

## MEDICOLEGAL STUDY OF FIREARM DEATHS PRESENTED TO ZEINHOM MORGUE

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### ABSTRACT

**Introduction:** The terminal ballistics refers to the behavior of a missile after it hits the target. When terminal ballistics deals with human tissues as the target it is called wound ballistics. The morphology of inlet and exit lesions found with a rifled firearm weapon depends mainly on the direction of the projectile travel. The inlet is typically smaller, steady, and inverted, while the exit is a bigger, uneven, and abundantly bleeding injury. **Aim:** The current study aims to analyze the medicolegal aspect of firearm wounds among deaths referred to Zeinhom Morgue. **Methodology:** This study was a prospective cross-section study, including all firearm deaths, presented to the Zeinhom morgue for 6 months duration. **Results:** 157 deceased subjects (149 males, 8 females) were included in the study, their ages ranged between the 2nd and 7th Decades. 122 subjects were found to have only single firearm wound entry, and 47.1 % of them had exit wounds. The anteroposterior direction of firing has the highest percentage. The highest percentage was to the far firing. **Conclusion and recommendations:** There is a male predominance in firearm injury cases, especially in the middle age period. The majority of the studied cases had no medical interference and died at the scene. Thus we recommend decreasing the number of firearms used and sold in Egypt.

**Keywords:** Firearms, Exit wound, Far firing, Zeinhom Morgue.

### INTRODUCTION

Firearm wounds can be caused by accidental, homicidal, or suicidal actions (Meral et al., 2020). The severity of the injury varies widely depending on the type of weapon and the distance between the causative weapon and the targeted body part (Stefanopoulos et al., 2014).

The terminal ballistics refers to the behavior of a missile after it hits the target (Kislov et al., 2022). When terminal ballistics deals with human or animal tissues as the target it is called wound ballistics. Wound ballistics help forensic

pathologists explore the various characteristics of firearm wounds (Kaur et al., 2023; Riva et al., 2019). There are important variables that decide the morphology of the firearm injuries such as the type of weapon, ammunition, the anatomical region targeted, and the distance of firing (Meral et al., 2020; Shrestha et al., 2020).

The morphology of inlet and exit lesions found with a rifled firearm weapon depends mainly on the direction of the projectile travel. The inlet is typically smaller, steady, and inverted, while the exit is a bigger, uneven, and abundantly bleeding injury with external

beveling (in the case of a bony exit) (Baum et al., 2022). The inlet wound is also characterized by burnt skin surrounding it and singed-off hair which is caused by the effect of flame (Rhee et al., 2016). There are also reddening, blackening, and tattooing, due to hot gases, smoke, and deposition of the unburnt gunpowder and metal particles, respectively. The exit wounds lack the previous characteristics as the abrasion rim and grease collar surrounding a wound suggest it to be an inlet wound of a missile (Stefanopoulos et al., 2017). A crater-shaped cone injury in the tissue is also an indicator of the presence of an inlet wound (Komenda et al., 2013).

### AIM OF THE WORK

The current study aimed to analyze the medicolegal aspect of firearm wounds among deaths referred to Zeinhom Morgue.

### METHODOLOGY

This study was a prospective cross-section study, including all firearm deaths, presented to the Zeinhom morgue during 6 months.

All cases with firearm causing death, both sexes and all ages presented to Zeinhom Morgue during the study period were included.

Cases with firearm injuries with other causes of death were excluded.

### Examination of cases

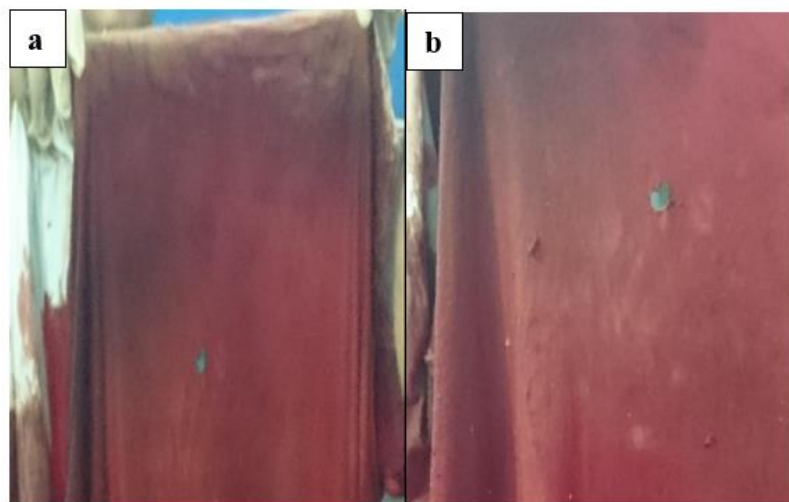
**1. Identification** (Identity status, age, Sex, residence, Registration at Zeinhom morgue data.

**2. Postmortem general examination**

a- Examination by X-ray Using a C-Arm X-ray machine to determine the presence or absence of retained particle, site and type of retained particle, and other clinical findings by X-ray related to firearm injury.

b- Examination of clothes & finding on clothes if present and comparing it with the wound (**Figure 1**).

c- Firearm injury examination: number and site of the inlet, exit wound (in case of multiple inlets; the inlets were numbered e.g: inlet 1, 2, 3,...and the same was done in case of multiple exits e.g: exit 1, 2,3, ..) and retained particle (presence and site of each), direction& distance of firing, surgical interference before death (sepsis or medical incision scars), possible cause of death, other complications and associated injuries related to firearm injury, the type of weapon and its caliber if possible.



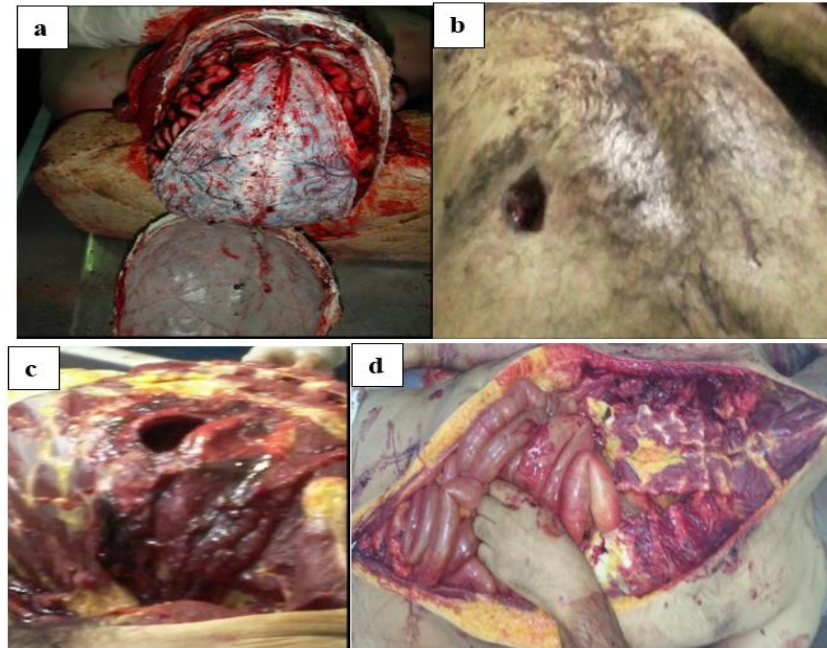
**Figure 1** [Zeinhom morgue]:

- a) Inlet opening in the clothes of a fired case by a rifled weapon.
- b) Exit opening in the clothes of a fired case by a rifled weapon.

### *Examination of firearm injury to the head*

An incision was done behind both ears through it, peeling off the scalp from posterior to anterior and then using a

special chainsaw the skull was opened by partial separation of the skull cap, allowing examination of the brain and its meninges and taking samples if indicated then closure of the head by suturing the outer wound of the scalp (**Figure 2a**).



**Figure 2** [Zeinhom morgue]:

- a) Head opening for examination of a firearm in the head , b) Inlet of a firearm in the anterior chest wall  
c) Opining on the inlet in the anterior chest wall, d) Mid-line incision for complete examination of dead bodies

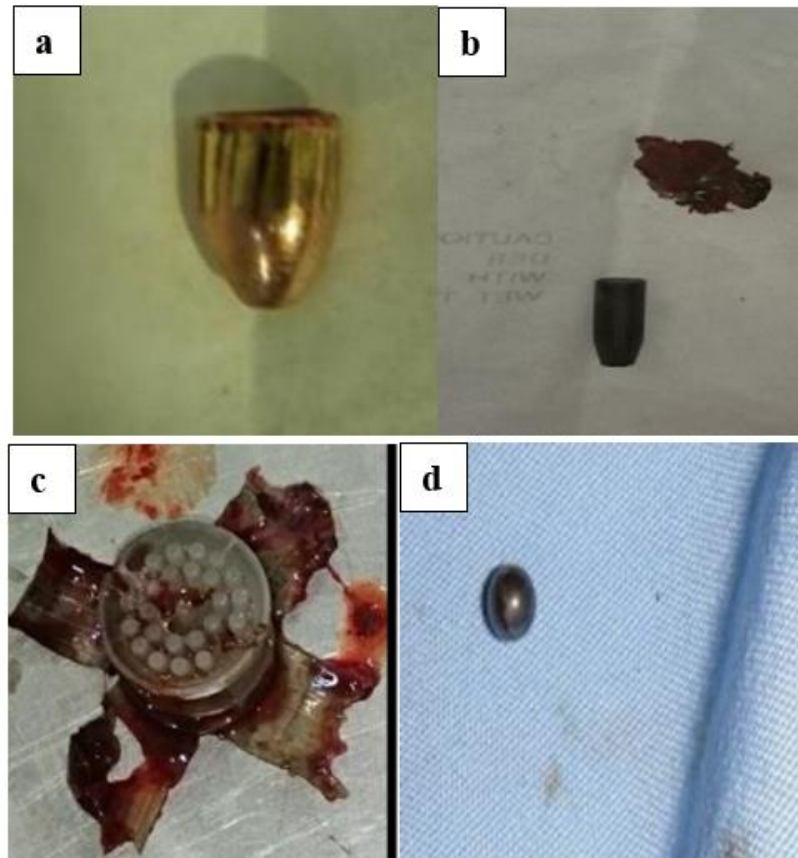
### *Examination of firearm injury to the trunk and limbs*

If a firearm injury in any site in the body rather than the head, the examination was done by simple incision by simple medical scalpel in the site of the firearm wound (**Figure 2b,c**).

Then complete examination by doing a mid-line incision from the neck to the symphysis pubis

allowing examination of the internal viscera (**Figure 2d**)

d- Retained particle Extraction and preservation of any retained particles in red wax sealed envelope to be sent in legal authorities after the examination (**Figure 3**).



**Figure 3** [Zeinhom morgue]:

a) 9mm (retained rifled missile) b) Fragmented 7.62mm bullet c) Retained internal wad (near firing of non-rifled missiles) d) Retained non-rifled shot

e- Collection of samples -if indicated by legal authorities- spatially DNA samples in cases which cannot be identified by the examiner and then finally closure of autopsy wounds (**Figure 4**).

### 3. Photography

Photos in the current study were taken using an A4K camcorder and a 20.7 MP camera.

### 4. Statistical analysis

The Data of our study was analyzed using the statistical package SPSS version 23. For



**Figure 4:** Closure of the autopsy incision [Zeinhom morgue].

categorical data Data we used count and percentage., and we used Chi square ( $\chi^2$ ) test for comparing categorical data. A P-value < 0.05 was considered statistically significant (Chan, 2003).

### RESULTS

157 deceased subjects were included in the study.

#### Demographic Charachtristics

There were 149 males and 8 females, their ages ranged between the 2nd and 7th Decades.

84.7% were between the 3rd and the 5th decades, and 86 % of them were known (well-identified) cases.

The cases were 58% from Giza, 31.20% from Cairo and 10.80% from Kalubyaia.

#### X-ray Examination

The X-ray examination was done for all cases and revealed that 61.1% of the studied individuals had retained particles. Also, 47.1% of cases had various internal injuries (Table 1). There was a statistically significant difference between the type of weapon (rifled and non-rifled) and the presence of retained particles, as there was 48.9% of cases fired by rifled weapon had a retained particle, while 100% of non-rifled cases had a retained particle (P value < 0.001).

#### Examination of The Clothes

On examination of firearm-injured subjects only

69 subjects' clothes were available for examination representing 43.9% of cases, of which 4 subjects' clothes had tearing and powder marks opposite the inlet representing 2.5% of the examined subjects. The other 65 subjects' clothes had only tearing opposite the inlet which represented 41.4% of the examined subjects.

**Table 1:** Internal Injuries Found by X-Ray.

Injury type	count	%
Cardiac Tamponade	6	3.8%
Intra-Peritoneal Hemorrhage	35	22.3%
Intra-Thoracic Hemorrhage	27	17.2%
Cardiac Tamponade + Intra-Thoracic Hemorrhage	4	2.5%
Bone Fracture By Firearm Projectile	2	1.3%
Nothing	83	52.9%
Total	157	100%

#### Entry Wound Examination

On examination of included subjects, 122 individuals were found to have only single firearm wound entry, 14 individuals with two firearm entry wounds, 2 individuals with three firearm entry wounds, and 19 individuals with more than three firearm entry wounds.

Regarding the relation between the type of weapon and the number of inlet wounds, there was statistical significance (P value < 0.001) as shown in Table 2.

**Table 2:** the relation between Type of weapon and number of firearm wounds.

No. of inlet wounds	Type of weapon		P value		
	Refiled No.	Non rifled %	No.	%	
Single inlet	112	85.5	10	38.5	0.001*
2 inlets	14	10.7	0	0	
3 inlets	2	1.5%	0	0	
4 inlets or more	3	2.3%	16	61.5	

Test: Chi-square ( $\chi^2$ ).

\*p value ≤ 0.5 is significant

#### The Character of Inlet Wounds

Table 3 shows the description of the inlet wounds from inlet 1 to inlet 4, the highest percentage in all sites was the small inlet wound

which was < 2cm while the large inlets > 2cm had the lowest percentages in all sites of firearm injuries except those who had more than 3 inlets which mostly related to non-rifled injury we found full disruption of shots had the highest percentage.

**Table 3:** Special character of inlet wounds from inlet 1 to 4.

	<i>Inlet 1</i>		<i>Inlet 2</i>		<i>Inlet 3</i>		<i>Inlet 4</i>	
	N.	%	N	%	N	%	N	%
<i>Small inlet Less than 2 cm</i>	127	80.9	13	92.9	2	10.5	1	50
<i>Large inlet more than 2cm</i>	12	7.6	1	7.1	1	50	1	5.3
<i>Full shot disruption</i>	18	11.5	0	0	0	0	1	84.6

The statistical comparison between the type of causal weapon and the special character of the inlet in site 1(cases of single inlet and inlet number 1 in multiple inlets) showed a statistically significant difference with both rifled and non-rifled weapons (P < 0.001). 95.4% of cases fired by rifled weapons had inlets which are less than 2 cm and 4.6% more than 2cm, while 69.2% of non-rifled cases had a full shots disruption followed by 32.1% of them had inlets that were more than 2cm then 7.7% of them has less than 2 cm inlets as shown in **Table 4**.

**Exit Wounds**

**Table 5** shows the presence of an exit opposite its corresponding inlet in sites 1 to 4 of firearm injuries (Exit 1 refers to a single exit and exit corresponds to inlet 1 in multiple inlet cases). The higher percentage showed the absence of an exit opposite its corresponding inlet.

**Table 4:** the relation between the type of weapon and special character of the inlet in site1\*

<i>the character of inlet wounds</i>	<i>Type of weapon</i>				<i>P value</i>
	Rifled		Non rifled		
	No.	%	No.	%	
<i>Less than 2 cm</i>	125	95.4	2	7.7	< 0.001*
<i>more than 2cm</i>	6	4.6	6	23.1	
<i>Full shot disruption</i>	0	0	18	69.2	

Test: Chi-square ( $\chi^2$ ).

\*p value ≤ 0.5 is significant

site1\*: cases of single inlet and inlet number 1 in multiple inlets.

**Table 5:** Presence of exit opposite its corresponding inlet in sites from 1 to 4 firearm sites of injury

	<i>Exit 1</i>		<i>Exit 2</i>		<i>Exit 3</i>		<i>Exit 4</i>	
	N	%	No.	%	No.	%	No.	%
<i>Present</i>	74	47.1	9	64.3	1	50	3	15.8
<i>Absent</i>	83	52.9	5	35.7	1	50	16	84.2

**Direction of Firing in Studied Cases**

According to the direction of firing in each site of firearm wounds, we found the anteroposterior direction has the highest percentage in all sites of firearm wounds while upward-downward has the lowest percentage as shown in **Table 6**.

Regards site1 (cases of single inlet and inlet number 1 in multiple inlets) we found no statistical significance in comparing the direction of firing and the presence of retained particles in cases fired by rifled weapon (P= 0.127). 70.3% of

**Table 6:** Direction of firing in each site of firearm injury

	<i>Wound 1</i>		<i>Wound 2</i>		<i>Wound 3</i>		<i>Wound 4</i>	
	No.	%	No.	%	No.	%	No.	%
<i>Antero-posterior</i>	97	61.8	9	64.3	2	100	15	78.9
<i>Postero-anterior</i>	17	10.8	2	14.3	0	0	4	21.1
<i>Right to left</i>	17	10.8	2	14.3	0	0	0	0
<i>Left to right</i>	21	13.5	1	7.1	0	0	0	0
<i>Up- downward</i>	1	0.6	0	0	0	0	0	0
<i>Below-upward</i>	4	2.5	0	0	0	0	0	0

cases who were fired anteroposteriorly had a retained particle in site 1, While when we compared statistically between the direction of firing and the presence of a retained particle in site 2 (inlet number 2 in multiple inlet cases), in

cases fired by rifled weapons we found statistical significance (P <0.001). 50% of the anteroposterior direction of firing, then 25% of left to right direction as shown in **table 7**.

**Table 7:** the relation between the Direction of firing in rifled weapons cases and retained particles in site 1\* and site 2\*\*

<i>Direction of firing</i>	<i>retained particles in site 1</i>				<i>P value</i>	<i>retained particles in site 2</i>				<i>P value</i>
	yes	No	yes	No		yes	No	yes	No	
	No.	%	No.	%		No.	%	No.	%	
<i>Antero-posterior</i>	45	70.3	40	59.7	0.127	4	50	5	4.1	0.001*
<i>Postero-anterior</i>	3	4.7	12	17.9		1	12.5	2	1.6	
<i>Right to left</i>	7	10.9	5	7.5		1	12.5	0	0	
<i>Left to right</i>	8	12.5	7	10.4		2	25	0	0	
<i>Up- downward</i>	0	0	0	0		0	0	0	0	
<i>Below-upward</i>	1	1.6	3	4.5		0	0	0	0	

Test: Chi-square ( $\chi^2$ ).

\*p value  $\leq 0.5$  is significant

site1\*: cases of single inlet and inlet number 1 in multiple inlets

site 2\*\*: inlet number 2 in multiple inlets

percentage was to the far firing (90.40%) followed by near firing (8.30%) then contact firing (1.30%).

**Distance of Firing**

According distance of firing the highest

Comparison between the distance of firing and the presence of retained particles in cases of

rifled weapons showed that 95.3% of cases that had retained particles were fired at a far distance of firing. While 73.1% of cases of non-rifled which had retained particles had a far distance of firing as shown in **Table 8**.

**Table 8:** The relation between distance of firing and presence of retained particles in studied cases fired by rifled weapons in site1\*

Distance of firing	retained particles in site 1				P value
	yes		No		
	No.	%	No.	%	
Contact firing	0	0	1	1.5	1
Near firing	3	4.7	4	6	
Far firing	61	95.3	62	92.5	

Test: Chi-square ( $\chi^2$ ).

\*p value  $\leq 0.5$  is significant

site1\*: cases of single inlet and inlet number 1 in multiple inlets.

### The Anatomical Regional Distribution Of Firearm Injuries

There were (35.5%) of cases fired in the head, 24.4% in the chest, 20.5% in the abdomen, 8.9% in the thigh, 5.7% in the back, 2.5% in the neck, 1.9% in the iliac region, and both chest& abdomen were present in 0.6%.

**Table (9)** shows the statistical comparison between the anatomical region of firearm wounds and the presence of exit wounds in rifled weapons. The head showed the site of inlet and presence of exit in 40.5% while the chest and abdomen showed 31.6% absent exit.

#### Organ Laceration In Studied Cases

Organ laceration was found in (84.7%) of the

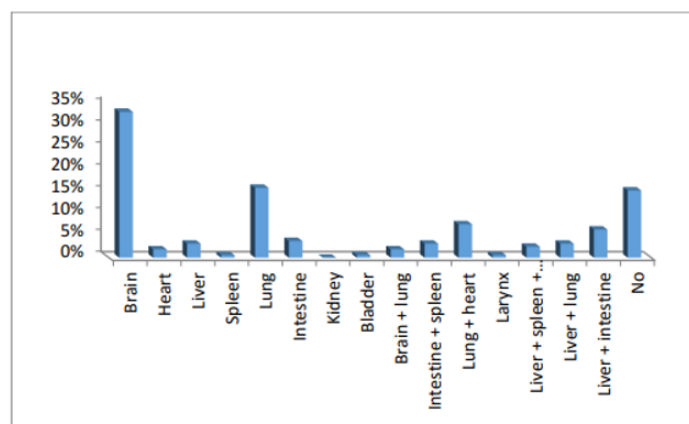
**Table 9:** Statistical comparison of the site of the inlet and the presence of an exit.

Anatomical region	present		absent		P value
	No.	%	No.	%	
Head	30	40.5	14	24.6	0.001*
Neck	2	2.7	2	3.5	
Chest	17	23.0	18	31.6	
Abdomen	6	8.1	18	31.6	
Back	6	8.1	1	1.8	
Thigh	12	16.2	2	3.5	
Iliac region	1	1.4	2	3.5	

Test: Chi-square ( $\chi^2$ ).

\*p value  $\leq 0.5$  is significant

studied cases and in most cases, it was a single organ laceration (59.60%), the most affected organ was the brain followed by the lung (figures 5,6).

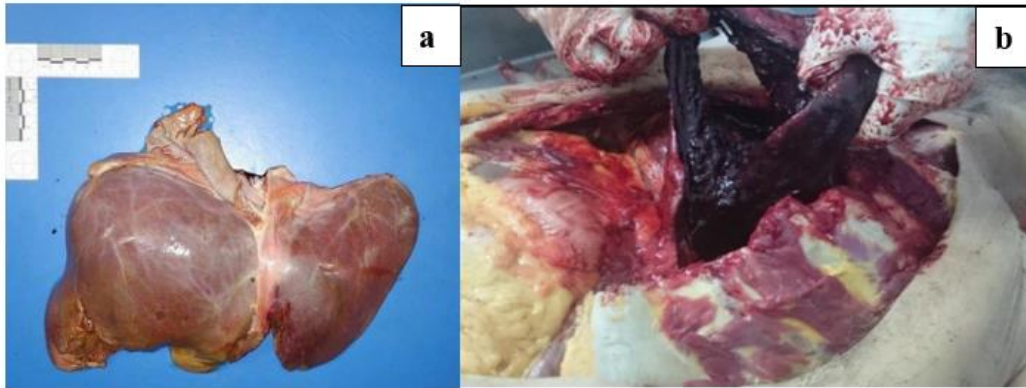


**Figure 5:** Distribution of organ laceration of the studied cases.

#### Hemorrhage And Vascular Complications

100% of studied cases had different types of hemorrhage (68.8%) of cases had both internal



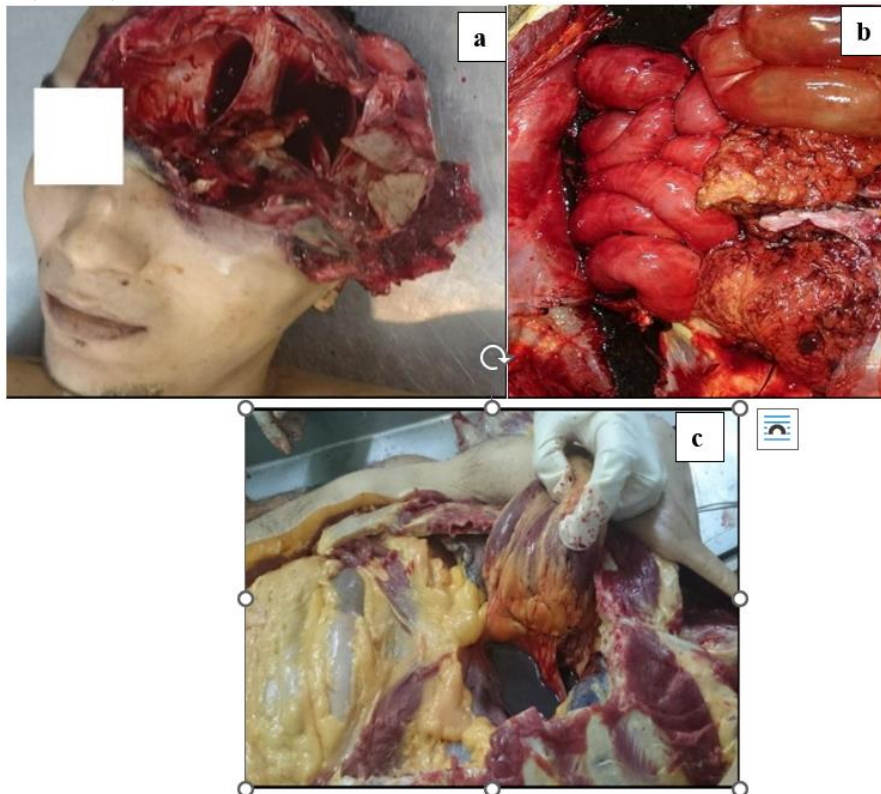


**Figure 6** [Zeinhom morgue]: a-Right lobe of liver laceration, b-Lunge laceration (non-rifled to the chest)

and external hemorrhage, while (18.5%) had external bleeding only and (12.7%) of cases had internal bleeding only, also, there was Vascular complication in the form of vessel laceration in (16.60%) of cases, septic complications in (4.50%), shot embolization in

one case (0.6%). **Figure 7** illustrates different sites of hemorrhage.

Only 5.70% of cases had medical interference before death, and most of the cases died at the scene.



**Figure 7** [Zeinhom morgue]: a)Cranial hemorrhage (firearm to the head). b) Intra-peritoneal hemorrhage (firearm to the abdomen), c) Intra-thoracic hemorrhage (firearm to the chest).

**Weapon Examination**

In 83.40% of cases fired by rifled weapons, 34.5% of them, the caliber was 7,62mm and 9mm in 8.9%, while nonrifled caliber was 12mm in 2.5% and 16 mm in 2.5% of cases as shown in **Table 10**.

**Table 10: Caliber of casual weapon in studied cases**

	<i>Rifled weapon</i>		<i>Non-rifled</i>	
	No.	%	No.	%
<i>caliber Not detected</i>	63	40.1	18	11.5%
<i>caliber 7,62mm</i>	54	34.5		
<i>caliber 9mm</i>	14	8.9		
<i>caliber 12</i>			4	2.5
<i>caliber 16</i>			4	2.5

There were statistically significant differences in comparing retained particles by x-ray and caliber of causal weapon ( $P < 0.001$ ). 77.1% of the retained particles by x-ray were of rifled weapon caliber 7,62mm, and 18.6% were 9mm as shown in **Table 11**.

**Table 11: The retained particle by X-ray examination and caliber of rifled causal weapon**

The caliber of rifled weapon	retained particles by x-ray examination				P value
	yes		No		
caliber	No.	%	No.	%	
Not detected	3	4.3	60	98.4	< 0.001*
caliber 7,62mm	54	77.1	0	0	
caliber 9mm	13	18.6	1	1.6	

Chi-square ( $\chi^2$ ). \*p value  $\leq 0.5$  is significant

**DISCUSSION**

The use of a firearm is commonly recognized in violent crimes (**Khoshnood,2018**). It could be used to force or threaten the victim or even cause serious injuries to them (**Logan et al., 2022**). It is considered a major cause of trauma worldwide, and, in some cities, the leading cause of injury. Firearm injuries are an important cause of morbidity and mortality all over the world and differ from country to country. There is a rise in the usage of illegal local guns in many countries. A firearm is a convenient method of destroying human life from a distance and at the same time allowing an easy escape for the assailant (**Holmstock, 2020**)

*Regarding the number of firearm wounds*, the majority of cases were single firearm wounds (77.7%), Which may be due to the type of causal weapon causing a single wound in most of them (83.40% rifled weapon). The results of the present study are in agreement with, **Haider et al., (2014)**, as 16.90 % of deaths in their study had multiple wounds while 83.1% had a single firearm wound. Also **Al Madni et al., (2008)**, mentioned that, the majority of his cases (56.3%) had a single wound while in 15.6% of cases there were two wounds.

*As regards the anatomical regional distribution of inlet sites* in the studied cases, the inlet in the head, face & neck was (38.1%), which may be due to the selection of fatal sites such as head & chest by the assailant.

Following the current work, **Haider et al., (2014)**, found that the highest percentage of inlet wounds of firearm deaths during the autopsy was in the head, face& neck (36.62 %) followed by the thorax (26.76 %). Also, **Myint et al., (2014)**, said that the head and face region was the most frequent site of entrance wounds. The study by **Papadopoulos et al., (2013)**, mentioned that the most seriously injured regions were the head (44.5%), and thorax (25.7%). In contrast to the current work, **Bhatti et al., 2012** mentioned that head and face injuries represented (2.6%). Also, **Hussain et al., 2013** found that the most frequently involved body region was the lower limbs followed by the upper limbs and the least affected were the head and neck. Also, **Khetran**

et al., 2012 found that the most common site of bullet entry was the chest and abdomen 56%. On the other hand, **Hagras & Kharoshah, 2010** mentioned the most common site of injury was the chest followed by the head.

**Regarding X-ray screening of the cases,** The X-ray examination was done for all 157 subjects and revealed retained particles in 96 subjects representing 61.1% of the studied individuals. X-ray examination and proper autopsy techniques may facilitate the extraction of retained particles. Following the current work, **Myint et al., 2014** found projectiles could be recovered from 91 cases (61.1%). From 58 cases (38.9%), projectiles could not be recovered. However, in contrast to the current study, **Al Madni et al., 2008** mentioned that in 51.5% of cases, no bullet was retained.

**According to the distance and direction of firing;** the highest percentage was to the far firing (90.40%).

The presence of a burning effect, blackening, and tattooing was the basis for deciding whether the injury was inflicted within near or contact firing. The absence of these findings was the criteria to decide that injury was inflicted within far distance of firing. The results of the present study are in agreement with, **Bhatti et al., 2012** found Far distance of firing in 80% of cases. Also, **Al Madni et al., 2008** found that distant-range fire was observed in 65.6% of cases.

**According to the type of causal weapon,** 83.40% of cases were fired by rifled weapons, which may be evidence of the spreading of rifled automatic weapons in studied regions.

In accordance with the current study, **Myint et al., 2014** showed dominance of rifled firearms, and in the study of **Al Madni et al., (2008)**, 76.5% of cases used rifled weapons. Also, **Hussain et al., 2013** found that The most common firearm weapons were high-velocity rifled weapons (Kalashnikov, rifles, pistols), followed by low-velocity rifled weapons (18/452, 3.98%) and shotguns (16/452, 3.54%).

In contrast to the current work, **Hagras & Kharoshah, 2010** mentioned that shotguns were responsible (70.1%) of cases.

**According to organ lacerations** found during the autopsy of cases, we found there were organ lacerations in (84.7%) of studied cases and in most of the cases, it was a single organ lacerated (59.60%). Brain laceration had the highest percentage (33.1%), Which goes with the higher percentage of firearm sites was the head.

In accordance with the current work, **Myint et al., (2014)**, said the brain was the most commonly injured internal organ in our study. In contrast with the current study, **Iflazoglu et al., 2015** found that small bowel injury had the highest percentage of organ injuries (48%). Also, **Kalesan et al., 2014** showed that internal organ injury only in (20.1%) of studied cases. Which is due to the anatomical distribution of firearm wounds in these sites.

**According to the caliber of causal weapon and presence of retained particle:** Statistical comparison between the caliber of rifled weapon and presence of retained particle shows statistical significance.

Also, **Myint et al., 2014** found statistical significance in comparing between caliber of rifled weapons and the presence of retained particles.

Post-mortem x-ray screening in addition to proper autopsy helps extraction of any retained particle which helps us to identify the type and caliber of causal weapon.

In contrast with the current study, **Iflazoglu et al., 2015** found that there is no significance between the caliber of causal weapon and the presence of retained particle

**Regards the presence of an exit opposite its corresponding inlet** in sites in different sites of firearm injuries; we found that there was an exit wound in (47.1%) of cases. It's easy with rifled weapons which had the highest percentage in the current study to found an exit wound –when conditions are available-

In contrast with the current study, **Sachan et al., 2013** found that (28.7%) of cases had exit

wounds while (71.3%) with absent exit wounds, Which depends on many factors such as the type of weapon and distance of firing.

*According to complications of firearm* injuries in the studied cases, 100% of studied cases had different types of hemorrhage as (68.8%) of cases had both internal and external hemorrhage. In contrast with the current study, **Iflazoglu et al., 2015** mentioned that the highest percentage of complication was for wound infection (21.7%).

### Conclusion and Recommendations

There was a male predominance in firearm injury cases, especially in the middle age period. The majority of the studied cases had no medical interference and died at the scene. The anteroposterior direction of firing has the highest percentage. The highest percentage was for the far firing.

Thus we recommend decreasing the number of firearms used and sold in Egypt by eradicating the local and illegal manufacturing places. Also, great attention should be paid to education and awareness of the danger of firearm usage especially in young males.

### CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest.

### ETHICAL APPROVALS

This study was approved by the Scientific Ethical Committee of the Forensic Medicine and Clinical Toxicology Department, Faculty of Medicine, Cairo University.

### FUNDING

None.

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## الملخص العربي

### دراسة طبية شرعية لحالات الوفاة بالأسلحة النارية التي قدمت إلى مشرحة زينهم

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#### المقدمة

يسمى سلوك الأعيرة النارية بعد إصابة الهدف بالمقذوفات الطرفية . وعندما تتعامل المقذوفات الطرفية مع الأنسجة البشرية كهدف، فإنها تسمى المقذوفات الجروح. إن شكل وتكوين جروح الدخول والخروج الناجمة عن استخدام سلاح ناري تعتمد بشكل أساسي على اتجاه وحركة المقذوف وأيضا على نوع السلاح المستخدم.

عادةً ما يكون جرح الدخول أصغر حجماً وثابتاً واتجاهه للداخل، بينما يكون جرح الخروج أكبر حجماً وغير متساوٍ وينزف بغزارة.

#### الهدف

تهدف هذه الدراسة الي دراسة الجوانب الطبية الشرعية لحالات الوفاة بالأسلحة النارية التي قدمت إلى مشرحة زينهم

#### المنهجية

هذه الدراسة هي دراسته مقطعية استباقية لمدة 6 أشهر ، تضمنت جميع الوفيات الناجمة عن الأسلحة النارية، والتي تم ارسالها الي مشرحة زينهم.

#### النتائج

شملت الدراسة 157 شخصاً متوفياً(149 ذكراً، 8 إناث)، تراوحت أعمارهم بين العقدين الثاني والسابع. تم العثور على 122 شخصاً لديهم جرح دخول واحد فقط بسبب سلاح ناري، و47.1% منهم لديهم جروح خروج مقابله لجرح الدخول. وكانت نسبة الاتجاه الأمامي الخلفي للإطلاق النار أعلى نسبة. وكانت النسبة الأعلى أيضا للتصويب البعيد.

#### الاستنتاج و التوصيات

هناك غلبة للذكور في حالات الإصابة بالأسلحة النارية، خاصة في فترة منتصف العمر.

غالبية الحالات التي تمت دراستها لم تتعرض لأي تدخل طبي وتوفيت في مكان الحادث.

ولذلك نوصي بتقليل عدد الأسلحة النارية المستخدمة والمباعة في مصر.