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Pattern of Fatal Firearm Injuries Pertaining to Manner of Death: An Original Research Article

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Abstract

The purpose of this study was to collect a data related to, but are not limited to, medico legal aspect, manner of death, type of firearm used, anatomical site involved, range of fire and their direction pertaining to manner of death in fatal firearm injury (FFI) cases, as limited data are available for such fatalities in this region. The direction of the internal bullet path has not been investigated in this area. This study was designed to address that deficiency.

Method- A prospective study over a period of 22 months was carried out on FFI cases brought to the mortuary.

Result –Among 54 FFI cases during study period, homicidal deaths were outnumbered the accidental and suicidal cases. Country made firearm was used in 37.03% FFI cases. More than one entry wound found only in homicidal cases. The typical entry wounds (n-59) in homicide were fired from close or near distance (61.02%), thorax were commonly involved (44.07%) with direction of fire running backward 73.08% (n-19), downward 69.23% (n-18) and towards the right 76.92% (n-20). Entry wound (n-5) in accidental FFI cases were fired from close or near range in 80%, abdomen involved in 80% (n-4) with direction of fire downward 75% (n-3), towards right 75% (n-3) and forward in 50% (n-2),and backward in 50% (n-2). In suicidal cases (n-3) head was involved in 66.67% (n-2) with all direction in backward, upward and towards left side.

Conclusions Country made firearms were involved in majority of cases. Multiple shots were present only in homicidal cases. Non contact entry wounds strongly indicate homicidal death. In homicidal death thorax was commonly involved and the direction of internal bullet path was towards the backward, downward and to the right side (B-D-R) in majority of cases. In all suicidal cases, the direction of fire was backward, upward and to left.

Key words: *Firearm, Country made firearm, Site of entry wound, Range of fire, Direction of fire.*

Introduction

Stabbing, mechanical asphyxia, blunt head injury and shooting are the most common methods of homicides, with firearm homicides on the increase throughout the world [1]. Indian national statistics reveal extreme variations across states and cities. As compared to other countries, firearm fatality rates in India are not particularly high. In 2008, India officially reported a national firearm murder rate of 0.36 per 100,000 people. Use of firearm for violent death is more common in Uttar Pradesh as compared to other states and firearm fatality rate in this city (Varanasi) was 3.1 per 1,00,000 population [2]. In India, in 2008 most of the victims of firearm murder are killed by unlicensed firearms (86%) [2] and use of unlicensed firearm increased in last

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few years. As per national data, firearm were used in approximately 9% of homicidal deaths in India and only this region was accounted for 34.7% in the year 2012 [3]. Few studies have been published in other part of the world regarding internal bullet path pertaining to manner of death [4, 5].Though in this region a number of studies are published on characteristics of firearm injuries [6, 7, 8], but direction of internal bullet path pertaining to manner of death were not investigated which can be also helpful for investigation of crime and reconstruction of event.

Material and Method

This prospective study was carried out on FFI cases brought to the mortuary of the department of Forensic Medicine, IMS, BHU, Varanasi, during period of 1st June 2009 to 30th March 2011. Before the start of the study, ethical clearance was taken from Ethical Committee of IMS, BHU. For the study, relevant questionnaires schedule were prepared.

Data relating to the study were collected by:

1) Examination of inquest report.

2) Interviewing the police personnel accompanying the cases

3) Interviewing the relatives, friends and eyewitnesses

4) Examination of photographs of scene of crime

5) Operative notes in case of hospitalized victims.

6) X-ray examination before autopsy in some cases.

7) Marking each gunshot wound on body diagram.

A large variety of features such as type of firearm, ammunition, number and site of entrance wounds, range of fire and direction of the internal bullet path were recorded.

The wound track was described in relation to planes of body relative to standing position:

(a) Frontal plane: From front to back or back to front.

(b) Sagital plane: From left to right or right to left.

(c) Horizontal plane: From above downwards (caudal) or from below upwards (cephalad).

Results were expressed in percentages. Chi-square and "P" values were calculated wherever applicable. P-value of <0.05 was considered significant.

Findings

Total 54 autopsies were studied due to fatal firearm injuries (FFI). Out of 54 case, 44 cases (81.48%) were victims of homicidal attacks, 5 cases (9.25%) were accidental and only 3 cases (5.55%) were suicidal , in 2 cases (3.7%) manner of death was undetermined. Overall unlicensed country made firearms was used in 37.03% FFI cases. Out of 44 homicidal FFI cases, country made firearm was used in 17 (38.64%) cases and was used in 3 out of 5 accidental FFI cases (Table-1). Pistol was preferred in suicidal cases.

A total of 69 entrance wounds were recorded in the 54 fatalities. Single entry wound was present in 79.62% (n-43) cases, two in 14.81% (n-8), three in 3.7% (n-2) and four in 1 case. Out of 44 homicidal cases single entry wound was found in 33 cases (75%) and multiple entry wound was present in 11 cases (25%). Interestingly Multiple entry wounds were present only in homicidal cases where as in accidental and suicidal cases only single entry wound was present (Table-2).

Total 59 entry wounds were recorded in homicidal cases, of which 36 (61.02%) were fired from close or near range and only 2 (3.39%) entry wounds were from contact range (Table-3). In accidental cases, 80% (n-4) was fired from close or near range and only 20% (n-1) was fired from distant range. In all suicidal cases range of fire was contact range (Table-3).

Anatomical site most commonly involved was the thorax (42.03%) followed by head (26.09%) and abdominal (17.39%) region (Table-4).

In homicidal cases, 44.07% of entry wound was present on thorax region followed by head, neck and face region (33.9%). Limbs were involved only in homicidal cases. In majority of homicidal cases the direction of entry wound on vital anatomical region (Head, Neck, Face, Thorax and Abdomen) was backward, downward and left to right side (Table-5).

Among the non homicidal cases, 5 cases represent accidental death and 3 cases represent suicidal death. In accidental FFI cases abdomen was involved in 4 cases and thorax involved in a single case. Out of 3 suicidal

cases, head (right temple) was preferred region in 2 cases by using pistol and with long barreled shotgun abdomen was preferred in 1 case. In all suicidal cases, the direction of fire was backward, upward and right to left (Table-6). Direction of fire on vital anatomical regions (Head, Neck, Face, Thorax and Abdomen) involved in homicidal and non homicidal cases showed association (χ^2 =3.8839, *p-value* = 0.487). Direction of fire towards backward, downward and left to right in FFI cases represents homicidal injuries.

Table-1: Type of firearm used pertaining to manner of death (n-54)

Type of firearm used	Homicide (n-44) (81.48%)	Accidental (n-5) (9.25%)	Suicide (n-3) (5.55%)	Undetermined (n-2) (3.7%)	Total (n-54)
Country made	17	3	-	-	20 (37.03%)
Pistol	9	-	2	-	11 (20.37%)
Rifle	8	-	-	-	8 (14.81%)
Shot gun	10	2	1	2	15 (27.77%)

Table-2: Number of entrance wound pertaining to manner of death.

Number of entry wound	Homicide (n-44)	Accident (n-5)	Suicide (n-3)	Undetermined (n-2)
One	33	5	3	2
Two	8	-	-	-
Three	2	-	-	-
Four	1	-	-	-

Table-3: Range of fire pertaining to manner of death

Range of fire	Homicide	Accident	Suicide	Undetermined
Contact	2	-	3	-
Close/near	36	4	-	2
Distant	21	1	-	-
Total no of entry wound	59	5	3	2

Table-4: Anatomical site and number of entry wound

Anatomical site	Number of entry wound	Percentage
Head	18	26.09%
Face	1	1.45%
Neck	3	4.35%
Thorax	29	42.03%
Abdomen	12	17.39%
Upper extremity	3	4.35%
Lower extremity	3	4.35%
Total	69	100%

Table -5: Entry wound (n-59) on anatomical site and their direction of fire in homicide

	Head, Neck, Face (n-20) (33.90%)	**Thorax (n-26) (44.07%)**	**Abdomen (n-7) (11.86%)**	**Upper Limb (n-3) (5.08%)**	**Lower Limb (n-3) (5.08%)**
Frontal plane					
F to B	15	19	6	2	1
B to F	5	7	1	1	2
Horizontal plane					
U to D	13	18	5	1	2
D to U	7	8	2	2	1
Sagital plane					
R to L	8	6	2	1	
L to R	12	20	5	2	3

F=forward, B=backward, D=downward, U=upward, R=right, L=left

Table-6: Entry wound on anatomical site and their direction of fire in non homicidal cases.

	Accidental cases (n-5)		**Suicidal cases (n-3)**	
	Thorax (n-1) (20%)	**Abdomen (n-4) (80%)**	**Head (n-2) (66.67%)**	**Abdomen (n-1) (33.33%)**
Frontal plane				
F to B	1	2	2	1
B to F		2		
Horizontal plane				
U to D		3		
D to U	1	1	2	1
Sagital plane				
R to L	1	1	2	1
L to R		3		

F=forward, B=backward, D=downward, U=upward, R=right, L=left

Discussion and Conclusions

Manner of death and type of firearm:

In our study, total 54 fatal firearm injury (FFI) cases were studied and this account for 1.54% of total autopsy cases. It was observed that maximum number of death were homicidal (81.48%) and rarely used for suicidal purpose (5.55%), this observation coincides with other studies conducted in India [2,6,7,8,9], similar result was reported in a study carried out in Edirne, Turkey [10], Egypt[11]. However, some other studies conducted in developed countries like, Brescia (Northern Italy) [12], Sweden [5, 13], New Zealand [14] reported that suicides accounted for the vast majority of firearm fatalities. We observed that unlicensed country made firearms were used in 37.03% FFI cases which is consistent with other studies conducted in India and other developing

countries. Firearms mainly used for homicides in developing countries, the reason could be easy and cheap availability of unlicensed country made firearms and they typically cannot be traced to any owner or by ballistic fingerprinting. These features make unlicensed firearms ideal for criminal use. In this country people rarely use firearm for suicide because people prefer more cheaper and more easily available methods like poisoning and hanging [15, 16]

The number of entry wound and manner of death:

We observed that in majority of cases (79.62%) single shot was fired. Similar observation was also found in Saudi Arabia by Magdy et al. [17], Druid H [5], A Kohli [9]. In 75%(n-33) of homicidal cases single entry wound was present as compared to 26-55% in other studies [5,18]. Interestingly we found in all non homicidal cases only single shot was present and multiple shots were present only in homicidal cases. In all accidental cases single gunshot injury was exclusively present in study by B.Karger et al [19] Myint Sithu et al [20] study also observed multiple entrance wound was common in homicidal cases. However some studies recorded multiple entry wounds in suicidal cases [12, 21]

Range of fire and manner of death:

The present study underlines that vast majority of homicide have close, near and distant range wounds, this consistent with other studies [4, 22] .In accidental cases contact wound was absent. In all suicidal cases only single contact wound was present and this findings are consistent with other studies in which contact or near contact wounds were present in more than 97% [22,23]. Only two cases of homicide were found to be discharged from contact range. Manner of death and range of fire showed significant association in our study. Non contact entry wounds strongly indicate homicidal death.

Anatomical site involved and direction of fire pertaining to manner of death:

Anatomical site preferred and direction of fire in homicidal, accidental and suicidal deaths is different. In homicidal cases, generally the victims are in motion either due to arguing with or opposing the assailant and the assailant generally prefer the large, vital and easy to target anatomical area to shoot. Contrary to this in suicidal cases, the person prefers comfortable position and most vital anatomical site for immediate death. While in accidental cases, the involvement of anatomical site and direction cannot be predicted and these cases totally depend on history of incidence.

In the current study, most common anatomical site of entrance wounds was thorax (n- 29, 42.03%), this result was consistent with other studies [10, 11]. Out of 59 entrance wound recorded in homicide, thorax (n-26, 44.07%) was most common targeted region followed by head, neck and face region (n-20, 33.90%) with the direction of internal bullet path towards backward, downward and to the right side (B-D-R) in majority of cases.

Out of 3 suicidal cases, head (right temple) was preferred region in 2 cases by using pistol because both persons were right handed, and in one case abdomen was preferred with long barrelled shotgun by using right great toe to pull a trigger. In all suicidal cases, the direction of fire was backward, upward and right to left (B-U-L). Similar observation was found by other studies [4, 5]

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