ORIGINAL ARTICLE

A Retrospective Study of Medico Legal Autopsies of Fire Arm injuries Deaths carried Out in Allama Iqbal Medical College Lahore during the Year 2014

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ABSTRACT

Background: This study was on all Fire Arm injuries deaths which were received for autopsies in Forensic Medicine Department, Allam Iqbal Medical College Lahore during the year 2014.The objective was to be carried out a retrospective analysis of 114 autopsies due to Fire Arm injuries Deaths The relationship of age and gender was focused.

Methods: Total medico legal autopsies which were carried out at Forensic Medicine Department at AIMC Lahore were 327 during the year of 2014. Out of these, 114 were the cases of Fire Arm injuries deaths which were selected for this study. The documents scrutinized for this purpose were autopsies reports, police papers and hospital history charts.

Results: Out of 327 total autopsies cases, 114 cases were of Fire Arm injuries death, 111 deaths were Homicidal and 03 were suicidal.

Conclusion: Out of 327 autopsies cases, 114 cases were of Fire Arm injuries death, 111 deaths were Homicidal and 03 were suicidal and 93 were males and 21 were females. 98 deaths were due to use of rifled weapon and 16 deaths were due to use of shot gum weapon.

Keywords: Allama Iqbal Medical College (AIMC), Fire Arm Injuries, Homicidal, Suicidal

INTRODUCTION

A firearm may be generally defined as an assembly of a barrel and action from which a projectile is propelled through the deflagration (rapid burning) of a propellant (gunpowder)[1]. As injuries due to firearms are common in most areas of the United States, skill in the interpretation of these injuries is vitally important for the practitioner of forensic pathology.

There are many unique features of firearms that may be of critical importance in a forensic investigation. Although the forensic pathologist need not be an expert on all types of firearms, he or she must be familiar with the basic operation of different weapons in order to interpret the injuries resulting from them. For example, knowledge about the safety features of a weapon that would have allowed or prohibited its operation in a given set of circumstances may be of great importance in determining the plausibility of a given death scene scenario. Similarly, knowledge of muzzle shapes, size and configuration of a weapon, approximate weight of trigger pull, amount of recoil, and a host of other factors may serve to refute or substantiate a putative explanation for how the injury was sustained.

Modern small arms may be classified generally into handguns, rifles, and shotguns[2]. Automatic weapons (machine guns and submachine guns) may also be included in this classification, but they are less commonly encountered in civilian practice.

A handgun is designed to be held in the hands without any bracing mechanism and generally has a short barrel relative to other types of arms. Handguns may be further divided into revolvers (in which a revolving cylinder contains the cartridges to be fired) and pistols (which include semiautomatic or autoloading weapons firing from a spring-loaded magazine).

Rifles are long-barrelled weapons with a stock designed to be braced against the shoulder of the shooter and a rifled barrel (spiraling parallel grooves cut into the barrel to stabilize bullets). Both of these characteristics serve to increase the practical accuracy of the weapon. In general, rifles are chambered for more powerful ammunition than that found in handguns, although this is not always the case, as many rifles are chambered for rounds that were designed to be fired in handguns, and vice versa. Rifles are available in a variety of action types,

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including semiautomatic, bolt action, lever action, and single shot, among others.

Shotguns are also long-barrel weapons, but they have a smooth, non-rifled barrel and usually fire a charge consisting of multiple, round shot instead of a single projectile. Common action types include pump action, semiautomatic, single-shot, and double-barrel varieties.

Modern cartridges for handguns and rifles are composed of a brass or nickel case enclosing a powder charge. A bullet, usually lead or copper-encased lead, sits atop the powder charge and is crimped into the case. At the base of the case is an impact-sensitive primer. The primer is designed to detonate when struck by the firing pin of a firearm, sending a jet of flame into the overlying powder charge and igniting it. Gas formed by the burning of the powder charge produces a rapid increase in pressure within the cartridge case and bore of the firearm, forcing the bullet out of the case and down the barrel of the firearm at great speed.

The general type of weapon may sometimes be determined by the characteristics of a wound, and by the recovery of the projectile causing a wound, with appropriate criminalistic analysis. In addition to determination of bullet caliber (diameter) and type, telltale markings may be present on recovered projectiles or casings, allowing matching of the projectile or case to a firearm. Such markings are created when a bullet or case contacts the barrel rifling, breech face, chamber, ejector, or other parts of a firearm, and they may be sufficiently unique to qualify as "individual characteristics" that allow matching of a recovered bullet or fragment to the specific weapon that fired it. In other cases, only general characteristics such as the likely type or brand of the firearm may be determined, but these features are still useful. The importance and necessity of recovering retained projectiles should be understood, considering the potential wealth of information that may be gleaned from their examination.

The types of injuries caused by firearm wounds have significance above and beyond cause and manner of death determination. The assessment of damage to vital organs, central nervous system components, or bony framework may allow a forensic pathologist to address many issues of legal significance, such as survival time or the time required for a wound to incapacitate a victim. It may also be up to the forensic pathologist to dispel much of the erroneous and mythologic concepts that abound regarding firearm wounds, such as "stopping power," instantaneous death, or bodies being hurled about by bullet impacts (see below).

The study of the interaction of a missile, projectile, or bullet is referred to as *terminal ballistics*, and it is a field of great importance to clinicians, forensic pathologists, those in law enforcement and military agencies, and others. Much work in this area has been done to attempt to elucidate the effects of a bullet on a victim's body[6,7]; many of these efforts have centered on explanation of the 2 primary traumatic effects of a projectile; that is, formation of the *permanent* and *temporary cavities*.

When a bullet perforates tissue, it forms a cavity or track that persists and results from crushing and laceration of body tissues. Because of the high velocity of the bullet, it will also form a temporary cavity caused by the sonic shock wave that radiates from the passing projectile. The size and shape of this cavity will be dependent on a number of factors, primarily the velocity of the projectile.

As kinetic energy increases by the square of bullet velocity, a high-velocity projectile will tend to cause a larger temporary cavity than a lower velocity one. Because of this, temporary cavities are usually not significant in handgun injuries, but they are of much greater significance in high-velocity rifle wounds. In addition to velocity, the behavior of a projectile in tissue (e.g., stabilized, destabilized, fragmented) will also bear on the size and shape of the cavity[11]. Depending on the elasticity and other characteristics of the tissue in question, the formation of the temporary cavity will have varying effects on the body.

Although there are well-systematized principles that allow for categorization of various types of firearm wounds, all such injuries are, in fact, unique, and exceptional variability may be seen in any large series of wounds. Some injuries defy categorization, and in any such case, the forensic pathologist must honestly assess the wound and the amount of interpretive information that may be extracted from it, without attempts to rigidly "pigeonhole" the wound for the sake of classification. A rigorous assessment of all features of the injury, thorough scene investigation, examination of clothing items of the victim, and examination and understanding of the implicated firearm (if available) provide the best opportunity for correct evaluation of the injury.

Forensic Investigation of Firearm Deaths: As firearm injuries will fall into the manner of death categories of homicide, suicide, or accident, all will come under the jurisdiction of a medical examiner, coroner, or justice of the peace, depending on the death investigation system in the local area. In addition to local statute, published professional standards require forensic pathologists in such settings to investigate deaths due to violence, which clearly includes firearm wounds.[12] It is not

uncommon for a person to survive a firearm wound, eventually succumbing to remote complications of the wound weeks, months, or even years later. However, such a case remains of medicolegal interest if it can be shown to be directly or indirectly related to the initial wound.

Although some authors might question the need for a detailed medicolegal investigation into deaths manifestly due to firearm wounds (after all, "we know why he died, don't we?"), the proper examination of such a case may clarify the cause of death, the identification of the assailant, and the manner of death. These are often areas of contention. Was the firearm wound death a homicide, accident, or suicide? Was the shot fired in self defense? Was the victim attacking or fleeing from the shooter? Was the fatal bullet fired from the accused person's gun? Proper interpretation of trajectory, range of fire, and other findings will help to answer these and many more questions. Recovery of a bullet may serve to exonerate or implicate a particular firearm in the incident[13].

Because of the seriousness and gravity of the legal questions to be answered, these examinations should be conducted by a physician properly trained and certified in forensic pathology.

Localization and measurement of wounds: The wound(s) should be localized on the body. Measurements to locate a wound may be taken from the top of the head and right or left of the midline of the body, but other datum points may be used as well. Use of a consistent reference point will allow reconstruction of wound trajectories, which is the primary reason for taking such measurements.

In addition to giving the precise measured location of a wound, its location should also be generally described using easily identifiable anatomic landmarks. For example, a firearm wound of the chest might be described as "36 cm from the top of the head, 4 cm left of midline, and above and medial to the left nipple."

Next, the wound itself should be measured, generally in 2 dimensions (e.g., 0.5 X 0.7 cm) and described by its shape (e.g., round, oval, slit like, stellate, ragged). The presence or absence of any abrasion rim should be noted, with its width and extent measured. Any soot or powder stippling should be noted, and its extent measured as well (see below).

External wounds versus number of internal bullets/projectiles: Before commencing the autopsy of a firearm injury victim, it is important to compare the wounds noted externally with the number of bullets or projectiles found in the body on radiographic examination. Because a bullet may either exit the body, producing both entrance and exit wounds (perforating), or remain in the body, producing only an entrance wound (penetrating), the number of wounds plus the number of bullets found on radiographs should generally be an even number. If there is a discrepancy, consideration should be given to the possibility of missed wounds (check the mouth, perineum, axillae, gluteal cleft, and other "hidden" spots), missed projectiles (increase the extent of the radiologic examination), or separation of bullets into core and jacket fragments within the body (1 entrance wound resulting in 2 "projectiles" seen radiographically).

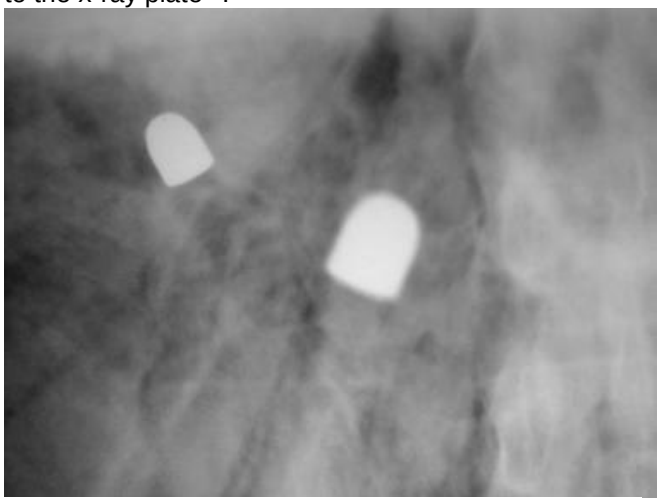
It is possible for a small-caliber bullet to enter the heart or a large blood vessel and be subsequently embolized or pumped "downstream" for some distance by cardiovascular action.[14] If surgery has been performed, consider that a bullet may have been purposely or inadvertently removed during the procedure. Small-caliber projectiles may be picked up by accident with a sponge, dropped, or suctioned away. It is also possible that multiple "entrance wounds" may have been produced by fragmentation of a projectile or an intermediary target (see below), or that "exit wounds" may have been produced by bone fragments instead of a bullet.

Radiography: The clothed body of a firearm wound victim should always be thoroughly radiographed. All parts of the body affected by a firearm wound must be imaged, and it may be that even sites distant from the entrance wound need to be examined. For example, a firearm wound of the shoulder can pass through the arm, chest, and abdomen, terminating in the decedent's leg under certain circumstances. Some modern full-body x-ray scanners, such as the Lodox machine, can provide high-resolution full-body radiographs in a minimum amount of time, making this process much more efficient and complete.

If appropriate bullets or fragments are not found in initial radiographs, repeat images of other body areas should be obtained, taking care to cover all areas of soft tissue and clothing. This is particularly important in obese decedents, in whom more than one x-ray plate may be needed to fully image a level of the torso. Such individuals may require a longer exposure or higher kilovoltage (kV) of the x-ray beam to obtain adequate visualization. Lateral views of retained projectiles will be of tremendous assistance in localization of the bullet in many cases.

When discussing firearm radiography, it is important to remember that magnification effects may make projectiles and fragments appear to be much larger than their actual size (see the following image). For this reason, one should never attempt to estimate the caliber of a projectile from a radiograph without appropriate consideration of the focal length of the x-

ray tube and the distance from the imaged projectile to the x-ray plate[15].



Radiograph showing identical projectiles with different apparent dimensions due to a magnification effect. One projectile is in the tissues of the anterior body, whereas the other is posterior.

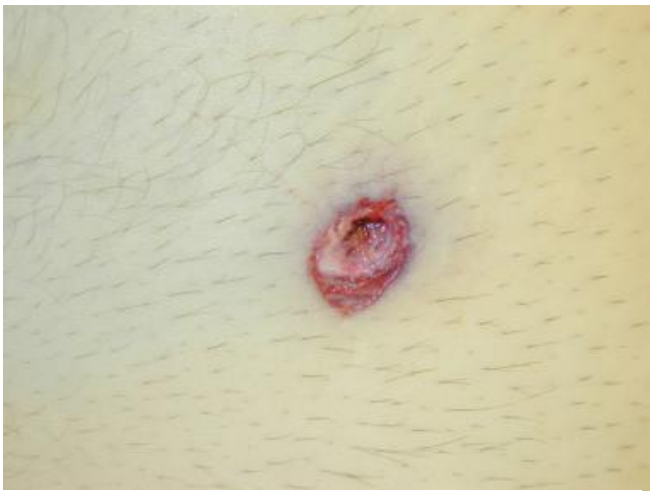
The pathologist should also be aware that some exotic ammunition may have bullet components that are less visible on radiographs than typical lead or copper bullets and jackets. These may include aluminum bullet jackets, plastic sabots or caps, or other components.

Some forensic pathologists have found fluoroscopy to be useful in localizing projectiles within the body, although this technique is far less common than standard radiography.

A few centers have been fortunate enough to have computed tomography (CT) scanning equipment available for examinations of decedents, and this technique has great potential for research. At this time, however, CT scanning of decedents remains expensive and is not readily available enough for routine use.

Entrance wounds: Firearm *entrance wounds* are typically round to oval, with smooth edges and a zone of epidermal abrasion surrounding the wound edge. This abrasion is caused by the rubbing or scraping of surrounding skin surfaces by the bullet as it indents the skin before perforating it. If the bullet strikes perpendicular to the skin, the abrasion will be of uniform width around the wound, as seen in the image below.

Entrance gunshot wound with a thin, evenly distributed abrasion rim. If the bullet strikes the skin at an angle other than perpendicular, the abrasion will be widest along the margin from whence the bullet came (toward the muzzle of the firearm). See the following images.



Entrance wound with an eccentric abrasion rim indicating that the bullet struck the skin obliquely. In this case, the bullet was traveling in an upward direction.

Gunshot wound with extremely eccentric marginal abrasion. The bullet traveled from the direction of the left upper margin of the photograph.

It must be kept in mind that the distinction of entrance versus exit wounds is not always a simple matter. With the exception of contact and intermediate range wounds, no single feature of a firearm wound of entrance (e.g., shape, abrasion, size) is necessarily diagnostic of an entrance wound. Rather, the totality of the wound features should be considered to differentiate between entrance and exit wounds. It should also be noted that caliber of an impacting projectile cannot be reliably determined from the size of an entrance wound on the skin.

Distant/indeterminate wounds: If the muzzle of the firearm is more than a few feet from the skin, there will be no residues of any kind deposited on the body surrounding the firearm wound. This type of wound is classified as a distant wound. Some practitioners refer to these as "indeterminate" wounds, based on the concept that one cannot entirely rule out the possibility that the wound was produced by firing at close range through an intermediate target that screened the firearm residues from the skin. This should, of course, be considered as a possibility during examination of death scenes and the body of a firearm wound victim.

METHODOLOGY

Total medico legal autopsies which were carried out at Forensic Medicine Department at AIMC Lahore were 327 during the year of 2014. Out of these, 114 were the cases of Fire Arm injuries deaths which were selected for this study. The documents scrutinized for this purpose were autopsies reports, police papers and hospital history charts.All data was collected and analyzed by using SPSS 13.

RESULTS AND DISCUSSION

Out of 327 total autopsies cases which were carried out in Forensin Medicine Department AIMC Lahore, 114 cases were of Fire Arm injuries death, 111 deaths were Homicidal and 03 were suicidal. Out of these, 93 were males and 21 were females. Table1,Table 2 and Table 3

Table 1

Total Autopsies during the year 2014	**n**	**%age**
327	114	35

Table 2:

Gender	**Fire Arm injuries Deaths**	**%age**
Male	**93**	82
Female	21	18
Total	114	100

Table.3:

Types	**Fire Arm injuries Deaths**	**%age**
Homicidal	111	98
Suicidal	3	2
Total	114	100

Table 4

Type of Weapon Used	**Fire Arm injuries Deaths**	**%age**
Rifled Weapon	98	86
Shot gun	16	14
Total	114	100

CONCLUSIONS & RECOMMENDATIONS

Out of total 327 autopsies which were carried out during the year 2014 at Forensic Department Allama Iqbal Medical College Lahore, 114 cases were Fire Arm injuries deaths, out of these 93 were males and 21 were females.111deaths were homicidal and 3 deaths were suicidal.98 deaths were due to use of rifled weapon and 16 deaths were due to use of shot gum weapon.

Following recommendations were suggested:

1. Need for massive improvement of the law & order situation of the country.
2. Impediment of Social Taboos.
3. Dire need for improvement of the social and economy of the country and population.
4. Proper prohibit of use of fire arms.
5. Free and well in time Justice.

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