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<b>Principal Investigator</b>	<b>Co-Principal Investigator</b>	<b>Co-Principal Investigator (Technical)</b>
<b>Dr. A.K. Gupta</b> Professor and Head, Department of Forensic Science Sam Higginbottom Institute of Agriculture, Technology & Sciences SHIATS, Allahabad	<b>Dr. G.S. Sodhi</b> Associate Professor Forensic Science Unit Department of Chemistry SGTB Khalsa College University of Delhi	<b>Dr. (Mrs.) Vimal Rarh</b> Deputy Director, Centre for e-Learning and Assistant Professor, Department of Chemistry, SGTB Khalsa College, University of Delhi  <i>Specialised in : e-Learning and Educational            Technologies</i>
<b>Paper Coordinator</b>	<b>Author</b>	<b>Reviewer</b>
<b>Dr. Adarsh Kumar</b> Professor (Addl.), Forensic Medicine and Faculty-In-charge Forensic Anthropology & Forensic Radiology AIIMS, New Delhi	<b>Dr. Antara DebBarma</b> Asst. Professor Forensic Medicine Malabar Medical College Modakkallur, Atholi, Calicut, Kerala	<b>Dr. Adarsh Kumar</b> Professor (Addl.), Forensic Medicine and Faculty-In-charge Forensic Anthropology & Forensic Radiology AIIMS, New Delhi
<b>Anchor Institute : SGTB Khalsa College, University of Delhi</b>		

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## 1. Learning Outcomes

After studying this module, you shall be able to know about-

- Injury, different definitions of Injuries
- Factors which affect causation of mechanical injuries
- Various classification of mechanical injuries
- Defense wounds, offence wounds & fabricated wounds

## 2. Introduction

Mechanical injuries are injuries which are produced by a mechanical force. The word “injury” is derived from Latin word “injuria” which means “a wrong”. Injury is also used synonymously with wound.

Under Section 44 of Indian Penal Code, injury is defined as “**Any harm whatever illegally caused to a person in body, mind, reputation or property**”.

**Medical definition of injury or wound:** Any breach in the anatomical continuity of the tissues of the body.

### General principles

An injury or wound is caused due to external mechanical force acting over the body either due to movement of both the body and the weapon of offence or movement of the body alone. In the first case, the counterforce is provided by the inertia of the body and in the second case by the rigidity of any stationary object against which the body strikes. Usually, combinations of both are seen. Due to the impact between the forward moving force and counterforce, energy is transferred to the bodies, which causes a change in their state of motion or rest.

### 3. Factors influencing mechanical injuries

#### 1. Amount of energy discharged:

In a moving object, kinetic energy is measured by  $KE = \frac{1}{2} mv^2$  where  $m$ =mass and  $v$ =velocity. So, an object having definite velocity and definite mass has a definite amount of energy. When mass doubles, kinetic energy also doubles and when velocity doubles, kinetic energy increases four times. Thus velocity has far more influence on the energy compared to the mass.

#### 2. Time:

The shorter the period of time needed for the transfer of energy, the greater is the likelihood of producing the damage. If a person gets punched, the more damage will be caused if withdrawn immediately, rather than if stays in place.

#### 3. Area of transfer:

The smaller the area of impact, the more is the damage than if same force is used over a larger surface.

#### 4. Inertia of tissue:

Inertia of tissue is the tendency of the tissue struck by a force to move and its ability to stop the motion without disruption of the tissue. So more the inertia of tissue, less is the damage caused.

#### 5. Elasticity and plasticity:

The less elastic and plastic the tissue, the greater is the chance of causing damage to the tissue.

## 6. Hydrostatic pressure:

When a force is being transmitted through a fluid containing tissue, such as bladder and stomach, then the force will displace the fluid medium away from the point of contact, resulting in tissue laceration.

A blow with a weapon having a flat surface will produce less severe injury than that of a narrow object, because of diffusion of the energy over a large surface. A blow struck with a projecting object with force will cause much more injury as all the force is delivered by the projection. A blow to rounded portion like head will produce more severe injury than the injury sustained over a flat portion of the body by same force, as the larger force is being dissipated over the flat surface.

## 4. Classification of injuries

### Medical Classification

Injuries are classified as follows:

#### A) Mechanical Injuries:

Mechanical injuries are classified depending on the weapon of offence involved.

- 1) **Blunt force impact:** Due to blunt force impact either striking the body as in a blow or the moving body striking a fixed object or surface, as in case of a fall on a rough surface etc. The injuries caused by blunt force impact are **abrasion, bruise (contusion) & laceration.**
- 2) **Sharp force impact:** Due to striking of the body by edge of any sharp object like knife tip, broken glass, or heavy sharp objects like axe etc. they cause injuries viz., incised wound, stab wound, chop wound.
- 3) **Due to fire arms:** 1) Fire arm injuries 2) Blast wounds/Bomb explosion.

## **B) Thermal Injuries:**

- 1) **Due to local effects of cold:** a) Frost bite. b) Trench foot/ Immersion syndrome  
c) Chilblain
- 2) **Due to generalized effects of cold:** Hypothermia.
- 3) **Due to local heat application:** a) Burns (Due to application of dry heat e.g.,  
flame.  
b) Scalds. (Due to application of moist heat)
- 4) **Due to generalized effects of heat:** a) Heat hyperpyrexia b) Heat exhaustion or  
heat collapse c) Heat cramps or miner's cramp d) Heat stroke

## **C) Chemical burns:**

They are nothing but result of chemical reactions as in cases of corrosive acids and alkalis.

## **D) Miscellaneous injuries:**

- a. Electrical injuries causing electrocution.
- b. Blasting injuries which can be termed as a combination of mechanical and thermal injuries.
- c. Radiation injuries caused as a result of radioactive substances/ X-rays.
- d. Lightning injuries which is a combination of electrical, mechanical and thermal injuries.

### Legal Classification

Legally injuries are classified into a) Simple b) Grievous c) Dangerous.

Grievous injuries are defined under Section 320 IPC which has got 8 specific clauses.

Dangerous injuries are otherwise extension of 8<sup>th</sup> clause of Grievous injuries; however it is defined as the injuries which pose eminent danger to life in absence of surgical or medical intervention.

Simple injuries are defined as those which are neither grievous nor dangerous.

### Medico-Legal Classification

Medico legally injuries can be suicidal, homicidal, accidental, fabricated and defense wounds.

### **Difference between Lacerated Wound, Incised Wound, Stab Wound**

<b>TRAIT</b>	<b>LACERATED</b>	<b>INCISED</b>	<b>STAB</b>
Manner of production	Blunt objects	Sharp objects	Either.
Site	Usually over bony prominence	Anywhere	Usually over vital organs, but can be anywhere.
Margins	Irregular	Clean cut	Either depending on the weapon.
Abrasion of edges	Present	Absent	Present if weapon is blunt.

Bruising	Present.	No adjacent bruising	Present depending on the weapon.
Shape	Irregular	Spindle shaped or linear	Depends on weapon, can be spindle or wedge shape etc.
Dimensions	Usually longer than deep.	Length is the greatest dimension.	Depth is the greatest dimension.
Underlying structures.	Crushed with bridging of tissues seen.	Clean cut.	Clean cut.
Hair bulbs	Crushed	Clean cut	Clean cut in case of sharp weapon.
Hemorrhage	Not profuse	Usually profuse	Profuse especially internal hemorrhage.
Bones	May be fractured	May be cut	Depends. May show cut.
Foreign bodies	Usually present.	Absent.	May be absent.
Clothes	May be torn	May be cut	May be cut

## 5. Defense Wounds

Defense wounds are caused by immediate and instinctive reaction of the victim to save himself. They are classified into two types:

- **Active defense wound:** Caused when the victim tries to grasp the weapon.
- **Passive defense wound:** Caused when the victim raises the hands, arms or legs to defend himself.



### **Salient features:**

- 1) In almost all homicidal injuries, defense wound are present if victim was.
- 2) When the weapon is sharp, then incised wounds or stab wounds are present, and when blunt weapon is involved, then usually abrasions and contusions along with rare fracture of the carpals and metacarpals are seen.
- 3) Usually, the victim raises the arm flexing the elbow, or tries to grasp the weapon, covering the head, face, eyes. As a result defense wounds are present over the extensor surface of the ulna, wrists and back of the hand, knuckles and lateral or posterior aspect of the upper arms. When the victim tries to grab the weapon, then defense wounds may be present in the palms. If single edged weapon is used, then incised wound are found either on palm or bend of finger. If double edged weapon used, then injuries are found on both palms and fingers.
- 4) Rarely, defense wounds may be found over the knees, thigh or over shin of tibia, if the victim is thrown over the ground and the victim curls up to kick the assailant. Usually in cases of sexual assault or rape such defense wounds are found.

### **Medico-Legal Importance:**

Defense wounds are almost always associated with homicidal injuries. In sexual assault victims, defense wound may be found in females, around thigh and knees.

## 6. Fabricated Wounds

Self-inflicted wounds or fabricated wounds are those which are produced by a person on his own body or by another person by his consent.

**Motives:** They may be produced for the following reasons.

1. In order to charge another person with assault or attempt to murder.
2. In order to change a simple injury into grievous in order to fabricate or for medical benefits.
3. By the assailant to pretend self-defense or to change the appearance of the wounds which can connect him to the crime.
4. By prisoners to bring charge of assault on officers.
5. By military men to escape service or for leave.
6. By women, to bring charge of sexual assault.
7. By mentally ill person or to fabricate feigned insanity.
8. Religious fanatics.
9. For blackmailing.

### **Salient features:**

Fabricated wounds are usually incised wound, sometimes contusions and rarely are lacerated wounds. Incised wounds are usually parallel, of equal depth at origin and termination. Usually the injuries avoid vital points like eyes, lips, ears and nose. Usually, the directions are behind forward, if on the top of forehead, above downwards, on the outer side of upper arm, below upwards, on the front of fore arm, vertical on the chest and abdomen, and on the legs they are variable. If stab wounds are present, then they are usually multiple in numbers and are superficial.

If burns are used, then they are superficial and seen usually over the left upper arm (in case of right handed persons) and vice versa. The clothes are not cut or torn. Even if they are, they do not correspond to the underlying injuries. The history given are incompatible to the injuries sustained.

### **Medico-Legal Importance:**

They are self-inflicted and usually inflicted by the person himself or by another person by his consent in order to malign a third party.

## **7. Offense Wounds**

Offense wounds, as the name suggests, are caused during offense, rather than defence and are found over the body of the assailant.

Injuries sustained are mainly abrasions, contusions, lacerations over knuckle. If the fist was planted over the victim's mouth and exposed teeth, then laceration may be produced by the teeth of the victim as well. The injury should match with the fractured or dislocated teeth of the victim. As per Locard's principle, saliva of the victim would be detected in such laceration and also the teeth of the victim may reveal blood stain of the assailant.

### **Medico-Legal Importance:**

Matching the injuries sustained over the body of the assailant during offence to the victim's injuries or blood stain or saliva found over the victim relates the assailant to the crime.

## **8. Summary**

- Under section 44 of Indian penal Code, injury is defined as “Any harm whatever illegally caused to a person in body, mind, reputation or property”.
- An injury or wound is caused due to external mechanical force acting over the body either due to movement of both the body and the weapon of offence or movement of the body alone.
- The shorter the period of time needed for the transfer of energy, the greater is the likelihood of producing the damage.
- Legally injuries are classified into Simple, Grievous and Dangerous.
- Defense wounds are caused by immediate and instinctive reaction of the victim to save himself.

- Self-inflicted wounds or fabricated wounds are those which are produced by a person on his own body or by another person by his consent.
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