FIREARM WOUND INTERPRETATION

KUHS MBBS FMT Exam-Oriented Study Notes

Case clue

A **punctured wound over the chest** with X-ray showing a **metallic particle inside the thoracic cavity** suggests a **rifled firearm entry wound with a retained bullet/projectile**. Since the bullet is retained, an exit wound may be absent.

1. Entry Wound of Rifled Firearm at Different Ranges

Range is interpreted from wound morphology and surrounding effects of flame, smoke and gunpowder.

A. Contact Shot

- The muzzle is held tightly against the skin.
- Over the **head**, wound may be large, irregular, **stellate / cruciate**, with everted or ragged margins due to expansion of gases between skull and scalp.
- Over the **trunk**, wound is usually circular because gases expand into the body cavity.
- **Muzzle imprint** may be present as patterned abrasion or contusion.
- External burning, blackening and tattooing may be absent.
- **Burning, blackening and tattooing are driven into the wound track**.
- Carbon soot may be found deep inside the track.
- Muscles around the track may appear **cherry-red** due to carbon monoxide absorption.

B. Close Shot / Flame Range

- Usually within **5-8 cm**.
- Entry wound is small and circular.
- Margins are **inverted**.
- **Abrasion collar** and **grease / dirt collar** are present.
- **Burning, singeing of hair, blackening and tattooing** are present around the wound.

C. Near / Intermediate Shot

- Usually from **8 cm to 60-90 cm**.
- Entry wound is small, circular, with inverted margins.
- **Abrasion collar** and **grease collar** are present.
- Burning and singeing are absent.
- **Blackening** may be present up to about **30 cm**.
- **Tattooing / stippling** may be present up to **60-90 cm**.

D. Distant Shot

- Usually beyond **90 cm**.
- Entry wound is small, circular and may be smaller than bullet diameter due to elasticity of skin.
- Margins are **inverted**.
- **Abrasion collar** and **grease collar** are present.
- **Burning, blackening and tattooing are absent**.

2. Exit Wound

The **exit wound** is the wound through which the bullet emerges from the body.

Features

- Usually **larger than entry wound** and larger than bullet diameter.
- Shape may be circular, elliptical, slit-like, stellate or irregular.
- Margins are **everted, torn or puckered**.
- Subcutaneous fat or muscle may protrude.
- Usually no **abrasion collar, grease collar, burning, blackening or tattooing**.

Shored Exit Wound

- If the skin at the exit is supported by a firm object such as tight clothing, belt, wall or floor, an **abrasion margin** may be produced.
- The exit wound may resemble an entry wound.

3. Differences Between Entry and Exit Wound

Feature	Entry Wound	Exit Wound
Size	Usually smaller than bullet diameter, except contact shot	Usually larger than bullet
Margins	Inverted	Everted, torn, puckered
Abrasion collar	Present	Absent, except shored exit
Grease / dirt collar	Present	Absent
Burning, blackening, tattooing	May be present depending on range	Absent
Bleeding	Less	More
Tissue protrusion	Usually absent	Fat / muscle may protrude
Clothing fibres	Turned inwards	Turned outwards
Skull bone	Outer table clean cut, inner table bevelled	Inner table clean cut, outer table bevelled
Metal deposition	More metal around entrance	Less metal around exit

4. Important Firearm Terms

A. Tattooing / Stippling

- **Tattooing** is produced by unburnt or partially burnt gunpowder particles striking and embedding into the skin.
- Also called **stippling / peppering**.
- Cannot be wiped off with wet cotton.
- Indicates near or intermediate range.
- It is an **ante-mortem phenomenon**.

B. Blackening

- **Blackening** is deposition of soot or smoke particles produced by combustion of gunpowder.
- Also called **smudging / smoke soiling**.
- Superficial deposition.
- Can be wiped off with wet cotton.
- Usually seen up to about **30 cm**.

C. Scorching / Burning

- **Scorching or burning** is caused by flame and hot gases from the muzzle.
- Causes thermal injury to skin and clothes.
- Produces **singeing, curling, clubbing or shrivelling of hair**.
- Seen in close-range firing.

D. Contact Pallor

- **Contact pallor / contact flattening / blanching** is not a firearm wound feature.
- It is a postmortem phenomenon where dependent parts of the body pressed against a hard surface remain pale because blood is compressed out and **postmortem staining does not develop** there.

E. Abrasion Collar

Abrasion collar is a rim of abraded epidermis surrounding the entry wound.

Mechanism: Bullet first indents and stretches the skin - perforation occurs through the tense skin - this produces a flattened, reddish-brown abraded ring.

Importance: It is a definite sign of **entry wound**. In oblique firing, it helps determine direction.

5. Assessment of Range of Firing

Range is assessed by studying the effects of **flame, smoke and gunpowder** around the wound.

Finding	Approximate Range Suggested
Muzzle imprint	Contact shot
Burning / singeing	Close shot, within 5-8 cm
Blackening / soot	Up to about 30 cm
Tattooing / stippling	Up to about 60-90 cm
Only abrasion and grease collar	Distant shot, beyond powder range

Test Firing

Accurate range is assessed by **test firing** the suspected weapon using the **same ammunition** on experimental targets and comparing the pattern of burning, blackening and tattooing.

6. Assessment of Direction of Firing

Abrasion collar > Beveling of bone > Wound track > Clothing fibres > Tissue undermining

A. Abrasion Collar

- Perpendicular entry produces a **concentric abrasion collar**.
- Oblique entry produces an **eccentric abrasion collar**.
- The **wider part of the abrasion collar** is on the side from which the bullet came.

B. Beveling of Bone

- In skull bone:
- Entry wound: clean punched hole on outer table, beveling of inner table.
- Exit wound: clean cut on inner table, beveling of outer table.

C. Wound Track

- The internal bullet path is traced through tissues and organs to determine direction, such as:
- Front to back.
- Left to right.
- Above downwards.

D. Clothing Fibres

- Fibres are turned inwards at entry.
- Fibres are turned outwards at exit.

E. Tissue Undermining

In soft tissues, direction of undermining beneath the skin may indicate angle of entry.

7. Correlation of Weapon with the Wound

Since X-ray shows a **metallic particle inside the thoracic cavity**, the bullet must be carefully recovered during autopsy without producing artificial scratches.

A. Class Characteristics / Primary Markings

- These help identify the type or make of weapon.
- They include: **Calibre**.
- Bullet size, shape and weight.
- Number of lands and grooves.
- Width, depth and direction of rifling twist.
- These markings identify the **make and model** of the firearm.

B. Individual Characteristics / Secondary Markings

- These are unique microscopic striations produced by:
- Imperfections inside the barrel.
- Wear and tear.
- Metallic fouling.

Ballistic Comparison

A test bullet is fired from the suspected weapon. Crime bullet and test bullet are compared under a **comparison microscope**. Matching secondary striations proves that the bullet was fired from that specific weapon.

Medico-legal Interpretation

Final Opinion

In this case, the chest punctured wound is most likely an **entry wound of a rifled firearm**, and the metallic particle seen on X-ray is a **retained bullet** in the thoracic cavity. The range, direction and weapon correlation should be determined from wound features, internal track, X-ray findings, recovered bullet and ballistic comparison.