PATTERN OF INJURY TO INTERNAL ORGANS IN FIREARM HOMICIDAL CASES — ON AUTOPSY

Hakeem Afridi[1], Fasseh uz Zaman[2], Mohammad Yousaf[1]

[1]Department of Forensic Medicine and Toxicology, Khyber Medical College, Peshawar - Pakistan

[2]Department of Forensic Medicine and Toxicology, Bacha Khan Medical College, Mardan - Pakistan

ABSTRACT

Objective: To analyse the pattern of injury to internal organs in victims of fatal firearm injuries inflicted with homicidal intent.

Material and Methods: This descriptive study was performed from January 2013 to December 2013. Record of autopsies performed on homicide victims in rural Peshawar was obtained and analyzed. The variables included in results were age, gender, manner of death, cause of death, internal organs involved in firearm injuries, and correlation of various internal organs involved.

Results: Reports of 1092 autopsies in the rural areas of Peshawar were analyzed. Out of these 998 (91.4%) were alleged homicidal cases. Among these homicidal cases, 832 (83.5%) were homicides caused by firearms. Among the firearm homicides male to female ratio was found to be 9:1. Most affected age groups were 20-29 years, 36.1%, 30-39 years, 22.4%, and 40-49 years, 14.1%. The most frequently involved organs were Lungs 46.4%, Brain 40.9%, and Heart 28.8% followed by intestines 15% and liver 12.3%. The involvement of heart in lung-damaged victims was 52.1%, while that of lung in heart damaged victims was 83.8% suggesting a strong mortality oriented relationship.

Conclusion: It is a need for up gradation of firearm management facilities in the regional hospitals and tightening of legislation regarding small arms control.

Key Words: Autopsy, Rural, Firearm, Internal organs, injury.

INTRODUCTION

Medico legal autopsies can a valuable source of information regarding the demographic data and injury pattern prevalent in firearm homicides. Homicide is the most 'heinous crime' prevalent in the society. Homicide means "Killing of human being by another human being". It is the killing by one who plans the death of another with malice-afore thought, one who looks for a purpose to kill but means to inflict serious injury only and the one who acts in want of disregard for human life.[1-3] It is the highest level of aggression found in all cultures.[4]

Many studies have found a direct relationship between firearm ownership and a rise in the incidence of homicide, particularly that of the homicide conducted by firearms in USA.[5,6] As such the statistical data collected in US has revealed a rise in firearm related homicidal injuries (both fatal and non-fatal).[7] In England and Wales, firearm homicide remains rare as compared to US.[8,9] And most of these cases were reported in the rural region.[10]

Address for Correspondence:
Dr. Hakeem Afridi
Associate Professor
Department of Forensic Medicine & Toxicology,
Khyber Teaching Hospital, Peshawar - Pakistan
Contact: 0333-9131334
E-mail: drhakimafridi@gmail.com

MATERIAL AND METHODS

The current study was conducted on autopsy reports submitted at all police stations in the rural areas of district Peshawar including Badabare, Chamkani, Daudzai, Khazana, Matani, Mathra, Nasir Bagh, Phandu, Pishtakhara, Reggi, Sarband, Urmar, in 2013. Incomplete reports and those reports awaiting further laboratory evaluation were eliminated. Further exclusion was performed on the basis of duplication tests in spss. All duplicate reports were removed from the database. The remaining reports were further scrutinized for homicidal deaths. Among the autopsy reports of alleged homicide only those reports were selected which employed firearm as a means to homicide. These reports were further classified according to age group, gender, body areas involved, and involvement of internal organs. Data was fed into SPSS 17 and descriptive analysis was done.

RESULTS

A total of 1092 autopsy reports from rural Peshawar were found eligible for the study. Out of these 1041 (91.4%) were alleged homicidal cases. Among these homicidal cases, 832 (83.5%) were homicides caused by firearms (Table 1).

Demographic data of the firearm autopsies has been summarized in Table 2. The highest number of cases was reported in the age group 20-29 with a predominance of males through all age groups, cumulative male percentage being 89.8% and female percentage being 10.2%. Male to female ratio was 9:1.

Table 1: Causes of death

Manner of death	No. of patients & percentage
Accidental	94(8.61%)
Homicidal	998(91.4%)
Firearms	832(83.5%)
Bomb Blast	42(4.1%)
Others	124(12.4%)
Total	1092 (100%)

Involvement of the individual organs of all cavities in firearm homicides has been summarized in Table 3. Lungs were the most injured internal organ (46.4%) followed by Brain (40.9%), and Heart (28.8%). Intestines (15.0%), Liver (12.3%) and major blood vessels of the thoracic and abdominal cavities (8.7%) were the other important organs related to deaths resulting from firearm homicides.

In Table 4, a complex statistical correlation between the important internal organs has been sum-

Table 2: Demographics of Homicidal Autopsies

Age group in years	Gender		No. of patients and percentage
	Male	Female	
0 – 9	8	1	9(1.1%)
10 – 19	50	16	66(7.9%)
20 – 29	268	32	300(36.1%)
30 – 39	168	18	186(22.4%)
40 – 49	109	8	117(14.1%)
50 – 59	78	7	85(10.2%)
60 – 69	24	0	24(2.9%)
70 – 79	9	0	9(1.1%)
80 – 89	2	0	2(0.2%)
Undetermined			34(4.1%)

Table 3: Number of Each Internal Organ Involved in Firearm Homicides

Region	Organ	No. of patients and percentage
Thoracic Cavity	Heart	240(28.8%)
	Lungs	386(46.4%)
	Diaphragm	13(1.6%)
	Trachea	14(1.7%)
Abdominal Cavity	Intestines	125(15.0%)
	Liver	102(12.3%)
	Stomach	55(6.6%)
	Spleen	14(1.7%)
	Pancreas	8(1.0%)
	Kidneys	12(1.4%)
	Bladder	8(1.0%)
Nervous System	Brain	340(40.9%)
	Spinal Cord	26(3.1%)
Head & Neck	Head & Face except Cranial Cavity	7(0.8%)
	Neck	56(6.7%)
Major Blood Vessels (excluding Limb Vessels)	72	8.7
Upper and Lower Limbs	12	1.4

Table 4: Correlation of the important internal organs with each other. Rows represent the independent variables while columns represent the dependent variables

Organs Involved (Independent Variable)	Involvement of Other Organs (Dependent Variables)					
	Lung	Brain	Heart	Diaphragm	Liver	Intestines
Lung	—	24.4	52.1	1.8	12.3	9.1
Brain	27.6	—	17.4	0.3	3.8	4.7
Heart	83.8	24.6	—	0.8	12.5	4.2
Diaphragm	53.8	7.7	15.4	—	46.2	0
Liver	63.7	12.7	29.4	5.9	—	26.7
Intestines	28.0	12.8	8.0	0	22.3	—

marized. It can be interpreted by taking example of cadavers with lung involvement. In those cadavers, heart was also injured in 52.1% cases. Other organs injured included Brain in 24.4% cases, Diaphragm in 1.8% cases, Liver in 12.3% and Intestines in 9.1% of cases. On the other hand, cadavers with damage to the heart also had involvement of the lungs in 83.8% of cases which is the highest correlation among any of the internal organs, and the higher among heart damage in lung damage victims Vs lung damage in heart damage victims. Other important correlations were found as follows: in autopsies with Diaphragm involvement lung was damaged in 53.8% of cases, in autopsies with liver involvement lung was damaged in 63.7% of cases. On the other hand, in autopsies with intestine damage, no damage to diaphragm was reported in any case with the same null relationship being noted for victims with diaphragm damage. Similarly with Brain involvement, no other organs were frequently involved. This observation can be explained by the obvious importance of central nervous system in keeping the cardiopulmonary drive.

DISCUSSION

In Pakistan the ease of availability of all types of firearms has drastically increased the incidence of firearm related homicide. A study from the neighboring country of Turkey reports a figure of only 21% homicides in 2951 autopsies reported during the period 1997-2001.[11] Among these 54.83% involved firearms. In contrast, a study conducted in the Forensic Department of Khyber Medical College, Peshawar revealed a 75% rate of firearm injuries in medico legal autopsies performed in the year 1999[12]. Another study conducted in the Forensic Department of Khyber Medical College in 2004 gave a homicidal rate of 77.7% among which firearms accounted for 91.87% of the deaths[13].

Similar to the increase in trends of homicidal firearm injuries observed throughout the world[5,6,7,8,9,10], our study observed an increase in incidence and percentage of firearm homicides. This observation also agrees with the increasing incidence of firearm homicides in other cities of Pakistan[15,16,17,18,19,20]. In 2002 Murad Zafar et al recorded 447 cases of firearm homicides making 85.96% of all homicides in peshawar[14]. The number of cases remained relatively stable at 457 in 2004 but the percentage rose to 91.87%[13]. In our study the number of firearm homicides from rural areas of Peshawar alone stands at 832 (83.5% of all homicides in rural Peshawar). Thus a very steep and worrisome rise in firearm homicides has been noted. In view of the studies conducted on relationship between gun ownership and firearm homicides rates, it can be safely concluded that the recent adverse law and order situation in Khyber Pakhtunkhwa has led to a very steep rise in the number of unregistered small arms[21].

The male to female ratio in Peshawar was observed previously to be 6.2:1 in 2002[14] while it was 5.75:1 in 2004[13]. Now it has been observed to be 9:1. It is significantly higher than Faisalabad (3:1)[22], D.I. Khan (4:1)[23], and is also higher than other cities of Pakistan. This may be explained on the basis of the differences in socioeconomical structure of Peshawar and other cities of Pakistan.

The highest incidence of firearm homicide was noted among the age group 20-29 (36.1%). The age group 20-49 comprised nearly 72.6% of the entire firearm homicide cases. This number is in agreement with the other studies conducted in Peshawar[13,14], and with other cities of Pakistan.

Damage to lungs and brain were found to be the two most frequently involved organs in homicidal firearm deaths, with frequency of 46.4% and 40.9% respectively. Other important organs included Heart 28.8%, Intestines 15.0%, Liver 12.3% and Major blood vessels 8.7%. These findings can be compared with those of the other studies. In the study conducted by Murad Zafar et al[14], the involvement of Head, Chest and Abdomen was 29.13, 37.25, 26.98 percent respectively. Ayesha Haider et al[23] recorded Head & Neck and Face, Thorax, and

Abdomen injuries as 36.62, 26.76 and 15.50 percents respectively. This observation can be explained by the tendency of the assailants to target Chest and Head because of the presence of vital organs in these regions.

The significance of organ damage pattern found in the autopsies can be evaluated by comparing with a study performed by Mian Mujahid Shah et al[24] in 2007. They conducted the study on Firearm Injuries treated in Emergency Department of Lady Reading Hospital, Peshawar. They found that the most affected region of the body was abdomen 44.6% followed by chest 14.9%. This was associated with damage to various viscera including intestines, liver, kidney, spleen, bladder and inferior vena cava. However, the survival rate of firearm victims was 93.2%, with only 6.8% wounds proving fatal. As such it can be speculated that the actual pattern of firearm injuries sustained by live victims can be significantly different from that found in the autopsies, because the modern surgical methods can ensure survival in most of the non-vital organ damage patients presenting to ER in time.

Our study made certain important correlations between the internal organs involved in fatal firearm injuries. The correlation of Lung with Heart (52.1%) and Heart with Lung (83.8%) was striking. Similarly the correlation of Liver with Lung (61.0%) and of Diaphragm with Lung (53.8%) was also important. The frequency of liver damage in victims with diaphragm involvement was 46.2%, which can be explained by the close proximity of liver with the right hemi diaphragm. No statistical significance tests were performed because of the relatively low sample size. However, these patterns can be predicted based on the anatomical proximity of these organs and the preferential targeting of Chest and upper abdomen by the assailants. On the other hand, when compared with the morbidity due to firearm injuries, these correlations may explain the significant mortalities in firearm victims when vital internal organs are involved, particularly in multiple wound cases.

Considering the data in this study, the rise of firearm injuries in district Peshawar is worrisome. The need for a strict gun possession control and tightening of the legislation in this regard has increased manifold during the past decade. Even though various estimates put the prevalence of unlicensed small firearms at 18 million in Peshawar district, the number of licenses issued for small arms have been merely 2 Million from 1970 to 2000[23]. As such, if we are to ever desire a lower homicide rate in Peshawar, particularly in view of the current anti-terrorism interests of the government, the need for a strict firearms control is undeniable. Special attention should also be paid to the upgrading of facilities in all hospitals for prompt and effective management of firearm injuries in hospitals, particularly in regards to those organs causing the most mortality in such victims.

CONCLUSION

There should be strict banned on the sale of illegal weapons in the market, so that homocidal firearm injury can be reduced.

REFERENCES

1. Camps FE. Gradwohl's Legal Medicine. The History of Legal Medicine. 3rd ed. Chicago: John Wright and Sons Ltd Publications; 1976. p. 1-14.
2. Mant AK. Taylor's Principles and Practice of Medical Jurisprudence. The Development of Medico Legal Systems. 13th ed. London: Churchill Livingstone; 1984. p. 1-14.
3. Simpson K, Knight B. Forensic Medicine. Types of Injuries and Wounds. 9th ed. London: Butler and Tanner Ltd; 1985. p. 48-70.
4. Dikshit PC, Dogra TD, Chandra J. Comprehensive Study of Homicides in South Delhi 1969-79. J Med Sci Law 1986; 6(3): 230-34.
5. Siegel M, Craig S. Ross, Charles King III. The Relationship Between Gun Ownership and Firearm Homicide Rates in the United States, 1981–2010. American Journal of Public Health: November 2013, Vol. 103, No. 11, pp. 2098-2105.
6. Siegel M, Negussie Y, Vanture S, Pleskunas J, Craig S. Ross, Charles King III. The Relationship Between Gun Ownership and Stranger and Nonstranger Firearm Homicide Rates in the United States, 1981–2010. American Journal of Public Health: October 2014, Vol. 104, No. 10, pp. 1912-19.
7. Centre for Disease Control. http://www.cdc.gov
8. Povey D, Coleman K, Kaiza P, et al. Homicides, Firearm Offences and Intimate violence 2007/08 (Supplementary Volume 2 to Crime in England and Wales 2007/08). London: The Home Office, 2009 8.
9. Povey D, Coleman K, Kaiza P, et al. Homicides, Firearm Offences and Intimate violence 2008/09 (Supplementary Volume 2 to Crime in England and Wales 2008/09). London: The Home Office, 2009 8.
10. Davies MJ, Wells C, Squires PA, et al. Civilian firearm injury and death in England and Wales. Emerg Med J 2012; 29: 10e14.
11. Ahmet H, Nemci C, Mete G Hakan OM, Ramazan K. Homicide in Adana, Turkey: A 5-year review. Am J For Med Path June 2005; 26(2): 141-45.
12. Memon MU, Khalil ZH, Aziz K, Kaheri GQ, Khalil IR. Audit of Cases Autopsied in the Mortuary of Khyber Medical College, Peshawar during the year 1999. Ann King Edward Med Coll Sep 2001; 7(3): 190-93.
13. Hussain Z, Shah MM, Afridi HK. Homicidal deaths by firearm in Peshawar: an autopsy study. J Ayub

Med Coll Abbottabad 2006; 18 (1).

14. Marri MZ, M. Bashir Z, Munawar AZ. Analysis of Homicidal Deaths in Peshawar Pakistan. J Ayub Med Coll Abbottabad 2006; 18 (4).

15. Marri MZ, Bashir MZ, Arif M, Maqsood M. Analysis of Medico legal Deaths in Sandeman Civil Hospital Quetta, Balochistan. JFJMC 2013; 7 (2): 13-18.

16. Saeed A, Bashir MZ, Munawar AZ, Iqbal J, Ali SMA, Khalil IR. Analysis of medico legal Autopsies at Faisalabad. The Profess 2003; 10 (2): 132-36.

17. Aziz K, Rana P, Malik SA. Homicide in Lahore. Pak PG Med J 1999; 10(1): 10-13.

18. Ali SMA, Rizvi SIH, Ali MA, Chaudry TH. Weaponry Patterns in the Homicidal Deaths in Bahawalpur. The Profess 2000; 7(4): 514-16.

19. Bashir MZ, Saeed A, Khan D, Aslam M, Iqbal J, Ahmed M. Pattern of Homicidal deaths in Faisalabad. J Ayub Med Coll Abbottabad 2004; 16(2): 57-59.

20. Yousfani GM, Memon MU. Spectrum of Unnatural Deaths In Hyderabad: An Autopsy Study. J of DUHS, Karachi 2010; 4(2): 54-57.

21. Khan, RS. Executive Director of SPADO. The Prevalance and Impact of Small Arms and Light Weapons in NWFP and Federally Administered Tribal Areas of Pakistan. http://www.spado.org.pk/images/publications/smallarms/PrevalenceandImpactsofSmallArmsbestresult.pdf

22. Qasim AP, Tariq SA, Naeem M. Profile of Unnatural Deaths in Faisalabad. Published on www.medforum.pk

23. Haider A, Khan J, Kamran S. Demographic Distribution of Homicidal Firearm Injuries in Dera Ismail Khan. Gomal Journal of Medical Sciences January-March 2014, Vol. 12, (1): 8-10.

24. Shah MM, Ali U, Zaman F. Morbidity and Mortality of Firearm Injury in Peshawar Region. J Ayub Med Coll Abbottabad 2008; 20(2): 108-11.

The Journal of Medical Sciences, Peshawar is indexed with WHO IMEMR (World Health Organisation Index Medicus for Eastern Mediterranean Region) and can be accessed at the following URL.

http://www.who.int/EMRJorList/details.aspx?docn=4468