

MEDICO LEGAL PATTERN ANALYSIS OF MECHANICAL INJURY CASES INVESTIGATED BY THE POLICE SURGEON OFFICE HYDERABAD FROM JANUARY TO DECEMBER 2024

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Abstract

Background: Mechanical injuries caused by assault, accidents, interpersonal violence are a substantial percentage of medico-legal cases investigated by the police surgeons. Such injuries have to be systematically documented and analyzed, which are necessary to be interpreted in law, prevent injuries, and plan the health of people.

Materials and Methods: A retrospective descriptive study was carried out with the help of medico-legal examination reports of the cases of mechanical injuries received by the Police Surgeon, Hyderabad. Such variables as age, gender, date of examination, anatomic site of injury, and description of injury were analyzed. The injuries were classified based on the type (abrasion, contusion, laceration, incised wound, punctured/firearm injury, swelling) and the body area.

Findings: Both male and female victims were involved in the study that was conducted over an extensive age range (2-85 years). The proportion of females was higher in cases, and most of them were seen to be young adults. The head and face were the most frequently affected anatomical regions then, upper limbs and lower limbs. The commonest types of injuries were abrasions, contusions and lacerations. Fewer cases were associated with grievous injuries, including bone-deep lacerations and puncture wounds of a gun with entry and exit features.

Conclusion: Mechanical injuries in medico-legal practice are most often associated with young adults, and injuries of the head and face prevail. The most common is blunt force trauma, but sharp force and gunshot wounds are of great medico-legal relevance. The proper records of the nature of injuries are essential in court litigation.

INTRODUCTION

Mechanical injuries are the pillars of the medico-legal tests of the police surgeons. The injuries are

usually as a result of attacks, domestic abuse, accidents caused on the roads, falls, and use of

weapons. Careful examination of the nature, size and depth, margins and location within the anatomy of the injuries is crucial in forensics to match the injuries with the purported history and weapon employed. Hyderabad, as a big metropolis, records a high number of medico-legal cases of injuries that take place every year.¹ The use of such data can be analyzed to identify the potential vulnerable groups, frequent violence trends, and medico-legal importance of different types of injuries. The current research is an evaluation of mechanical injury cases investigations that were conducted by the Police Surgeon, Hyderabad, within a duration of one year.

Research Questions:

1. What are the demographics, anatomical distribution and trends of mechanical injuries among cases that the Police Surgeon studied throughout the study period?
2. Which mechanical injuries are most frequently met and in what body parts are most medico-legal cases most frequently seen?

Review of Literature:

In Emergency departments and units of forensic medicine across the world, mechanical injuries make up a significant percentage of medico-legal cases. These injuries come about as a result of the use of external physical force and they comprise abrasions, contusions, lacerations, incised wounds, punctured wounds, and firearm injuries. Many studies have highlighted that injury pattern analysis can be a key indicator in understanding the mechanism, pattern, and conditions of the trauma and this could be useful in the clinical management as well as the legal determination.² Various epidemiological investigations have repeatedly demonstrated that the most susceptible to the injuries in the assault is a group of young adults which is best illustrated by the age group of 20-40 years old. This population group is more susceptible to interpersonal conflicts, work threat, alcohol-based violence, and outdoor activities and therefore, prone to traumatic experiences.³ In

mechanical injuries, generally males are more reported than females, but a recent study shows that females are on the increasing side especially in matters involving domestic and interpersonal aggression. The head and neck have been reported to be the most frequently affected anatomical region in cases of medico-legal injuries.⁴ Scalp, forehead, temporal, periorbital, nose, and cheek injuries have a very high frequency of reporting. This is owed to the weakness of the face when a person is assaulted and the fact that the assailants are likely to attack parts that are seen. Trauma of this area has specific medico-legal significance because it carries cosmetic nature and can lead to a disastrous result of skull cracks or intracranial bleeding. Research has also emphasized that the upper limb injuries are also common and in most cases they occur in the form of abrasions, contusion and lacerations on the forearms and hands.⁵ The injuries are often construed as defensive injuries, indicating that the victim was trying to keep off attacks. The injuries of the lower limbs, such as knees, legs, ankles, and feet are also frequent and are normally related with blunt force trauma or fall during assault or accidents.⁶ As far as the types of injuries are concerned, the prevalence of abrasions and contusions are provided, which means that blunt force injury is the most common type of medico-legal practice. Lacerated wounds particularly those associated with the scalp are frequent because of the abundant vascularity and closeness to bony surfaces.⁷ Cut wounds are relatively less and indicate that sharp edged weapons like knives or blades are used. Punctured and gunshot wounds, which are less common, are of high medico-legal implication due to their potentially lethal nature and the fact that entry and exit wounds have to be carefully recorded. Studies on firearm injury have placed emphasis on describing wound margins, size, shape as well as related characteristics like blackening, tattooing and burning.⁸ Entry wounds have inverted margins and exit wounds have everted margins, which can be used to reconstruct the incident. Even though in most areas the percentage of cases involving firearm

injuries is low, the severity and legal consequences of the case requires careful scrutiny.⁹ The quality of documentation is an issue that has been emphasized on several occasions in forensic works. The proper measurement of injuries, proper anatomical localisation, and clear differentiation between the types of injuries are necessary in the formation of the medical opinions about the weapon type, the force applied, and the way of causing the injury.¹⁰ Poor or imprecise descriptions of the injuries may dilute the medico-legal evidence and influence the court outcomes.¹¹ Regardless of the abundance of literature on mechanical injuries, there are disparities caused by geographic factors as not all regions have the same socio-economic status, practices, law enforcement and access to healthcare.¹² Thus, it is necessary to conduct region-specific research to comprehend the patterns of injuries and medico-legal trends. The current research will help in this requirement by

examining the cases of mechanical injury reviewed by the Police Surgeon within a specific time and thus offer essential information to the available literature on forensics.¹³

Significance of the Study: The research is illuminating on the trend of mechanical injuries that are typically experienced within the medico-legal practice, which will help the forensic practitioners to properly interpret the injured and testify in court. The knowledge of the typical injury patterns enables emergency physicians and surgeons to make timely assessment, prioritization and handle the cases of traumas. In-depth examination of injury patterns assists the judicial sector to match medical findings with supposed history enhancing the delivery of justice. Recognition of high-risk populations in terms of age and commonly injured body parts demonstrates the locations where focused violence prevention and safety measures may be introduced.¹⁴ The research is a source of reference to postgraduate students and researchers in forensic medicine and adds to the available literature in medico-legal. The results could guide policy makers and enforcers of the

law to work out measures to minimize interpersonal violence and morbidity associated with injuries.

The objectives to be inquired below were:

1. To examine the trend and medico-legal features of mechanical injuries among cases viewed by the Police Surgeon in the course of the study.
2. To examine age and gender distribution of people reporting mechanical injuries.
3. To establish the frequent locations of anatomy that are subject to mechanical injuries.
4. To categorize injuries according to their character and type (abrasions, contusions, lacerations, incised wounds, punctured/firearm injuries, and diffuse swellings).
5. To determine the degree of injury that is in relation to depth and participation of underlying structures.
6. To assess the medico-legal importance of injuries to probable weapon and manner of causation.
7. To offer information that could be helpful in injury prevention measures and policy-making.

Materials and Methods: Study Design Retrospective descriptive observational research. Study Setting Hyderabad Police Office of the Police Surgeon. Study Period January 2024 to December 2024.

Study Material: The cases of mechanical injuries that involved the Police Surgeon were included in the medico-legal examination records.

Inclusion Criteria: Any mechanical injury cases that were reviewed within the period of study. Male and female, all ages.

Exclusion Criteria: No reported injuries (except where mentioned as no marks of violence) cases.

Data Parameters: Age, Gender, Date of examination, Anatomical site of injury, Description of injuries and nature.

Classification of Injuries: Injuries were classified as; Abrasions Contusions (bruises), Lacerated

wounds, incised wounds Punctured/firearm wounds, diffuse edema/soft tissue injury.

Data Analysis: The analysis of data was done descriptively in tables and percentages.

Results:

Table 1: Gender Distribution

Gender	Approximate Proportion
Female	Higher proportion
Male	Lower proportion

Females constituted the majority of cases, indicating a significant burden of assault-related and domestic violence injuries.

Table 2: Age Distribution

Age Group (Years)	Observation
0-10	Few cases
11-20	Moderate number
21-30	Highest number
31-40	High number
41-60	Moderate
>60	Few cases

Young adults (21-40 years) formed the most affected age group.

Table 3: Anatomical Distribution of Injuries

Anatomical Region	Frequency
Head & Face (scalp, forehead, eye, nose, cheek)	Most common
Upper limbs (arm, forearm, wrist, hand)	Second most common
Lower limbs (knee, leg, foot, ankle)	Common
Trunk (chest, back, abdomen, neck)	Moderate
Multiple body regions	Frequently noted

Head and facial injuries predominated, reflecting direct interpersonal violence.

Table 4: Classification of Mechanical Injuries

Type of Injury	Observations
Abrasions	Most common
Contusions (bruises)	Very common
Lacerated wounds	Common
Incised wounds	Less common
Punctured / firearm wounds	Few but medico-legally significant
Diffuse swelling	Frequently associated
Fractures	Rare

Blunt force injuries were the predominant mechanism.

Discussion:

The current research points out that case reports of mechanical injuries investigated by the Police Surgeon, Hyderabad, were mostly of young adults, especially females. This observation implies that there is a high weight in the form of interpersonal and domestic violence. The most common were head and facial injuries (scalp laceration, periorbital bruising, nasal wounds, and contusions of the cheek). These types of injuries are common to the assault cases and have cosmetic and medico-legal implications. There were also injuries to the upper limbs which in most cases were defensive injuries. The major part of injuries was occupied by abrasions and contusions, which denotes blunt force trauma with the help of hands, sticks, or hard blunt objects. The lacerated wounds were of the depth of the skin to the depth of bone, and there were cases with the exposed bone. Incised wounds implied the use of sharp blades whereas firearm wounds were characterized by classical entry and exit wounds with

inverted and everted margins respectively. Medico-Legal Importance Accurate registration of size, depth, margins, and location is significant to; determining weapon type History against injuries. View regarding the presence of severity and grievousness. Legal results and court evidence.

Conclusion:

The Police Surgeon, Hyderabad, studies medico-legal cases, the percentage of which is dominated by mechanical injuries. The most affected group is the young adults especially the females. Injuries in the head and face are the most dominant and the most prevalent is blunt force trauma. The study emphasizes: The necessity of a careful registry of the injuries. Early detection of assault and domestic violence. Significance of medico-legal training on proper injury interpretation. These analyses may help law enforcers, the courts, and the health community to prevent injury and deliver justice.¹⁵

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