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The importance of victim's clothes in gunshot wounds

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Abstract

Objective: Determination of victim's clothes in gunshot wounds is important due to the necessity of immediate workup in the emergency room as well as the legal aspects of cases. The aim of this study is to evaluate the importance of victim's clothes in gunshot wounds referred to autopsy hall of legal medicine bureau of Tehran, Iran from 2014 to 2017.

Methods: In this analytical comparative study, 202 consecutive cadavers of gunshot victims, referred to Tehran Legal Medical Hall from 2014 to 2017, were enrolled and the effect of shotgun and gunshot wound were determined and compared. Data were collected using a researcher-made questionnaire. The significance level of the tests was considered as $P<0.05$. Spearman correlation coefficient and chi-square tests were used accordingly. The data were analyzed using SPSS software version 22.

Results: In this study, all women were killed by gunshot. Also, all of the 26 people who were killed by shotgun were men. The mean of age only in males was 39-48 years for shotgun, and 29-38 years in both genders for gunshot. Evaluation of their clothes in the emergency room and autopsy hall was helpful in 70% of cases in order to determine shot distance and type of gun ($P=0.0001$). Conversely, we did not observe a significant difference between sex ($P=0.082$) and the pattern of death ($P=0.211$).

Conclusion: Based on the obtained results, it seems that some characteristics of victim's clothes may be useful to differentiate shotgun and gunshot.

Keywords: Shotgun, Gunshot, Victims, Wounds, Gunshot, Firearms

Introduction

Ballistics is the science of mechanics that deal with the flight, behavior and the effects of projectiles. (1) Ballistics sciences have three branches: (a) internal ballistics: the study of processes originally accelerating the projectile. (b) External Ballistics: the study of projectile as it passes through space. (c) terminal ballistics: the study of the interaction of the projectile with its target (2,3) (Figure 1A-B). Sometimes the entry and exit holes are alike and assessment of the clothes-related findings may be useful (4,5). The prevalence of death due to gunshot is dependent upon access to the gun (2). Suicide by gunshot is usually seen in adults, but it is less common in those younger than 10 years (4,5). The effect of gunshot on clothes may help to determine the type of gun, distance, angle, bullet-related entry and exit site, and direct versus indirect bullet shot (4). The effects of gunpowder on the clothes and also the lead effects may be evaluated (5). The gunshots to the temporal zone are usually suicidal and the gunshots from a distant location are killing (6). Type of the gun would also affect the type of injuries (7,8). Due to the paucity of researches concerning the topic under investigation in Iran and because of its importance, we decided to carry out this research.

Methods

In this analytical comparative study, 202 consecutive cadavers of gunshot victims, referred to Tehran Legal Medical Hall from 2014 to 2017, were enrolled in the study. Data regarding age, sex, distance, bullet exposure location, cover of the location, type of death, site of death, and results of clothes assessment were recorded in a checklist. Inclusion criteria were cadavers aged over 18 years injured with shotgun or gunshot. The exclusion criteria were death not due to warm shot or with idiopathic etiology. Also, cases with incomplete data were excluded. Finally, the effect of shotgun and gunshot wound were determined and compared in the cadavers. Data analysis was done by using SPSS software version 24. Categorical data were expressed as frequency and percent. Numerical data were demonstrated as mean and standard deviation. The utilized tests were chi-square and Fisher exact tests

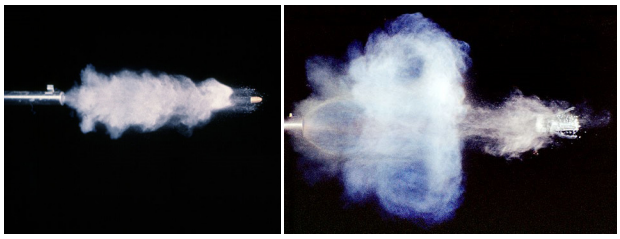

Figure 1. (A) Ballistics in gunshot firearm. (B) Ballistics in shotgun firearm.

and *P* value less than 0.05 was considered statistically significant. Collected data from patients' records were considered confidential.

Results

The mean age of deaths was 30 ± 5 years and it was statistically significant ($P=0.0001$). Also, in both types of guns, there was a significant difference in firearm detection when examining victim's clothing ($P=0.0001$). As shown in Table 1, findings regarding the location of bullet injury ($P=0.018$), cover of location ($P=0.023$), death site ($P=0.005$), and the assessment of victim's clothes ($P=0.0001$) were different. On the contrary, sex ($P=0.082$) and the pattern of death ($P=0.211$) were not different.

Discussion

In this study, we evaluated the importance of victims' clothes and it was concluded that keeping the victims' clothes intact can play an essential role to determine the severity and the distance of gunshots, especially when a patient is initially admitted in the emergency department. Besides, we compared the effects of gunshot and shotgun. Findings revealed that age between the two groups differed and the main age for gunshot was 39 to 48 years, and it was 29 to 38 years for shotgun. In terms of distance, it was medium and far for shotgun and gunshot, respectively. Other findings showed that the site of exposure was abdomen and upper limb mainly for shotgun and gunshot, respectively. The exposure location was usually covered especially in shotgun cases. The death location for both groups, especially for shotgun was public locations.

Table 1. Frequency distribution of variables across the gun type

Variable	Subgroup	Shotgun (n=26)	Gunshot (n=176)	*P* value
Age	18-28	1 (3.8%)	61 (34.7%)	0.0001
	29-38	6 (23.1%)	91 (51.7%)	
	39-48	14 (53.8%)	20 (11.4%)	
	49-58	5 (19.2%)	4 (2.3%)	
Sex	Female	-	21 (11.9%)	0.082
	Male	26 (100%)	155 (88.1%)	
Distance	Tangency contact	1 (3.8%)	28 (15.9%)	0.0001
	Near contact	2 (7.7%)	75 (42.6%)	
	Intermediate contact	18 (69.2%)	59 (33.5%)	
	Far contact	5 (19.2%)	14 (8.0%)	
Exposed site	Skull	1 (3.8%)	33 (18.8%)	0.018
	Neck	-	7 (4.0%)	
	Abdomen	15 (57.7%)	47 (26.7%)	
	Upper limb	10 (38.5%)	87 (49.4%)	
	Lower limb	-	2 (1.1%)	
Exposed site coverage	Naked	1 (3.8%)	41 (23.3%)	0.023
	Clothing	25 (96.2%)	135 (76.7%)	
Manner of death	Murder	25 (96.2%)	152 (86.4%)	0.211
	Suicide	1 (3.8%)	24 (13.6%)	
Location of death	Home	-	(%25)44	0.005
	Military	1 (3.8%)	8 (4.5%)	
	Public	22 (84.6%)	120 (68.2%)	
	Others	3 (11.5%)	4 (2.3%)	
Clothes assessment results	Blood	7 (26.9%)	50 (28.4%)	0.0001
	Blood and burn	19 (73.1%)	58 (33%)	
	Burn and smog	-	1 (0.6%)	
	Burn, blood and smog	-	67 (38.1%)	

In the study by Bowyer and Sellier et al (9,10) among 5215 arm injuries, some of the bullets' particles were still present in 347 of the cases. But majority of greater wounds had no bullet particles. However, in our study the entry location was not different between the two groups. In Riehl et al study (11), it was found that 39% of injuries were in non-military subjects and one-third of injuries were due to bullets. In another study Ali et al (12), it was seen that among 144 cases of injury by air shots, 92% were males with the age range from 1 to 70 years, but no death cases were reported. In our study, male gender was predominant in both groups, but we did not observe gender difference between the groups.

In the current study, it was concluded that in 50% of the cases, presentation of victims' clothes and submitting them to legal counsels could determine the distance and the exact form of the injury, whether it was gunshot or shotgun. It is important to state that there are no specific sources for this issue in our country. Matoso et al (13) compared the entry site for different guns from the same distance and with entry to the same tissue. It was stated that by evaluating the entry wound, we can determine the type and caliber of the type of gun. In our study, the type of wound had no significant effect, but the burn and smog were related to gunshot injuries. In an Iranian study (14) among 38 cadavers due to bullet exposure, all of them were men with the mean age of 32.4 years. The locations were head, chest, abdomen, and limb in 16, 9, 2 and 1 cases, respectively. The injuries related to brain, lung, and other organs in 18, 5, and 12 subjects, respectively. Also, 33% of deaths were due to suicide, half of them were done out of home, 33% in the home, and 16% in the workplace. Half of the cases were due to gunshot. In our study unlike other studies, regarding murders and suicides, the shooting distance was one meter (Figure 2). In a study by Iflazoglu et al (15) among 16753 trauma cases, there were 104 injured cases with gunshot, 8 dead cases and majority of injuries were in limbs. The mean of age was 28.2 years. In our study, all these factors except sex helped to differentiate the type of the gun. Lustenberger et al (16) reported that injuries by shotgun were more severe. In addition, they reported that type of gun and bullet had an effect on the status of injured subjects. In a similar line, the horizontal and vertical stretching, hard tissue amount, and body mass index in subjects were noted as contributing factors. In our study unlike other studies, the soot or smoke was only found on the gunshots fired on the clothes. In other words, soot was not found in the shotguns on the clothes. In 70% of the cases, the presence of bullet-proof debris on the clothes was helpful in detecting the firing distance and the type of gun used. These findings were not mentioned in other studies.

Putting Forensic science to use

Feature	Accidental	Suicidal	Homicidal
Site of entry wound	Any part	Head/Chest	Any part
Range	Close	Contact/Close	Any range
Direction	Any direction	Upward/backward	Usually upward
No. of wounds	One	Usually one	One or multiple
Firearm residue on hand	Present	Present	Absent
Weapon at scene	Present	Present	Usually absent
Location	Anywhere	Usually home	Anywhere
Sex	Usually males	Usually males	Either sex
Motive	Absent	Depression, mental illness	Robbery, revenge

Figure 2. Differential diagnosis of manner of death in firearm.

Conclusion

According to the obtained results, it seems that some characteristics of victims' clothes may be useful to differentiate shotgun and gunshot. However, further studies with a larger sample size to assess other possible contributing factors can help to obtain more definite results.

Authors' contributions

All authors contributed in designing, conducting and writing all parts of the article.

Ethical issues

This study was approved by the Medical Ethics Committee of Shahid Beheshti University of Medical Sciences with code number 1396/203. Information from patients' records was considered confidential.

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