

## Case Report

# Shot Wounds With Positive Projectils

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### ABSTRACT

**Introduction:** Violence with firearms has increased in the last decade, it is estimated that there are more than 500,000 cases per year due to firearms. According to a report from the World Health Organization in 2001, this number represented a quarter of the total estimated 2.3 million deaths due to violence.<sup>1,2</sup> Meanwhile in Indonesia, according to the second quarter 1998 human rights report issued by the ELSAM (Institute for Studies and Community Advocacy) in the second quarter there were 102 citizens who became victims of violence caused by firearms.<sup>5</sup>

**case report:** a case was reported with the victim a male corpse, initials MAD, 40 years old, body length 173 cm, medium stature, tan skin, the victim was examined at the hospital, based on a request letter for visum et repertum (VER) by the police to be carried out external and internal examination of the body (victim).

**Results:** external examination found bruises, abrasions and a wound with two stitches on the left back. On internal examination found penetrating wounds on the left back, left lung, heart, great veins of the heart, right lung, left chest, projectiles.

**Discussion:** based on the examination carried out on the victim, it was found that there was an entrance gunshot wound to the left side of the back, so it is suspected that the victim was shot from behind while running away, but to be more certain it is necessary to identify the entrance gunshot wound but the wound has been treated with stitches so it is difficult to determine.

**Conclusion:** from external and internal examination it was concluded that the cause of death of the victim was a gunshot wound that penetrated the left back, left lung, heart, great vein of the heart, right lung, left chest which resulted in bleeding.

**Keywords:** gunshot wound, projectile

### I. Introduction.

Gun violence has increased in the last decade. In the context of public health, it is estimated that more than 500,000 injuries per year are gun injuries. According to a 2001 report from the World Health Organization, this number represents a quarter of the estimated total of 2.3 million violent deaths. Of the 500,000 cases, 42% were suicides, 38% were homicides, 26% were wars and armed conflicts (*Idries AM. 1997; Donoghue ER, 1984*).

Gunshot wounds are the leading cause of homicide death in the United States and in many jurisdictions, the most common is suicide. It is estimated that each year in the United States there are  $\pm$  70,000 gunshot wounds with 30,000 deaths. Examination of these wounds

requires special training and specialists, either by emergency physicians on live gunshot wounds or by forensic pathologists on deceased victims (*Hueske E. 2006*).

Laporan dari negara lain seperti Inggris dan Wales pada tahun 2001 angka kejadian luka tembak adalah 0,4/100 ribu (bunuh diri 65%, homicide 7%, kecelakaan 28%), dan angka kejadian di Kanada pada tahun 2002 adalah 2,6 per 100.000 (bunuh diri 80%, homicide 15%, kecelakaan 5%).(*Di Maio, V.J.M. 1999*)

Meanwhile in Indonesia, according to the second quarter 1998 human rights report issued by the ELSAM (Institute for Community Studies and Advocacy) in the second quarter there were 102 citizens who were victims of violence caused by firearms (*Chadha P.V. 1995*).

To explain the duties and functions as an examiner, the doctor must explain various things, including: whether the wound was indeed a gunshot wound, which one was an incoming gunshot wound and which one was an exit gunshot wound, the type of weapon used, the shooting range, the direction of the shot, the approximate position of the victim when shot. , the number of times the victim was shot and which gunshot wound caused the death.

Correct interpretation of gunshot wounds by a pathologist not only provides valuable information that can support the enforcement of the law during an investigation, but is also important for determining the final type of death. (*Knight, Bernard. 1996*)

The medical, legal, and emotional costs of these crimes are an uphill battle for hospitals, the justice system, families, and society at large. Evaluation of these injuries requires special training and expertise by both a doctor who handles the emergency department of gunshot wounds as well as pathologists and forensics. (*Tsokos, Michael. 2008*)

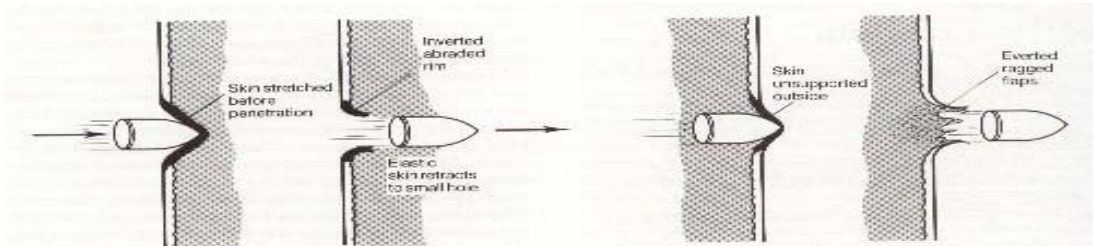
Definition; Gunshot wounds are injuries caused by the penetration of a bullet into the body projected through a firearm or contact of a bullet with the body. Included in the gunshot wound are incoming and outgoing gunshot wounds. Incoming gunshot wounds occur when the bullet enters an object and does not come out again, while in exit gunshot wounds, the bullet penetrates the object as a whole. Generally, gunshot wounds are characterized by a small entrance wound and a larger exit wound. These wounds are usually accompanied by damage to blood vessels, bones, and surrounding tissues.

Gunshot wounds occur due to the energy of the bullet as it penetrates the body. The more energy the bullet generates, the more severe the damage can be. Energy will increase with the

size, weight and speed of the bullet. In general, large bullets fired from rifles cause more damage than small bullets fired from pistols.

## II. Identification of Gunshot Wounds

Based on the unique characteristics of each shot fired from various distances, the estimated shooting distance can be known, thus a classification can be made.



*Figure 1. the occurrence of gunshot wounds*

The classifications referred to include:

### 2.1 Entrance Gunshot Wound

An entry gunshot wound is usually in the form of a streak with a circular abrasion of the edge around the defect produced by the bullet. The edge abrasion is in the form of scratches or abrasions on the skin caused by the bullet when it presses into the body. When the tip of the bullet penetrates the skin, it will result in concentric abrasion of the edges, namely scratches on the skin in the form of rings of the same thickness, because the bullet enters perpendicular to the skin. When the tip of the bullet penetrates the skin at an angle, this will result in an eccentric edge, which is a thicker ring in one area. The thick area of eccentric abrasion of the edge indicates the direction of the bullet. In addition, the thicker the edge abrasion, the smaller the angle of the bullet when it hits the skin corner.

Atypical entrance gunshot wounds are irregular in shape and may have tears at the edges of the wound. This type of entrance wound usually occurs when the bullet loses its round by firing inside the barrel of the gun. Even in their twisted course, the bullet moves staggered when it hits the skin, often giving the wound a D-shape. Atypical entry gunshot wounds can be caused by a malfunctioning weapon or from faulty ammunition, but more often than not they result from a Ricochets-type bullet or a bullet hitting another object, such as an auto-moving window, before hitting the body. Another type of atypical gunshot wound occurs when the mouth of the gun comes into direct contact with the skin over a bony surface, such as the skull or sternum. When the gun is fired, it stops the gas directly from the mouth of

the gun into the wound around the bullet. The gas will penetrate into the subcutaneous tissue, where the gas expands, causing the skin around the gunshot wound to stretch and tear. The tear or laceration spreads from the center to give a stellate-shaped or star-shaped defect.

Gunshot wounds can be divided into:

- a. Gunshot wounds (contact wounds), Occur when the muzzle of the weapon is pressed against the victim's body and fired. Generally, the wound is circular in shape, surrounded by a seam of blisters that are the same width on each side. The subcutaneous tissue 5-7.5 cm around the gunshot wound is lacerated. Around the wound appears a red or brown red area, which describes the shape of the muzzle of the weapon, this is called a barrel injury. The hair and skin around the wound can be burned. The wound channel will be black caused by grains of gunpowder, soot and lubricating oil. The edges of the wound can be red, due to the formation of COHb.
- b. Close range wounds occur when the distance between the muzzle of the weapon and the victim's body is still within range of the gunpowder grains (close-range gunshot wounds) or the range of soot and fire (very close-range gunshot wounds). The wound is round or oval in shape depending on the angle of entry of the bullet, with around it black spots (tattooed lice) and/or soot (soot seam). The size of the wound is smaller than a bullet. Around the wound, red or charred areas can be found. If there is a tattoo seam, it means that the distance between the muzzle of the weapon and the victim is about 60 cm (50-60 cm), namely for handheld weapons. If there is also a seam of soot, the distance is about 30 cm (25-30 cm). If there is also a seam of fire, the distance between the muzzle of the weapon and the victim is about 15 cm.
- c. Long range wounds occur when the distance between the muzzle of the weapon and the victim's body is out of reach or the distance of the unburned or partially burnt gunpowder. Distance above 60 cm, the size of the wound is much smaller than a bullet. There is no blackish color or hem of the tattoo. The wound is round or oval in shape with the presence of a seam of blisters. If the weapon is often treated (greased with oil) then the seam of the blisters can be seen with oily black dirt, so there is a rough seam or fat seam.

## 2.2 Gunshot wound

When a bullet fired from a firearm hits the victim's body and the force is still sufficient to penetrate and exit other parts of the body, the gunshot wound where the bullet leaves the body is called an exit wound. An exit gunshot wound has a special characteristic

which is also the main difference from an entry gunshot wound. These characteristics are the absence of a seam of abrasions on the exit gunshot wound, in the absence of a seam of abrasions, certain other seams are also not found. In the vicinity of the exit gunshot wound, blisters may also be found if there is a hard object at the exit, such as a belt, or the victim is leaning against a wall. The exit gunshot wound is generally larger than the entry gunshot wound due to the deformity of the gunshot wound, the shaking of the bullet and the subsequent rupture of bone tissue from the exit gunshot wound. In bullets that penetrate a flat bone, such as the roof of the skull, a funnel will be formed which opens in the direction of the motion of the bullet. The factors that cause an exit gunshot wound to be larger than an entry gunshot wound are: Changes in the area of the bullet, due to deformity when the bullet is in the body and hits the bone. The bullet when it is in the body undergoes a change in motion, for example due to hitting a hard body part, the bullet moves in a circle from end to end, this condition is called “tumbling”, The movement of a straight bullet becomes irregular, called “yawning”, The bullet breaks into several fragments. These fragments cause the exit gunshot wound to become larger. If the bullet hits the bone and the bone fragments are carried out too, then the bone fragment will create additional tears so that it will enlarge the gunshot wound.

The exit gunshot wound may be smaller than the entry gunshot wound if it occurs in a patch/contact gunshot wound, or in a bullet that has exhausted its energy by the time it exits the body, the shape of the exit gunshot wound is atypical and often irregular. In some circumstances the exit gunshot wound is smaller than the entry gunshot wound, this is due to: The speed or velocity of the bullet when it will penetrate out is reduced, so the damage (outlet wound hole) will be smaller, please note that the ability of the bullet to cause damage is directly related to the size of the bullet and its velocity. The presence of objects holding or pressing the skin in the area where the bullet will come out which means it inhibits the speed of the bullet, the exit gunshot wound will be smaller when compared to the entry gunshot wound

The shape and number of exit gunshot wounds is unpredictable. Partial exit wound, this is possible because the bullet's power is almost exhausted or there is an obstacle pressing at the place where the bullet will exit, thus the wound can only be in the form of a slit and not infrequently the bullet protrudes slightly in the gap. The number of exit gunshot wounds can be more than entry gunshot wounds, this is possible because: The bullet broke and each shard inflicted its own gunshot wound, the bullet caused a bone to break and the bone was pushed out at a different place from where the bullet came out. The two bullets entered the body

through a single gunshot wound (“tandem bullet injury”) and inside the body the two bullets separated and exited through different places.

Bullets can rarely be stopped by bone, especially thin bones such as the scapula and ileum or thin parts of the skull. Bullets hitting unusual locations can cause injury and death but entry gunshot wounds can be very difficult to locate. For example ears, nostrils, mouth, armpits, vagina, and rectum. (*Knight, Bernard. 1996*)

Table 2.1 The Difference Between Entry Wounds And Exit Gun Wounds

No	Entrance Gunshot Wound	Gunshot wound
1.	It's small in size, because the bullet penetrates the skin like a drill at high speed	They are larger and more irregular than gunshot wounds, because the bullet's velocity is reduced, causing tissue tears
2.	The edges of the wound bend inward because the bullet penetrates the skin from the outside	The edges of the wound bend outward because the bullet is heading out
3.	The edges of the wound are abraded	The edges of the wound are not abraded
4.	Clothes get into the wound, carried by the incoming bullet	There isn't any
5.	The wound may appear black, burn, tattoo seams, or soot	There isn't any
6.	In the skull, the edges of the wound are regular in shape	Looks like a cone-like image
7.	Can appear bright red in color due to the presence of carbon monoxide	There isn't any
8.	There are ecchymotic seams around the wound	There isn't any

### III Microscopic Examination

The changes that appear are caused by two factors, namely: mechanical and thermal trauma, patch gunshot wounds and close-range gunshot wounds

1. Compression of the epithelium around the gunshot wound appears normal epithelium and that is experiencing compression, elongation, and flattening of epidermal cells and elongation of the cell nucleus,

2. Distortion of the epidermal cells at the edges of the wound that may mix from the gunpowder grains.
3. The epithelium undergoes necrosis, coagulative, swollen epithelium, vacuolization of basal cells,
4. As a result of heat, the collagen tissue blends with HE staining, it will take on more of the blue color (basophilic steining).
5. There is bleeding that is still fresh in the epidermis (this disorder is the most dominant) and the presence of gunpowder grains.
6. Cells in the dermis essentially shrink, vacuolize, and pyknotic
7. The grains of gunpowder appear as irregular objects, black or black brown in color,
8. In "hard contact" gunshot wounds, the surface of the skin around the wound contains no or very few gunpowder grains, many gunpowder grains will appear in the lower layers, especially along the edges of the wound canal.
9. In "soft contact" patch wounds, gunpowder grains are found on the skin and tissues under the skin
10. In close-range gunshot wounds, gunpowder grains are mainly found on the skin surface, only a few are in the layers of the skin.

Progressive changes in the epithelium due to heat and mechanics are changes that can be found. Similarly, the possibility of obtaining gunpowder in the wound tract and in the epithelial changes. In general, the wound channel in a patch gunshot wound will contain more gunpowder when compared to a gunshot wound where the muzzle of the gun is not attached to the skin. (*Dahlan, Sofwan. 2007*)

#### **IV** Supporting investigation

X-rays are important in examining gunshot wounds. All gunshot wounds should be x-rayed, especially for exit gunshot wounds.

The uses of x-rays include:

- a. To see if the bullet or parts of the bullet are still in the body
- b. To determine the location of the bullet
- c. To determine the location of the small fragments of bullets left in the body so that they can be removed
- d. To identify the type of ammunition and weapons used
- e. To document the direction of the bullet

A CT scan is a more accurate tool for evaluating the location of bullets and bone fragments. It can be seen how far the bullet hit the organ or tissue. In a gunshot wound to the head, it can be seen whether there is bleeding in the brain, fractures of the vertebrae and others.

- The paraffin test is a non-specific test, because it can only detect the presence of nitrate and nitrite. So this test can also give a positive result if the hands are contaminated with tobacco, nuts, fertilizers or drugs.
- Harrison and Gilroy test, using gauze that has been moistened with hydrochloric acid. The difference with the paraffin test is that the latter test detects the presence of metallic elements, mercury, antimony, barium, or lead. Of course it must be taken into account whether the work is related to these metals.
- Harrison and Gilroy test, using a gauge that has been moistened with hydrochloric acid. The difference with the paraffin test is that the latter test detects the presence of metallic elements, mercury, antimony, barium, or lead. Of course it must be taken into account whether the work is related to these metals.

## V. CASE REPORT

A case was reported with the victim a male corpse, initials MAD, 40 years old, body length 173 cm, medium stature, tan skin. Police: B / 08 / VIII / 2011 / Criminal Investigation Unit for external and internal examination of the body (victim). With Explanation: The body was found in Naga Rejo Village, Galang District, Deli Serdang Regency, on August 24, 2011 at 20.00 WIB. The victim was evacuated from the scene of the incident and taken to the Pirngadi Hospital in Medan.

Examination of the victim was found; General identification: male corpse, male, adult, known, body length 173 cm, medium stature, tan skin, straight black hair, thick eyebrows, mustache.

Specific identification: Found a tattoo on the chest, about the midline of the body, extending to the left, black color, bird motif, measuring 14 cm long, 15 cm wide, 7 cm distance from the top of the shoulder.



*Figure 1 . bird pattern tattoo*



Back: Found on the left back of the skin suture with black thread as much as 2 (two) stitches, after the stitches were opened an open wound was found, round in shape, the edges of the wound were uneven, blackish spots were found around the wound (allegedly a klim tattoo). with a diameter of 0.7 cm, 2 cm deep to the base of the muscle, at a distance of 27 cm from the midline of the body, 30 cm from the top of the left shoulder, 130 cm from the heel



Figure 2. Sutured entry gunshot wound

Chest: Opening the skin and muscles of the left chest, found a round wound with a diameter of 0.5 cm

On cutting the skin on the right chest, a gray (silver) metal projectile was found in the 4th intercostal space, the distance from the heel of the foot was 133 cm, the distance from the midline of the body was 16 cm, the distance from the right armpit was 8 cm. The size of the projectile is 1.8 cm long, 0.8 cm in diameter.

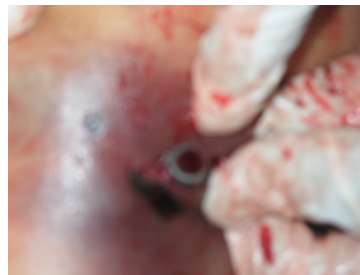


Figure 3 shows the projectile on the right chest skin incision



Figure 4 . projectiles found for identification

In the heart bag, found blood infiltration, measuring 6 cm long, 3 cm wide.

A penetrating wound was found, about the same as the infiltration of blood, measuring 2.5 cm long, 1 cm wide.

At the opening of the cardiac pouch; A penetrating wound was found in the back of the left ventricle of the heart, measuring 1 cm long, 0.4 cm wide, 9 cm deep, penetrating the veins of the heart, the distance from the top of the heart is 8 cm.

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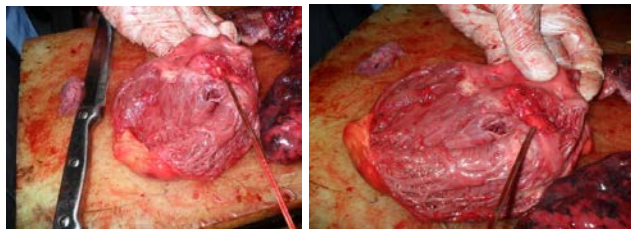


Figure 5.6 shows a penetrating wound to the heart

## VI. Discussion

Upon examination of the victim, a male corpse was found, male, adult, known, body length 173 cm, medium stature, brown skin, straight black hair, thick eyebrows, mustache. Based on the visa request letter and interviews with investigators that the victim worked as a check in PT. PP. Lonsum (security), which is in charge of supervising the garden from theft, the plantation where the victim works as security often sees cattle, when the incident the victim does not keep security but steals the cows where the owner suspected and reported to the police that the victim was eventually shot. the gunshot wounds associated with the shooting range are not clear but it is still possible to believe that the victim was allegedly shot in the back while fleeing .

From the external and internal examination it was concluded that the cause of death of the victim was a gunshot wound that penetrated the left back, left lung, heart, great veins of the heart, right lung, left chest which resulted in bleeding, from the bullet path which was known from the autopsy results, it could be believed death victims of cardiac tamponade.

Bruises were found on the skin on the right side of the chest, and on hard palpation, the skin on the right chest was cut and a gray (silver) metal projectile was found in the 4th intercostal space, so this victim had a gunshot wound and the bullet did not come out.

Based on the place/location of the gunshot wound, it can be believed that it was not an act of oneself or an accident but the result of an act by another person in this case the security forces and indications of shooting can also be accepted because the victim fled when he was about to be arrested.

To obtain a complete picture of the gunshot wound, radiological examinations, namely X-rays and CT-scans, can be performed. Generally, X-ray is more often done considering the cost factor is more affordable. However, this was not done for the victim because at the Pirngadi Hospital Medan it was not customary to do X-rays on the bodies.

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