

Original Article

Incidence, Pattern, and Outcome of Stray Bullet Injuries: Three Years' Experience in a Teaching Institute

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ABSTRACT

Objectives: The purpose of this study is to better define the incidence, pattern, and outcome of a stray bullet.

Materials & Methods: The current study summarizes the data on stray bullet injuries presented to the Emergency Department (ED) Hayatabad Medical Complex, Peshawar. A total of 24 subjects were included for three years. We enrolled all patients who had head or spine injuries caused by a stray bullet. Data were extracted on demographic profile, site of injury, operative procedure, complication, and mortality, and were recorded on prescribed proforma.

Results: A total of 24 subjects were included for 3 years. 17 (70%) were male patients and 7 (30%) were females. Male to female ratio was 2:1. out of 24 cases, 9 (37.5%) were from District Peshawar, 3 (12.5%) cases were from Mardan and Charsadda District, and 2 (8.3%) cases were from Swat. 12 cases had a bullet in the Head and face. out of which 7 were supratentorial 3 cases had a bullet in the posterior fossa. Out of 24 cases, 13 (54.1%) were operated for the removal of bullets. 5 (20.8%) developed focal or generalized fits. 13 (54.1%) developed a neuro deficit. 4 (16.6%) of cases remain in a vegetative state, and the overall mortality rate is 20%.

Conclusion: Morbidity and mortality due to stray bullets is an increasing problem in our society. This study aims to bring awareness among the concerned authorities to try and bring an end to this menace resulting in deaths and misery.

Keywords: Stray Bullet Injuries, Supratentorial, Posterior Fossa.

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INTRODUCTION

A stray bullet is a bullet, fired from a gun and hits an accidental target. Such a type of shooting occurs as a result of a celebration or crossfire. It is widely practiced in the Middle East, northern India's south Asian region, Pakistan, especially the Khyber Pakhtunkhwa Province, Afghanistan, and parts of Latin America.¹ In our province, the most common occasion for stray bullet shootings is a wedding, new year celebrations, political victories,

disintegration of gathering by police, and victory in cricket/Hockey matches. On returning to the ground the bullet may fall on someone's head spine another part of the body. The extent of such injuries may be either superficial or very deep causing fatal outcome.^{2,3}

Stray bullet shooting leads to a sense of insecurity and fear in the community. These events are commonly reported in media but less studied. In literature, the epidemiology of stray bullet shootings is not mentioned. It is possible that not all stray bullet shootings were recognized, there is vast differential reporting related to the severity of outcome, and missing data were common.⁴ A study by the U.S. Centers for Disease Control and Prevention (CDC) found that 80% of celebratory gunfire-related injuries are to the head, feet, and shoulders.⁵

A bullet's terminal velocity is determined by several factors. The bullet composition is one of them. Because of its high specific gravity and high weight per volume, lead is used in the majority of bullets. As a result, lead bullets would have less air drag per mass as they fall, resulting in a higher terminal velocity. The angle of firing is another aspect that affects the terminal velocity. The bullet will fly further and faster over terminal velocity if the angle is between 20° and 45° or even more acute.⁶

Migration of retained bullets or bullet fragments may present as a complication of gunshot wounds to the head. This phenomenon has been reported in cases of abscess formation or retained copper fragments. Management of such migratory fragments is controversial.⁷

Any penetrating brain injury with a retained foreign body carries the risk of spontaneous migration. Close clinical assessment is necessary in cases where a retained intracranial foreign body cannot be safely removed during initial debridement. Plain-film or computed tomographic imaging should also be taken into consideration to improve the early detection of delayed-onset life-threatening deterioration, such

as meningitis and occlusion of cerebrospinal fluid drainage due to spontaneous migration.⁸

The mortality rate from falling bullets is about 32%, which is significantly higher than the 2%–6% mortality rate from nonfalling bullets, despite the latter's effect having a much greater ability to kill. According to many reports, the head is the most frequent site of injury.⁹

To date, no such clear data is available regarding the epidemiology, pattern, and outcome of a stray bullet in the region of Khyber Pakhtunkhwa. The purpose of this study was to better define stray bullet induce pathology and its consequences.

MATERIAL AND METHODS

Study Design and Settings

A retrospective chart analysis of patients of all ages who presented to the Emergency Department was conducted.

The current study summarizes the data on stray bullet injuries presented to the Emergency Department Hayatabad Medical Complex, Peshawar, from January 2016 to November 2020. The study was approved by the hospital's ethical and research committee. HMC is KPK's largest tertiary care center, with nearly 49,000 annual patient visits.

Inclusion criteria

We enrolled all patients who had head or spine injuries caused by a stray bullet.

Exclusion criteria

Exclusion criteria included any bullet injuries that were not explicitly listed as stray bullets by the attending physician in the ED at the time of injury and those patients who were brought dead in the ED.

Management

The patient presented in the emergency department with a stray bullet injury to the skull or spine and was initially resuscitated. ATLS protocol was used for the stabilization of the patient. A design proforma is filled which includes the Patient's characteristics such as symptoms, signs, wound of entry and exit, operative findings, operative, and postoperative complications, and the total number of days of stay in the hospital noted.

Those who need surgical intervention were shifted to the operation theater where wound debridement and removal of the bullet were performed under general anesthesia. Bullets stuck in the skull were carefully removed via minimal craniectomy. The wound was closed in the layer. The patient was shifted to the ward and was discharged on the fifth day.

Data Analysis

Data were extracted on: injured body part, admission to hospital, number of days spent in hospital, site of injury, operative procedure, complication, and mortality, which were recorded on prescribed proforma. Additionally, demographic variables such as age, gender, and area of distribution were also noted. Data were analyzed using SPSS version 26 and presented in tabulated form.

RESULTS

Age and Gender Distributions

A total of 24 subjects were included for 3 years. 17 (70%) were male patients and 7 (30%) were females. Male to female ratio was 2:1. Among these patients, the most common age group was 30 – 40 years (Table 1).

Districts & Patients

Out of 24 cases, 9 (37.5%) were from District

Table 1: Age and Gender Distribution.

Age in Years	Sex		Total No. of cases
	Male	Female	
1 – 10	2	0	2
10 – 20	3	1	4
20 – 30	4	2	6
30 – 40	7	1	8
40 – 50	0	2	2
50 and above	1	1	2

Peshawar, 3 (12.5%) cases were from Mardan and Charsadda District, 2 (8.3%) cases were from Swat, Bannu, and Deer District, and one each from the Kuram Agency, Malakand Agency, and Bara. The predominance of 37% from District Peshawar signifies the increase in a built-up area and thickly populated city, making the general population more vulnerable to injuries and death from a stray bullet. As shown in Table 2.

Table 2: Area Distribution.

District	No. of Cases	Frequency
District Peshawar	9	37.5%
District swat	2	8.3%
District Deer	2	8.3%
District Mardan	3	12.5%
District Charsadda	3	12.5%
District Bannu	2	8.3%
Kuram Agency	1	4.1%
Malakand Agency	1	4.1%
Barra	1	4.1%

Outcome

10 cases were pronounced dead on arrival in the Neurosurgical center and were not included in the study: 12 cases had a bullet in the Head and face. Out of which 7 were supratentorial 3 cases had a bullet in the posterior fossa with large hematoma and severe compression. Out of 24 cases, 13 (54.1%) were operated on for the removal of bullets: 8 from the cranium, 2 (8.3%) from the neck area which is outside the canal and deep in the muscle, and 2 (8.3%) from dorsal and 1 (4.1%) bullet remove from lumbar spine removed. As shown in Table 3.

Table 3: Characteristics and outcome of stray bullet injuries.

Characteristics	No. of Patients	Frequency
Location		
Head and face	12	50%
Neck	2	8.3%
The spinal column (in the canal)	3	12.5%
The spinal column (outside the canal)	4	16.6%
Extremities	3	12.5%
Surgery		
Operated	13	54.1%
Nonoperated	11	48.5%
Outcome		
Neurodeficit	13	54.1%
Fits	5	20.8%
Wound complication	8	33.3%
Vegetative state	4	16.6%
Mortality	5	20.8%

Out of 7 supra-tentorial cases, 3 had hemiplegia, and 1 case was aphasic before the operation; 2 cases developed left-sided hemiparesis after the operation and were discharged home. Posterior fossa cases made a good recovery, but on follow-up 1 developed hydrocephalus and needed shunt procedures. A total of 24 cases, both in the operative and the nonoperative group developed complications. 13 (54.1%) developed a neurodeficit. 5 (20.8%) developed focal or generalized fits. 4 (16.6%) of cases remain in a vegetative state, and the overall mortality rate is 20%.



Figure 1: X-ray skull lateral view showing bullet in the skull. (The image was used with the patient or his/her attendant).



Figure 2: X-ray skull AP view showing bullet in the skull. (The image was used with the patient or his/her attendant).

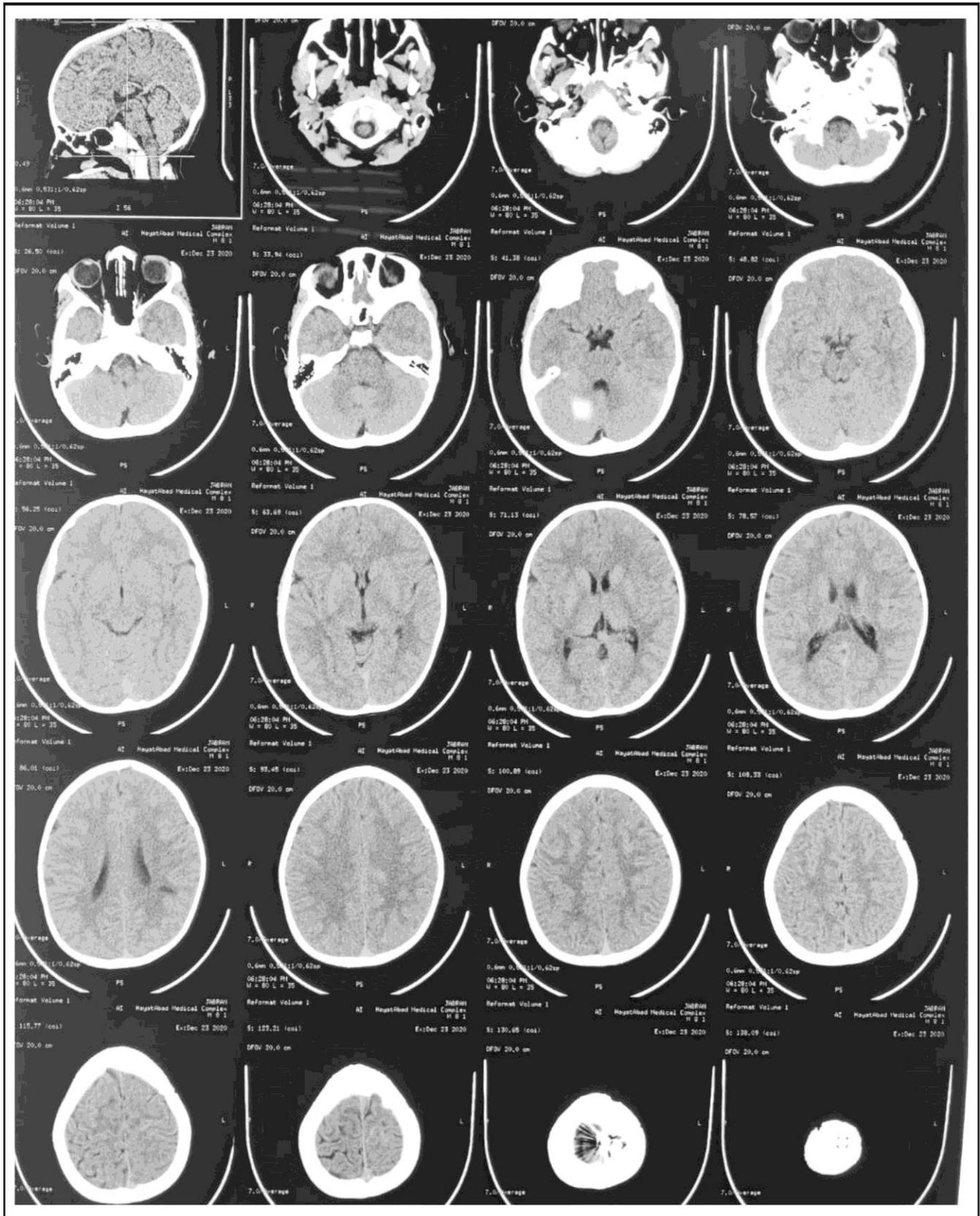


Figure 3: CT Scan of brain showing bullet inside the brain tissue. (The image was used with patient or his/her attendant).

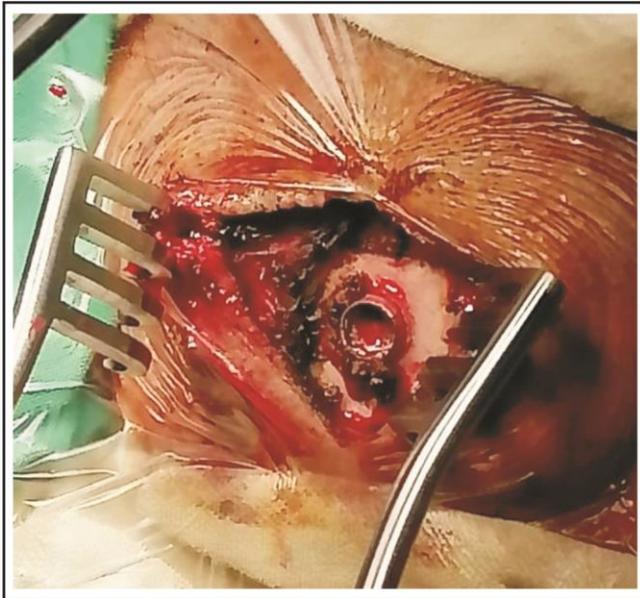


Figure 4: Per-operative picture of the bullet inside cranium vault. (Picture taken after permission of the attendant).

DISCUSSION

In Pakistan, injuries from stray bullets are not uncommon. The majority of these bullets are shot into the air during wedding ceremonies. These bullets have the potential to inflict significant brain injury, with potentially fatal consequences. The occurrence of stray bullet injuries to the brain that do not result in neurological deficits is extremely rare. There is a lot of literature available on bullet injuries in general and most of them are found in Newspapers.¹⁰

In our study males were most commonly affected as compared to females and the most communal age group was 30 – 40 years. This corresponds to the study conducted by Arshad M, Malik et al, at Liaquat University of Medical and Health Sciences Hospital in 2013.^{11,12}

In this study, the most communal site of the stray bullet is the head and face in 12 (50%) followed by the spinal column (outside the canal) in 4 (16.6%). 13 (54%) patients were operated for removal of the bullet. 4 (16%) went into a persistent vegetative state. the overall mortality rate was 20%. similarly, results were reported by Azaz Ali shah in 1994 in leady reading Hospital,

Peshawar¹³.

The major factor behind the increasing use of firearm weapons in our society seems to be the lack of effective measures by law enforcement authorities. There is no check and balance on the sale and purchase of ammunition and as a result, unauthorized weapons are freely available.^{14,15}

Apart from the loss of life and injuries, there is a great burden on the resources of the state. There should be legislation against issuing prohibited bore licenses and aerial firing on any occasion; mass education of the public through different media available and prompt police action against law breakers¹⁶. The issue of a license for any weapon should be subject to a person's sound mental and psychological health. Moreover, issuing such a license should be vigilantly scrutinized.

As one can realize, this study is just the iceberg of the greatly increasing problem. It is recommended that more surveys are conducted at the center and peripheral levels, as many cases remain unreported from the periphery. These studies would produce awareness among doctors and concerned officials of the state so that gradually the menace is eradicated from our society, and the wasting of innocent lives is avoided.

Firing in the air is a social evil and there is no doubt that it should be stopped at any cost: Whether it is by legislation or mass education. It has taken lots of innocent lives; has put an extra burden on the economy and resources and has devoted the attention of doctors to an avoidable issue.

CONCLUSION

Morbidity and mortality due to stray bullets are increasing problems in our society. The Neurosurgical Department of Hayatabad Medical Complex, Peshawar has studied skull and spine injuries. This study aims to bring awareness among the concerned authorities to try and bring

an end to this menace resulting in deaths and misery.

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Additional Information

Disclosures: Authors report no conflict of interest.

Ethical Review Board Approval: The study was conformed to the ethical review board requirements.

Human Subjects: Consent was obtained by all patients/participants in this study.

Conflicts of Interest:

In compliance with the ICMJE uniform disclosure form, all authors declare the following:

Financial Relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work.

Other Relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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AUTHORS CONTRIBUTIONS

S. No.	Authors Full Name	Intellectual Contribution to Paper in Terms of:
1	Shahid Ayub	Study design and methodology
2.	Sohail Amir	Paper writing, referencing, data calculations
3	Mushtaq	Data collection, and analysis of the Data
4	Muhammad Nasir	Paper writing, referencing, data calculations
5	Imran Khan	Final proofreading and critical review