

Civilian perspective of firearm injuries in Bahawalpur

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Abstract

Objective: To study the firearm injury patterns, weaponry detail, etiological factors and offered management in civilian population.

Methods: The retrospective descriptive cross-sectional study was conducted at the Bahawal Victoria Hospital comprising 297 cases of civilian firearms fulfilling the inclusion criteria from January 2008 to December 2010. Medicolegal record of the hospital's Statistical Department was collected and recorded on a pre-designed proforma.

Results: Of the 297 cases 248 (84%) related to men, and 49 (16%) to women. The age of patients ranged between 10 and 50 years, with a 5: 1 male-female ratio. There was an yearly increase in the number of patients, with 84 patients in 2008; 99 in 2009; and 114 in 2010. Weaponry detail was not available in 89 cases; hand-guns were used in 104 cases; hunting guns in 62 cases; and assault rifles in 42 cases. There were 178 (60%) injuries in civilian clashes; 59 (20%) in homicidal cases; and 30 (10%) in robbery encounters. Limbs were involved in 148 (50%) patients; abdomen injuries in 92 (31%) patients; thorax in 35 (12%) patients; head and neck in 18 (6%) patients; and multiple injuries in 6 (2%). Overall mortality was 36 (12%).

Conclusion: Hand-guns were the commonest weapons in civilian firearm injuries. Civilian clashes were the leading cause followed by homicidal and robbery events. Firearm injuries to the extremities were associated with severe morbidity. Laparotomy was used in the majority of abdominal firearms, while chest intubation was the mainstay in thoracic injuries.

Keywords: Firearm, Roadside accidents, Gunshots. (JPMA 63: 20; 2013)

Introduction

Firearm injuries are the leading cause of trauma along with roadside accidents in tertiary care hospitals around the world.¹ Civilian violence is on the rise in most countries of Europe and the Americas. Moreover, its contribution to morbidity and mortality is enormous. The situation in the developing world, including Pakistan, is even worse where poverty, social inequality, unemployment and access to the illegal weapons are obvious.² In Pakistan, the war on terrorism is a recent addition which has caused further deterioration in the already poor law and order situation. The major reasons of civilian firearm injuries are homicidal, suicidal, sectarian, accidental and robbery related.

Civilian firearm has a more focal injury distribution than military weapons.³ The limbs are frequently involved in gunshots followed by abdomen, thorax and the scalp. The fatality depends on the type of weapons, distance of the shot, anatomical area of contact, and the timing of injury management.⁴

This study was conducted to explore civilian firearm injury patterns, etiological factors, type of weapons used and the extent of management offered because the available data of firearm impact on health remains scanty.

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Patients and Method

The retrospective, descriptive cross-sectional study was conducted at the Bahawal Victoria Hospital, Bahawalpur, Pakistan, from January 2008 to December 2010. Data of all those civilian firearm patients who were initially managed and had got their medicolegal workup in Accidental and Emergency (A&E) Department of the hospital was included in the study. Records of the mortuaries, the emergency department, the intensive care units, the operating rooms and the surgical units were analysed to identify any injury caused by firearm. Cases where initial intervention had been done at some peripheral health facility or medicolegal proceedings had been performed already, and those who had died before admission were excluded from the study. Hospital records of the patients were retrieved manually on pre-designed proformas from the medicolegal records of the Statistical Department of the hospital. Demographic data, injury distribution of firearms, causes of firearm injury, type of weapons used and treatment outcome were analysed and presented in frequencies and percentages.

Results

Of the 297 cases that were included in the study, 248 (84%) were men, and 49 (16%) were women. The age ranged from 10 to 50 years, while the majority were between 30 and 40 years. The male-to-female ratio was

Table-1: Demographic and Yearly Distribution.

Age	Year 2008		Year 2009		Year 2010		Total
	Males	Females	Males	Females	Males	Females	
10-20 Years	-	-	02	-	04	01	07
20-30 Years	21	03	19	05	31	08	87
30-40 Years	26	04	30	06	43	11	119
40-50 Years	17	02	17	04	14	01	55
> 50 Years	09	02	16	01	-	01	29
Total	73	11	83	16	92	22	297

Table-2: Weaponry type.

Type	Unknown	Hand guns	Hunting type	Assault rifles
Percentage	89 (29.97%)	104 (35.01%)	62 (20.87%)	42 (14.14%)

Table-3: Etiology.

Etiology	Total patients n=297	Percentage %
Civilian clashes	n=178	59.93%
Homicidal	n=59	19.86%
Robbery	n=29	9.76%
Accidental	n=15	5.05%
Suicidal	n=9	3.03%
Unknown	n=7	2.35%

5:1 (Table-1).

In the context of weapons, no details were available in 89 (30%) cases. Hand-guns (n=104; 35%), hunting guns (n=62; 21%) and assault rifles or military weapons (n=42; 14%) were used in the rest of the cases (Table-2).

There was a gradual increase in the number of cases of civilian firearms. In 2008, the number of victims was

84 (73 [86%] male, 11 [14%] female) which increased to 99 (83 [84%] male, 16 [16%] female) in 2009, and reached the figure of 114 (92 [81%] male, 22 [19%] female) in 2010.

Throughout the period, civilian clashes remained the major cause which was almost 178 (60%) while 59 (18%) patients had homicidal intent. Robbery cases were 29 (10%). Patients injured in accidental malhandling or caught at a clash scene were 15 (5%), while 9 (3%) patients attempted suicide (Table-3).

In terms of injury site, 142 (48%) patients got it on their limbs, 92 (31%) abdomen, chest 17 (12%), head 6 (4%), and neck 3 (2%). Four (3%) patients got multiple injuries.

In the abdomen, 37 (40%) patients had perforations in the small intestine, while liver was involved in 24 (26%) cases, and spleen in 17 (18.5%) cases. Colorectal and kidney (Figure) injuries were found in 5 (5.4%) patients each.

Table-4: Injury Distribution and Management.

Organs involved	Percentage	No. of patients	Treatment offered		
Limbs	48%	142	Fracture fixation (interna/external) 61	Vessel repair (arterial and venous)/embolectomy 30	Amputations 11
Abdomen	31%	92	Primary repair 15	Stoma Formation 12	Resection and Anastomosis 10
Small Intestine			Buttress Sutures 16	Perihepatic Packing 05	Spongestone placement 03
Liver			Splenorrhaphy 02	Partial Splenectomy 04	Total Splenectomy 01
Spleen			Stoma Formation 03	Hemicolectomies 01	Closure with proximal decompression 01
Colon			Hartman Procedure	Proximal Decompression 01	APR 01
Rectum			Buttress sutures 01	Partial nephrectomy 01	Total nephrectomy 03
Kidney			Chest Intubations 30	Pericardiocentesis 02	Thoracotomy 03
Chest	12%	35	Conservative 12	Exploration 06	—
Head & neck	06%	18	Conservative 07	Exploration 02	—
Multiple e.g. spine etc.	03%	9			

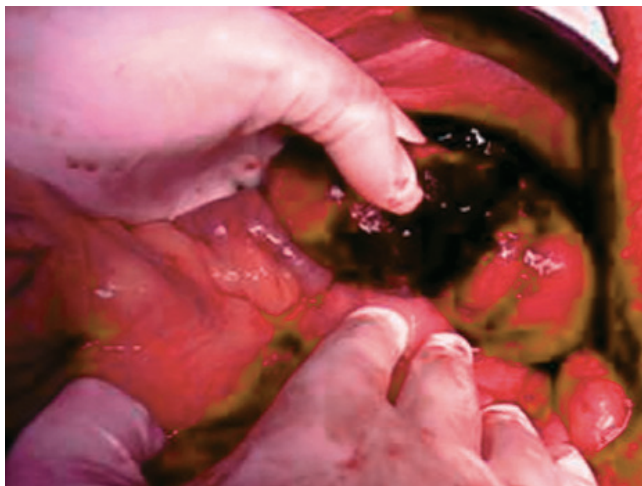


Figure: Kidney bisected by a bullet.

Diaphragm was breached in 1 (1.08%) patient, while multiple injuries were present in 3 (3.2%) patients.

In limb injuries, fracture fixation either external or internal was done in 61 (43%), vessel repairs including arterial, venous or embolectomies in 30 (21%) and amputations were done in 11 (77%).

Management of other injuries was also noted (Table-4). Within the study population, 35 (11.78%) patients died.

Discussion

Civilian firearm injuries are the major contributors to the number of trauma patients worldwide. Gunshot injuries have become extremely prevalent among the United States civilian population because of increasing urban violence and the availability of handguns. In contrast, gunshot violence showed different trends in European countries. In 2002 it was markedly increasing in the UK, but was declining in Germany.^{1,2}

Firearm injuries are usually labelled as low- or high-velocity injuries.⁵ Low-velocity wounds are attributed to weapons having muzzle velocity of less than 600 metre per second and classically caused by handguns and are, therefore, more common in civilian population. Military or hunting weapons have a muzzle velocity of more than 600 metres per second and cause high-velocity wounds.

The majority of the patients ranged between 30-40 years, median 55 years and the male:female ratio was 5:1, which almost coincided with the already published work. The male preponderance is in keeping with the fact that males are generally more adventurous and

more aggressive. Data revealed that majority of cases were due to civilian assaults which was comparatively similar to other studies.⁶ The area of concern is the percentage of torso injuries with homicidal intent, which was alarmingly high. This Trend is indicative of intolerance in society. Next to follow were robbery encounters and accidental handling of weapons. One percent cases were of suicide or of shooting from a relative. The weaponry detail was unknown in a few cases, but in the majority handguns were the commonest, reflecting their easy handling and availability.⁷

Gunshot injuries in civilians have more focal injury patterns and should be considered distinct entities. A new classification system has been proposed based on five gunshot injury parameters which include energy, vital structures involved, wound characteristics, fracture, and degree of contamination. In our study, the commonest injury sites were the extremities, followed by torso and the head and neck region which are in accordance with the literature.⁸

Firearm injuries to the extremities are rarely life-threatening, but can be associated with severe morbidity.⁹ The destruction of tissue is directly proportional to the velocity and energy of the missile. Lower limb remains the mainly affected part. Usually the shots were multiple and associated with either arterial, venous or nerve injuries. In our series, the occurrence of arterial injury was quite high, followed by venous insults. Vascular repair was attempted in the majority, but the results were not encouraging. This was partly due to unawareness of the issue in rural areas and relatively delayed transportation to tertiary hospitals. The result of embolectomies was excellent in our series. Venous injuries were dealt with more easily either by ligation or repairs. The limb salvage rate was not as high as mentioned by Persad.¹⁰ Few developed systemic inflammatory response syndrome (SIRS) later on despite good wound care. Fasciotomies were performed in almost all cases of vascular injuries with good result. Fracture fixation¹¹ was done along with wound debridements. Local wound sepsis was the major sequela.

Civilian gunshot injuries to the torso mostly reflect homicidal intention. The haemodynamic status of the patient is the key consideration. For a patient who survives on the scene and is haemodynamically stable, insertion of a chest tube is the usual requirement in majority of penetrating chest injuries. Haemodynamically unstable patient requires

immediate intervention in the form of laparotomy or thoracotomy.¹² In general, the bullet entry and exit wounds exhibit limited minimal chest wall trauma and in some patients minimal lacerations and contusions to the lungs. Our management algorithms for firearm were similar to most trauma centres of the world. Most cases were managed without explorative thoracotomy. Firearm injuries of the chest were haemothorax, tension pneumothorax, pneumothorax and pericardial tamponade.¹³ We received two patients with haemopericardium who were managed conservatively by putting pericardial drains under echo guidance and were referred to specialised centres.

Abdominal injuries conventionally mandate laparotomy. However, due to high complication rate, many advocate selective non-operative management.¹⁴ Focused abdominal sonography for trauma (FAST) remains the main diagnostic tool, but not the sole reason for exploration.¹⁵ Diagnostic peritoneal lavage (DPL) can be more informative, but has gained less popularity in trauma patients due to the availability of non-invasive sonography. We explored the abdomen in cases of unstable haemodynamic status, peritonitis and evisceration. In majority of cases, operative intervention was done which reflects a diversion from the international trends.¹⁶ Patients initially observed for conservative management ended up in laparotomies later. As handgun was the common weapon used, so a large bulk of patients had single-entry wounds on anterior abdomen while the rest had multiple. Firearm injuries with homicidal intention were the closed impacts, and had exit wounds while ranged shots had bullets inside in a few cases. The most commonly injured viscera were small intestine and liver with spleen and kidneys to follow. The management depended on the grade of injury, time interval and haemodynamics of the patients. In different series, liver stood out ahead of intestine.¹⁷ In liver, extensive impact qualified perihepatic packing, while limited injury is managed with either Spongston placement or buttress sutures. In the small intestine, approved options like stoma formation, primary repairs and resection anastomosis were used selectively. Spleen and kidney injuries were managed either with excision or partial repairs. Some cases also dealt with haemostatic sutures. Wound sepsis and intestinal anastomotic leakage remained the major concern. Nevertheless, firearm abdominal organ injury patterns and survival have plateaued over the past decade. Death from refractory haemorrhagic shock or exsanguination in the first 24 hours remains the most common cause of mortality. Damage control surgery is being used more frequently

with improved early survival, but with a concurrent increase in late morbidity.

Spinal gunshots are not immediately life-threatening. Computed tomography (CT) remains the main diagnostic tool after clinical examination. In special circumstances, some authors suggest magnetic resonance imaging (MRI) in case of lead bullets than steel due its lower risk of causing artifacts. According to many authors the risk of MRI is less than its benefits.¹⁸ We managed 3 cases conservatively who had paraplegia. Bullets can be removed in those cases where they are suspicious of causing neurological damage. The final outcome was not encouraging in most cases, but contrarily some authors still believe that operative intervention is the mainstay of treatment.¹⁹ Life-long debilitation remains the major concern.

Cranio-cerebral firearm injuries are lethal and are associated with poor outcome. Glasgow Coma Scale (GCS) remains the main prognostic parameter.²⁰ The mortality for patients with an initial low GCS score was high. In general extensive tract debridement and bullet removal is not recommended. However, Dura repair and evacuation of haematomas is advocated by many.²¹ We repaired Dura in few cases to avoid secondary infection. The majority of deaths occurred at an early stage. Among the survivors, the functional outcome was acceptable.

Neck firearm injuries are scary as they are in proximity of vital anatomical structures. Neck is divided into zone I from clavicle to cricoids; zone II from cricoids to the jaw angle; and zone III from the jaw angle to the skull base. Doppler and CT angiography can uncover many injuries in the neck.²² Operative intervention is required in case of organ injuries, especially vascular injuries. Conservative management in zone II stable patients is acceptable.

The hospital stay ranged from 0-135 days which is comparatively high to the local studies.²³ The longest stay was observed in patient of head firearms and in long bone fractures with some segmental loss or with complicated Pelvic fractures.

Conclusion

Handguns were the commonest weapons in civilian firearms injuries. The leading causes of injuries was civilian clashes followed by the homicidal and robbery events. Males between 30 and 40 years of age were the main victims with yearly rise. Limbs were the most affected part followed by the abdomen. Firearm injuries to the extremities are associated with severe morbidity.

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