Original Research Article

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Pattern of firearm injuries managed at rural tertiary centre in Western Uttar Pradesh, North India

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ABSTRACT

Background: Firearm injuries are associated with substantial emotional, physical and financial burden on community and hospital resources leads to profound morbidity. It is a global public health problem and pose therapeutic challenges to surgeons. Proper management of firearm wounds requires a working knowledge of physical factors involved in the creation of such injuries. Regional variations of the parameters of medico legal aspects of firearm injuries are still lacking. Objective is to analyse pattern of firearm injuries managed at rural tertiary hospital.

Methods: All firearm injury cases brought to the emergency department of Hospital, from January 2016 to December 2016 were included in the study.

Results: In this study 108 (83.7%) victims were males and 21 (16.3%) were female. Most common age group victimized was 20-29 year (33.3%). Most cases occurred in winter season.113 cases (87.3%) victim were unemployed.81 cases (62.8%) had below intermediate education. 110 (85.3%) cases were of homicidal motive. Shotgun/ 'kattas' outnumbered the rifled firearm injuries (109) cases (84.5%). Trunk was involved in 45 cases (34.8%) and lower extremity in (32.6%) 42 cases,) Exit wound found in 93(72.2%) cases only. The fatality rate was 3.9% (5 cases). Wound debridement was performed for 48 cases (37.2%) of patients, while emergency exploration was done for 30 cases (23.3%). The hospital stay of 49 cases (37.9%) of patients was more than one week. 111 cases (86.1%) were discharged.

Conclusions: Addressing the root causes of violence such as poverty, unemployment, substance abuse will reduce the incidence of firearm injuries in our environment. Establishment of efficient emergency health care services for prehospital care and effective ambulance system for rapid transport of injured victims to hospital will reduce morbidity and mortality. Management requires knowledge ATLS protocols, mode, presentation and ballistic of firearm. Authorities issuing license for possession of firearms need to be more strict and vigilant.

Keywords: Firearm, Homicidal, Shotgun

INTRODUCTION

From the beginning of civilization, trauma due to conflicts has been part of human evolution. Firearm injuries also increased with the development powerful weapons and protective gears to deal with changing weapons systems. Patterns of firearm injuries changed with time. Firearm injuries are associated with substantial emotional, physical and financial burden on community and hospital resources.¹ This causes profound morbidity due to prolonged hospitalization, high cost of health care, loss of productivity and reduced quality of life and above all death.^{1,2}

Firearm injuries is a global public health problem and pose therapeutic challenges to surgeons all over the

world. Civilian firearm injuries increasing globally.^{3,4} Increased incidence of firearm injuries in developing countries has been attributed to poverty, unemployment, political instability, and lack of education, unequal distribution of wealth.^{2,5,6} Easier availability of handguns and rifles is rising and as a result there is a rise in gunshot wound victims seen at hospitals.⁷

Trauma surgeons should be familiar with management of firearm injuries. Proper management of firearm wounds requires a working knowledge of physical factors involved in the creation of such injuries.

There is no organized trauma service in many developing nations. A detail study with regional variations of the parameters of medico legal aspects of firearm injuries are still lacking.

Therefore, study objective is to study the pattern and various parameters of firearm injuries in western Uttar Pradesh region elucidating the situation with regard to the extent and severity of the problem and comparing with the pattern seen in other regions.

METHODS

The study was conducted in UPUMS, Etawah as tertiary rural health care centre. All the injury cases brought to the emergency department of Hospital, from January 2016 to December 2016 were included in the study. The cases of road traffic accidents and poisoning were excluded.

All the cases were examined and various parameters were noted

Detailed history

- Victim's data age, sex, address, education, occupation.
- Motive suicidal, accidental, homicidal
- Suicidal- history of suicidal note, substance abuse, psychiatric disorders, previous suicidal attempts
- Homicidal- history of robbery, dacoit, interpersonal violence, caste feuds, terrorism, mob or police firing

- Accidental injuries due to hunting, defective
- firearms, unsafe handling (cleaning/repairing, unloading, firing in parties)
- Mode of travel, time of arrival and time taken to reach hospital
- Type of firearms used.

Examination

- General examination of victim
- Wound examination- number, site, size, number, margins, entry and exit wounds and associated injuries.

All these findings were noted. Type of weapon used was assessed by examining the wound in detail.

Procedure

• Procedure performed as emergency laparotomy under water seal drainage, wound debridement, POP application.

Outcome

- Duration of hospital stay
- Discharged /secondary infection or death.

RESULTS

A total of 129 injury cases reported to the emergency department. In this study 108 (83.7%) victims were males and 21 (16.3%) were female. Most common age group victimized was 20-29 year (33.3%) (Table 1). Most cases occurred in winter season November to January. In the present study, 113 cases (87.3%) victim were unemployed.81 cases (62.8%) had below intermediate education (Table 2).

83 cases (64.1%) reached to hospital within 6 hours.22 cases (17.6%) arrived within 6-12 hours. 109 cases (84.5%) were brought in by relatives, 6 cases (4.7%) by police and only 4 cases (3.1%) by ambulance (Table 2).

Age group/month	0-9 M/F	10-19 M/F	20-29 M/F	30-39 M/F	40-49 M/F	50-59 M/F	60-69 M/F	>70 M/F	Total M/F
January	-	1/2	6/0	4/0	1/1	-	1/0	1/0	14/3
February	-	2/0	3/0	1/0	2/0	0/1	-	-	8/1
March	-	-	1/1	-	-	-	1/0	-	2/1
April	-	1/0	3/0	0/1	1/0	1/0	-	-	6/1
May	-	1/0	1/2	-	6/0	3/1	-	-	11/3
June	-		4/0	5/0	4/0	1/0	3/0	0/1	17/1
July	-		2/0	0/1	1/0	1/0	0/1	-	4/2
August	-	0/1	5/0	2/0	1/0	1/0	1/0	-	10/1

Table 1: Distribution of gunshot victims according to age.

September	-	-	1/0	-	-	-	-		1/0
October	1/0	1/0	2/0	-	2/0	-	-	-	7/0
November	-	1/1	8/0	1/1	2/0	2/2	1/1	-	15/5
Deccember	-	3/0	3/1	3/0	3/0	1/2	-	-	13/3
Total M/F	1/0	10/4	39/4	17/3	23/1	10/6	7/2	1/1	108/21
Total	1	14	43	20	24	16	9	2	129

Table 2: Educational and hospital arrival details of
patients.

Education	No. of patient	Percentage	
No education	32	24.82	
Below intermediate	81	62.80	
Higher	16	12.36	
Employment			
Unemployed	113	87.28	
Employed	16	12.72	
Time of arrival			
Less than 6 hours	83	64.12	
6 to 12 hours	22	17.6	
More than 12 hours	24	18.28	
Time of injury occurr	ed		
12 p. m. to 12 a. m.	32	24.8	
12 a. m. to 12 p. m.	97	75.2	
Mode of travel			
By relative	109	84.5	
By police	6	4.7	
Ambulance	4	3.1	
Not documented	10	7.8	

Table 3: Distribution of patients according to site of
entry wound.

Area	Head and neck	Trunk	Upper extremity	Lower extremity
Actual number	14	45	28	42
Percentage	10.9	34.8	21.7	32.6

In this study 110 (85.3%) cases were of homicidal motive, 6 cases (4.7%) cases of suicidal intent, 9 (6.9%) cases of accidental firing and in 4 (3.1%) cases, intent could not be ascertained due to unavailable history. Shotgun/ 'kattas' outnumbered the rifled firearm injuries (109) cases (84.5%). In 18 cases (13.6%) rifled firearm had been used and in 2 cases (1.9%) type of weapon could not be ascertained. (Table 3). Most of the cases of gunshot injuries 91 (70.8%) were of single entrance wound and 38 (29.2%) cases were of multiple entrance (Table 3). 93 cases (72.2%) had exit wound.

The maximum numbers of firearm injury cases were reported during night hours 12am-12pm a total of 97 cases (75.2%) (Table 3).

On wound examination, the most common site for firearm injury was trunk involved 45 cases (34.8%) and lower extremity (32.6%) 42 cases, followed by upper extremity (21.7%) 28 cases, then head and neck (10.9%) 14 cases. (Table 3) Exit wound found in 93 (72.2%) cases only. The fatality rate was 3.9% (4 cases).

Table 4: Distribution according to mode of gunshotand type of weapon.

Parameter	No.	%
Homicidal	110	85.3
Accidental	9	6.9
Suicidal	4	4.7
Insufficient information	4	3.1
Total	129	100
Shotgun	109	84.5
Rifled	18	13.6
Not certain	2	1.9
Multiple entrance	38	29.21
Single entrance	91	70.79
No exit	36	27.82
Exit	93	72.18

Table 5: Distribution of patients according to
procedure done after injury.

Procedure done	No. of patient	Percentage
El	30	23.3
UWSD	10	7.7
Craniotomy	2	1.6
Рор	39	30.2
Debridement	48	37.2

Table 6: Final outcome and duration of hospital stayof patients.

Outcome	Total GSI	Percentage
Discharge	111	86.1
Death	5	3.9
Secondary infection	13	10.1
Hospital stay		
Upto 3 days	34	26.4
Upto 1 week	46	37.9
>1 week	49	35.7

Soft tissue injuries and open fractures, and punctured wounds and lacerations were the most common type of gunshot wounds. Wound debridement was performed for 48 cases (37.2%) of patients, while emergency exploration was done for 30 cases (23.3%), under water seal drainage was done for 10 cases (7.7%) and plaster for 39 cases (30.2%) (Table 5).

The hospital stays, of 49 cases (37.9%) of patients was more than one week, while 46 cases (35.7%) stayed more than one week.111 cases (86.1%) were discharged while 5 cases (3.9%) were not survived. 13 cases (10.1%) get secondary infection which required further intervention (Table 6).

Parameters	Fbi US	Hussain	Kohli A	Singh B	Kumari	Present study
Sex						
Male	Na	85.2%	90.7%	78%	90%	83.7
Female	Na	14.8%	9.3%	13%	10%	16.3
Most common age						
Group/	15-29	16-30	21-30	Male:31 years,	11-30	20.20
Mean age	(54%)	(42%)	(46.7%)	female:24 years	(71.8%)	20-29
Motive						
Homicidal	40.8%	70%	92.6%	70%	88.3%	85.3
Suicidal	56.1%	-	6.5%	3.0%	3.4%	4.7
Accidental	2.4%		0.9%	19%	6.67%	6.9
Rifled	96.5%	82.1%	82.2%	-	40%	13.6
Shotgun	5.1%	3.5%	17.8%		60%	84.5
Can't be ascertained	13.2	-	-			1.9
Single shot	Na	Na	100%	80%	95%	70.8
Double shot			Nil	8%	5%	29.2
Multiple shot			Nil	5%	Nil	
Most common site of injury	Head and neck	Head and neck	Chest	Chest	Abdomen	Trunk

Table 7: Comparison of other studies to present study.

DISCUSSION

In the present study, Male outnumber females. Firearm injuries were found to be most common in the third decade of life. This observation can be explained by the fact that male youths are generally more adventurous and are more often involved in interpersonal violence and are indeed the principal perpetrators of civil conflicts and armed robbery similar to the findings of other studies (Table 7).^{8,12}

In Europe, gunshot injuries have been reduced by restrictive firearm legislation in the European Union in 1997. Since then, the rates of firearm suicides and homicides have decreased significantly.¹³ On the other hand, in USA, there has been a transition in US firearm injuries from an epidemic phase (mid-1980s to early 1990s) to an endemic one (since the mid-1990s). There has been substantial stability in firearm injuries and deaths during the last decade.¹⁴

The prehospital care of trauma patient has been reported to be the most important factor in determining the ultimate outcome after the injury.^{2,15} None of our patients had pre-hospital care; as a result, the majority of them were brought in by relatives, and police who are not trained on how to take care these patients during transportation. Only 4 patients in this study were brought in by ambulance. This observation is common to many other developing countries.^{1,15} The lack of advanced prehospital care and ineffective ambulance system for transportation of patients to hospitals are a major challenge in providing care for trauma patients in our environment and have contributed significantly to poor outcome of these patients.

Most of the cases belong to rural areas due less strict law and order, lower literacy and high unemployment rates. In the present study, homicidal cases due to firearm injuries were 88.34%. This result was similar to other the Indian studies done by Kohli A et al 92.6%, Singh B P et al 70%, however is much higher than the US statistics.^{11,12} The incidence of homicidal injuries in our region is due to large usage of unlicensed, country made guns, which are cheap, easy to procure and destroy.⁹

In the present study, suicidal cases caused by firearm were 4.9%, as seen in other Indian studies Kohli A et al, 6.5%, Singh BP et al, 3.0% in contrast to US statistics, suicidal cases due to firearm were 56.1%.^{9,11,12} In this

study, a small proportion of people are committing suicide by firearm because people tend to use cheaper methods like hanging and poisoning. Most common firearm used in various studies was rifled firearm in US 82.1%, Kohli 82.2%, Hussain 96.5%.⁹⁻¹¹ However in our study was shotgun was most commonly used in 84.5 cases, as indigenously manufactured in our region.

Most common site of injuries was abdomen in our study, while chest was most common site of injury in other studies. Hussain reported maximum case of head and neck injuries.^{10,11} Most of patients in this study sustained soft tissue injuries and open fractures, and punctured wounds and lacerations were the most common type of gunshot wounds. Similar injury patterns were also reported by other authors.^{2,16-19} A good knowledge of the nature and type of gunshot wounds allows the clinicians to understand the type gun used and this is of great importance for medico-legal purposes and surgical treatment.

The present study showed that hospital stay of 35.7 of patients was within one week, while 37.9% stayed more than one week is similar to study done by Abha, KSA, Softah et al and by Alassiri MA.^{19,20}

CONCLUSION

Firearm injuries have become a major cause of morbidity and mortality among young males in our society where resources for prehospital and hospital trauma care are limited, and interpersonal violence are the major causes of these injuries.

High rates of unemployment, poverty and substance abuse have been reported to be responsible for increasing incidence of youth restiveness, armed robbery and associated gunshot injuries in our society. Addressing the root causes of violence such as poverty, unemployment and substance abuse will reduce the incidence of firearm injuries in our environment. Establishment of efficient emergency health care services for pre-hospital care and effective ambulance system for rapid transport of injured victims to hospital will reduce morbidity and mortality associated with these injuries. Surgeons with subspecialty in vascular surgery, orthopaedic and neurosurgery should work as a team. When these specialized facilities are not available at any centre then it challenging to a surgeon to manage all possible injuries associated with firearm. Management requires knowledge ATLS protocols, mode, presentation and ballistic of firearm.

In the present study, homicidal motive was common in firearm injury cases in western Uttar Pradesh region and Shotgun/kattas was the most common weapon used, as it is indigenously manufactured in this region. Country made firearms are cheap, easily available and easier to be destroyed. Strict laws may help reducing the production of country made firearms. Authorities issuing license for possession of firearms need to be more strict and vigilant. These steps may help in reducing the burden of firearm injury cases.

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