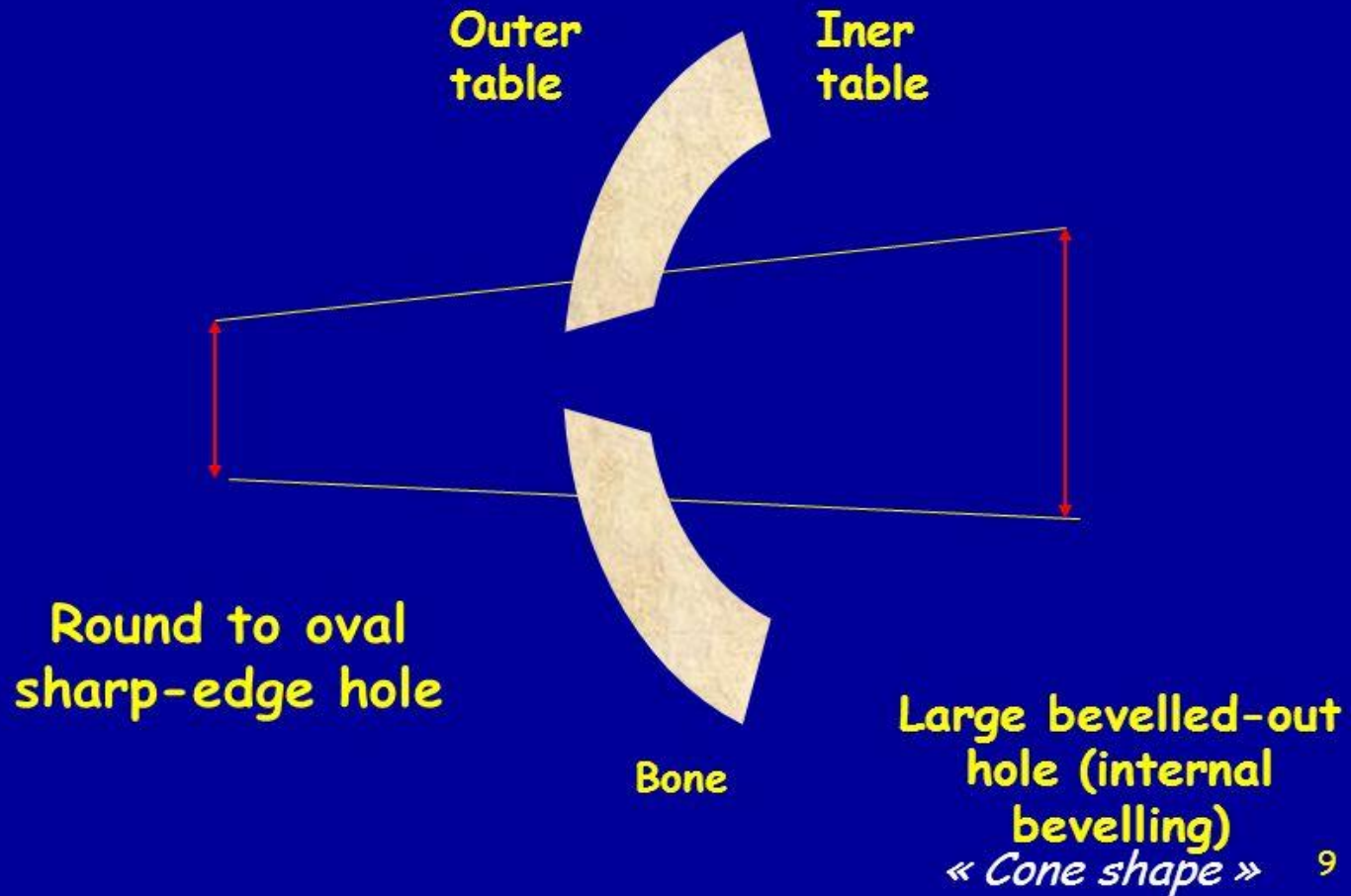
Internal beveling

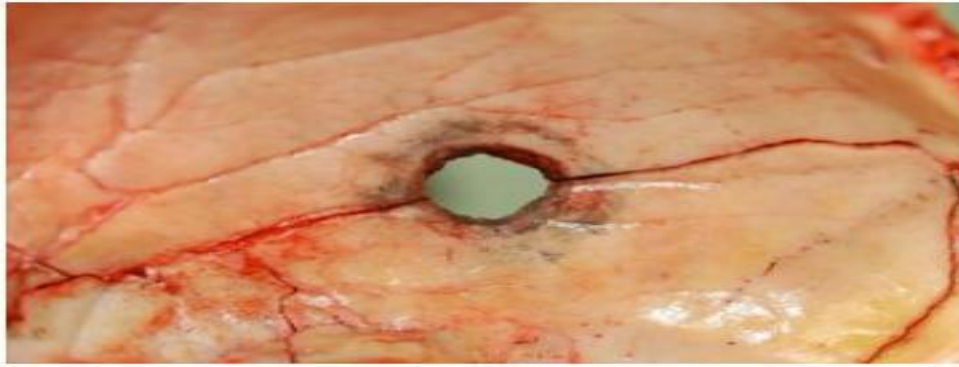


External beveling



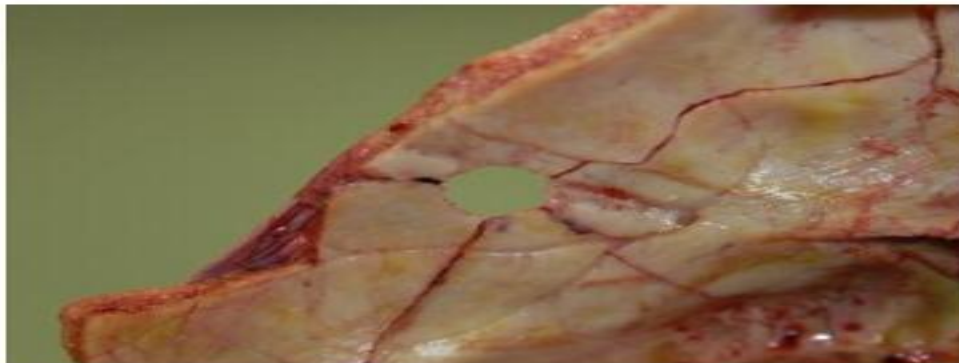
ENTRANCE





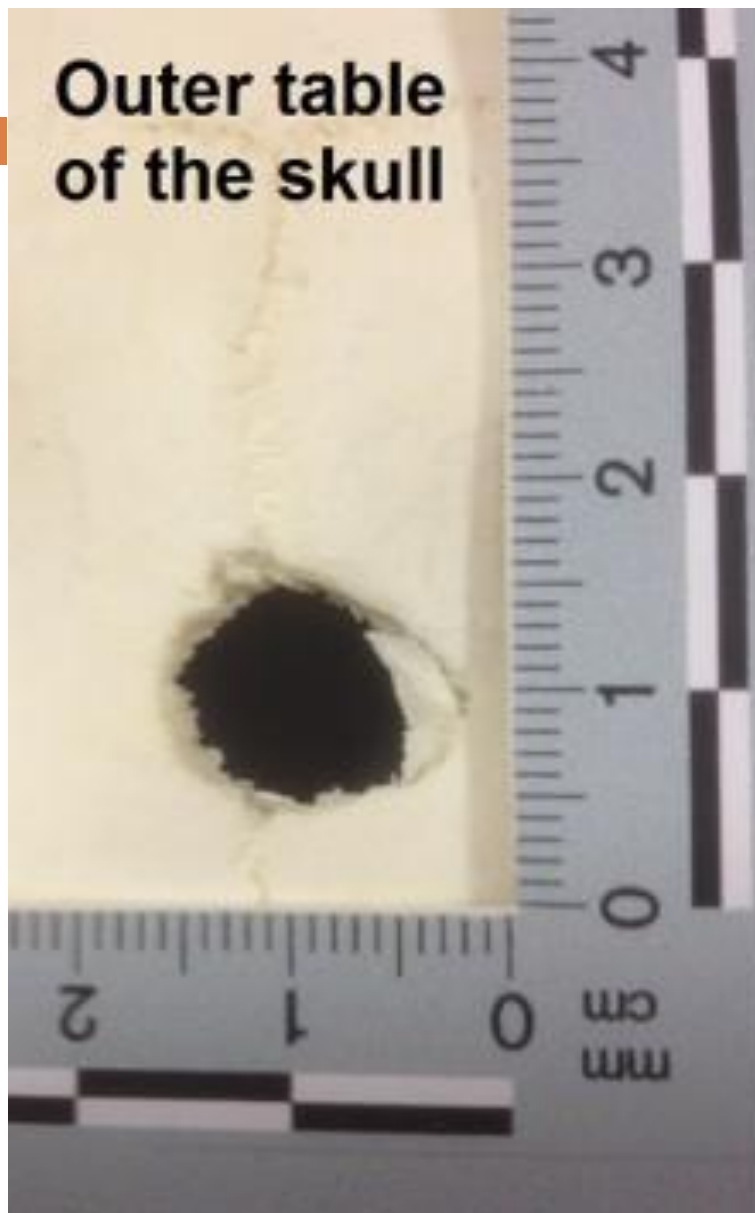
Internal beveling of a contact entrance wound of the head. Note the soot on the internal table of the skull.

[View Media Gallery](#)



View of the internal table of the skull with an exit gunshot defect. No internal beveling is present. External beveling of the outer table would be expected in this type of defect.

**Outer table
of the skull**



**Penetrating skull injury -
captive bolt pistol**

Inner table of the skull

beveling

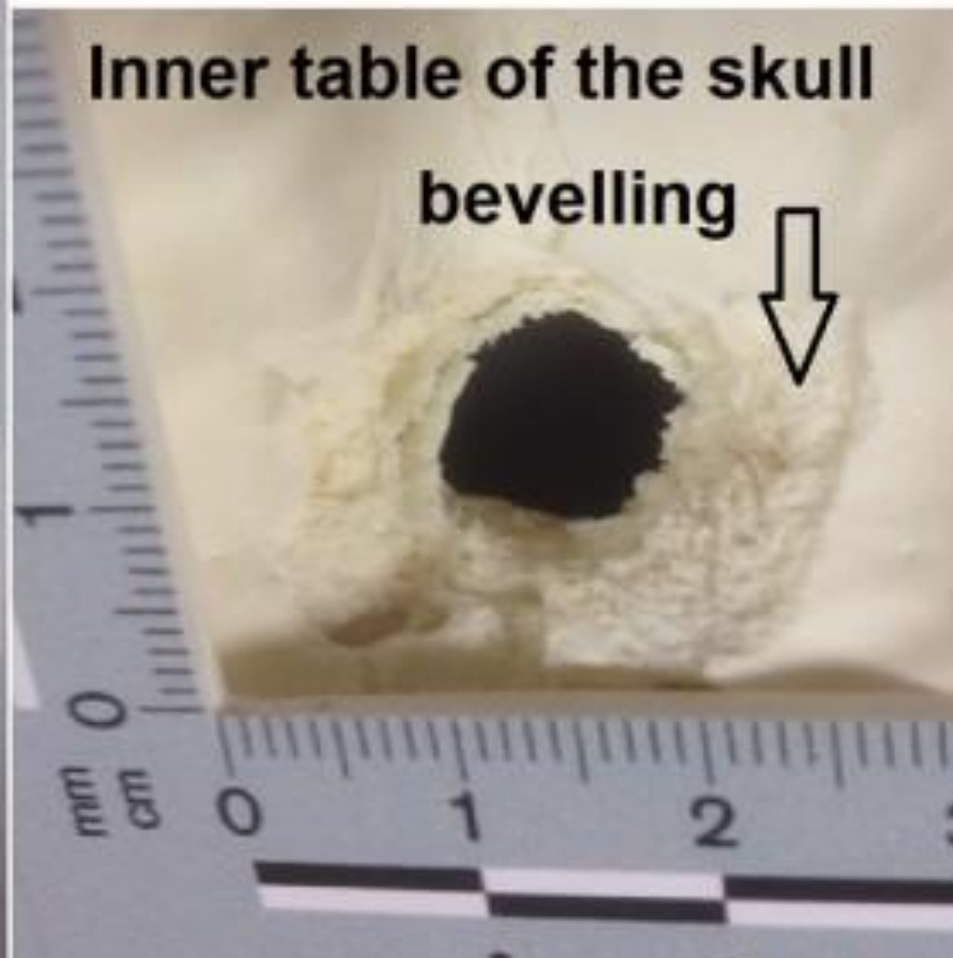
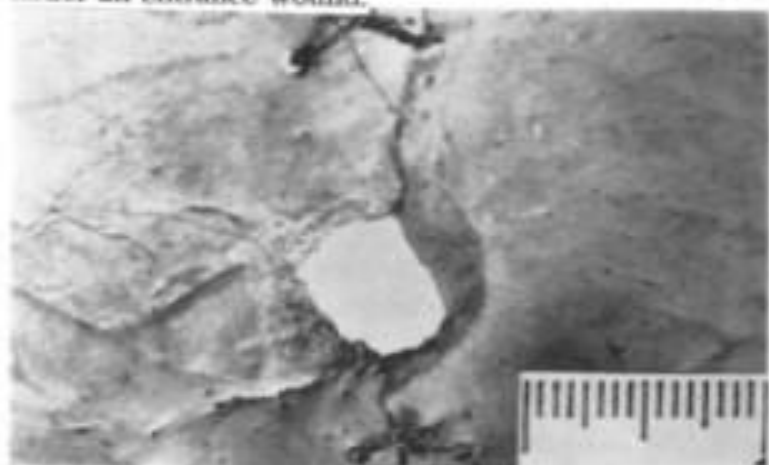
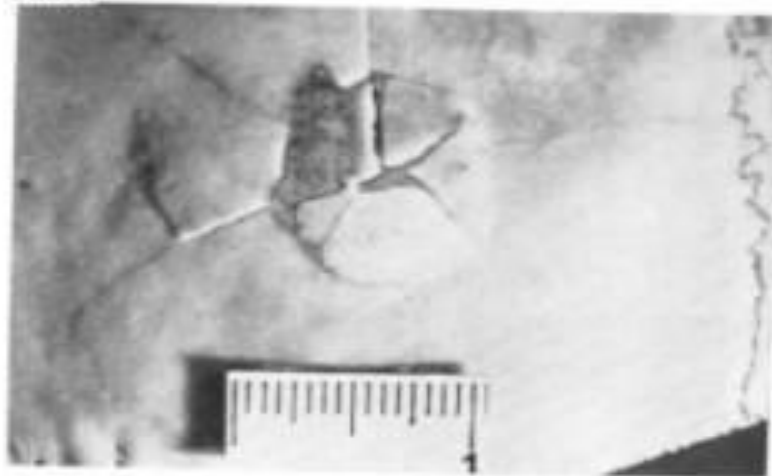


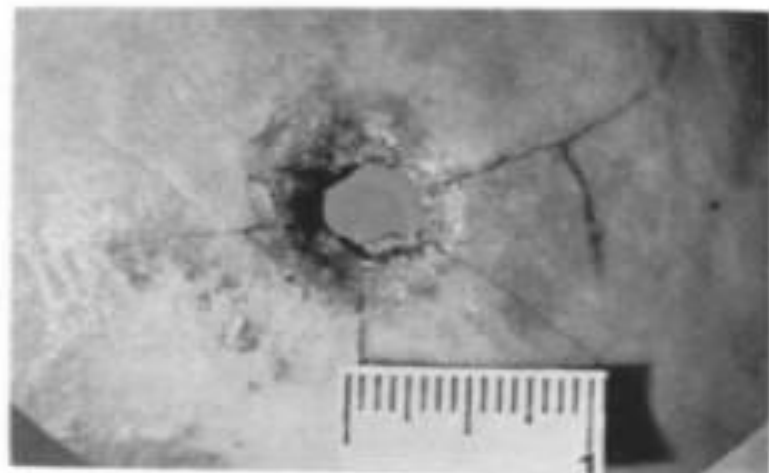
FIGURE X-53. Upper: Internal surface of the skull, showing inward beveling of the defect in the bone under an entrance wound.



Middle: Outer surface of the skull, to show the mechanism of outward beveling at the exit. Note the raised bone fragments by the exiting bullet.



The actual hole is shown in the lower photograph. Lower: Outer surface of the skull, showing outward beveling of the exit defect.



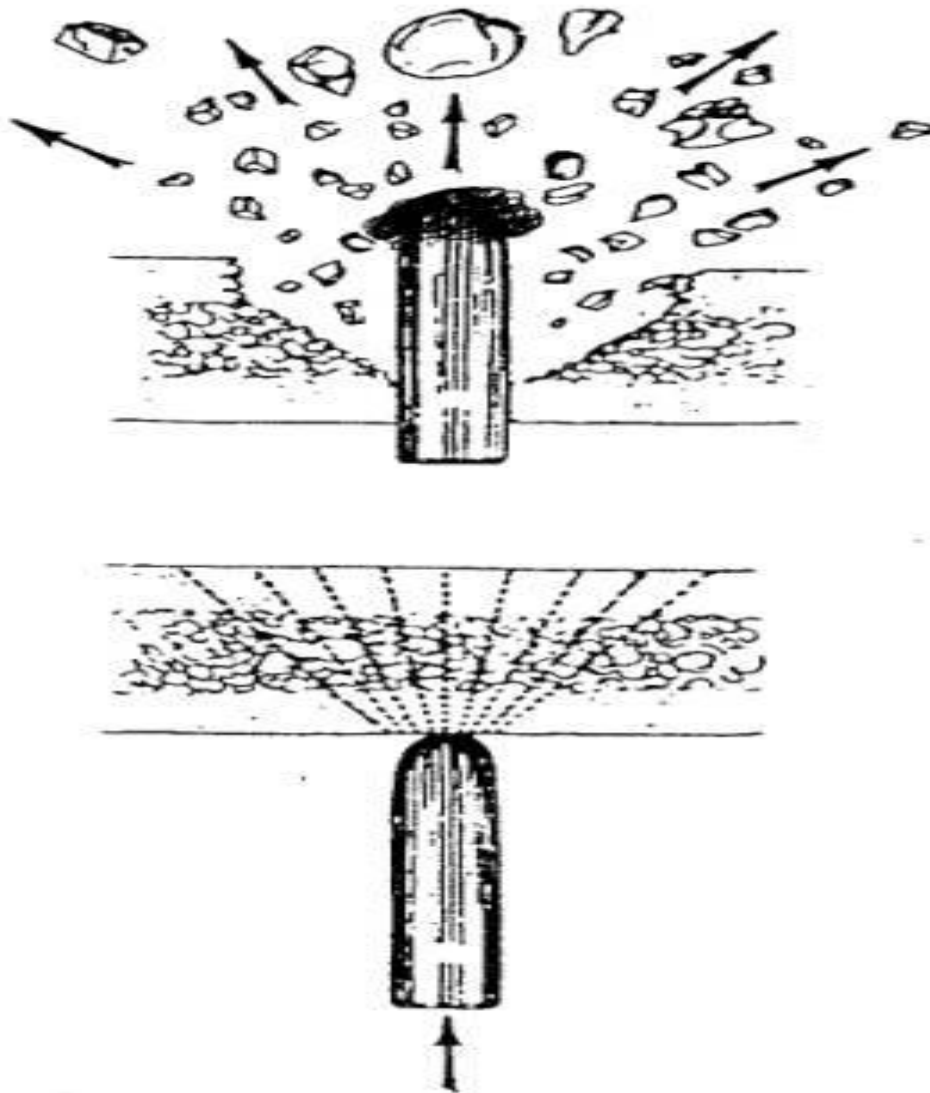


Figure 15.
Beveling

Diagram illustrates that a missile striking a surface of the skull—whether entering or exiting—creates a small hole on the side of impact and a larger, beveled-out hole as it emerges from that surface. This “beveling” effect permits a distinction to be made between bullet entrance and exit wounds of the skull, since the larger, beveled-out hole will be on the side opposite the point of impact. Thus, if the exterior surface of the skull exhibits beveling, the wound is an exit; if the interior surface does, it is an entrance.

** References :

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5th year forensic and toxicology dossier .



THANK YOU