

Mechanical Trauma 1

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Objectives



- ▶ **Be able to**
- ▶ Identify different types of mechanical injuries
- ▶ Identify causative weapons
- ▶ Identify circumstances of injuries
- ▶ Date injuries for medico legal purposes
- ▶ Identify medico legal significances of injuries
- ▶ Describe injuries for medico legal purposes

Mechanical injuries

- ▶ Mechanical injuries (wounds) are injuries produced by physical force.

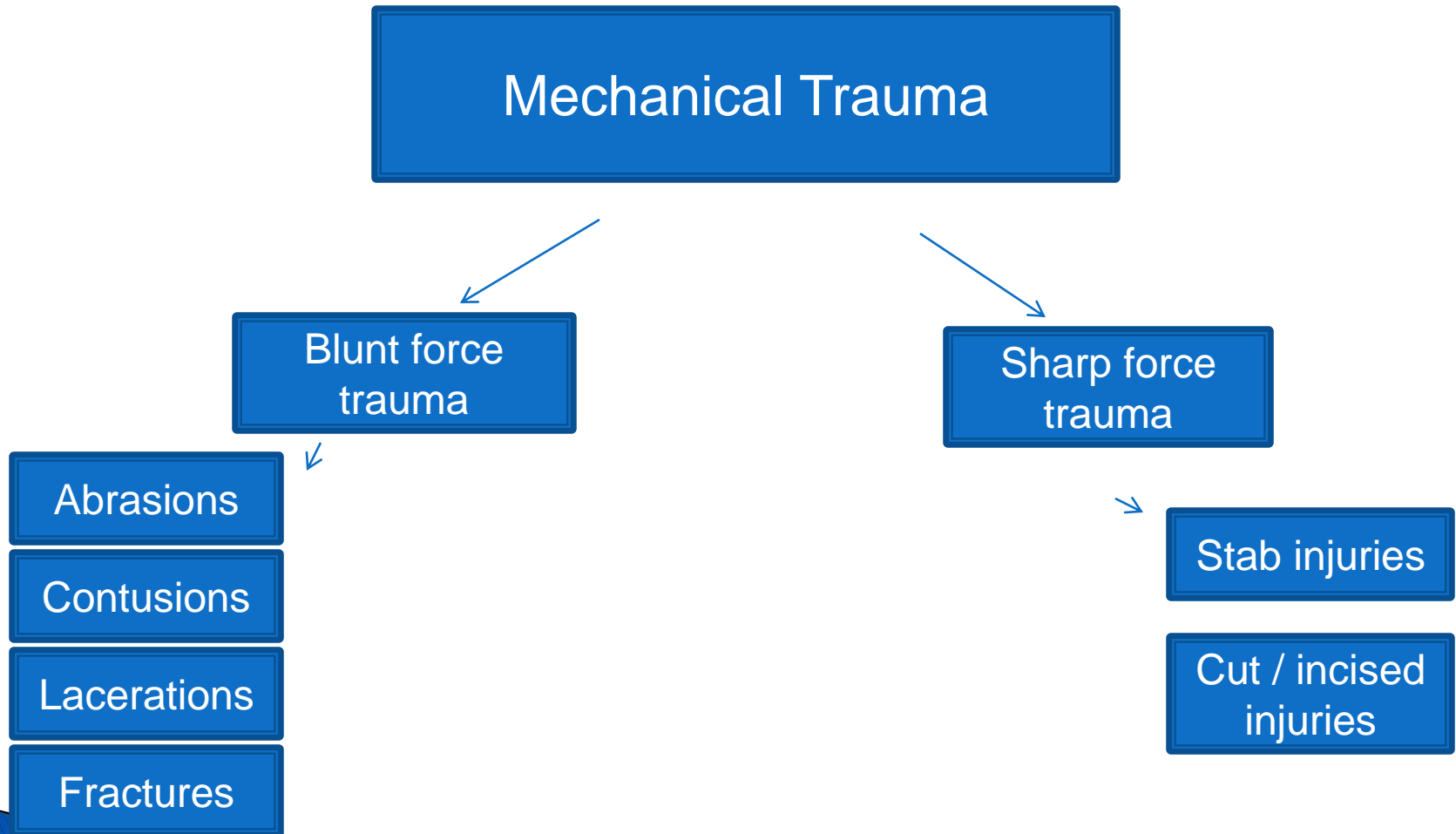


Application of physical force

- ▶ Blunt force
- ▶ Sharp force



Classification of injuries caused by mechanical trauma



Definitions



Injury

- Any harm whatever illegally caused to any person's body, mind, reputation or property

Ante mortem injuries

- Injuries that are caused during life

Post mortem injuries

- Injuries that are caused after life

Abrasions



- ▶ Injury to the epidermal layer of the skin
- ▶ Superficial, therefore no scarring

Sub types of abrasions

Scratches

Grazes

Imprint /patterned

Friction

Scratches



Linear abrasions



Caused by pointed objects moving across the skin
Eg: thorn, sand grain, tip of a knife

Grazes



Multiple parallel scratch abrasions placed closed to each other



Epidermal tags give direction of blow.

Grazes



- ▶ There is a tangential movement of a broad rough surface on the skin.
- ▶ Eg: Road traffic accidents, falls

Friction abrasions

- ▶ Friction abrasions are caused by linear pressure upon the skin with an agent with smooth surface accompanied by movement.
- ▶ Eg: ligature mark from clothing



Imprint/patterned abrasions

- ▶ Imprints are due to the impact of rigid hard rough surface over a localized area without movement.



Imprint/patterned abrasions

- ▶ Examples of imprints abrasions are nail marks, tire marks, cycle chain marks, ligature marks, bite marks



Medico legal significances

- ▶ Help to identify the shape of the object



Ligature mark



Chain mark



Bite mark

Medico legal significance

- ▶ Help in reconstructing the event



Nail mark



Tire mark



Hilt mark

Medico legal significance

- ▶ Abrasions may disappear in



Decomposition



Burns



Immersion

Dating of abrasions



Soon
after –

oozing
with
redness



24
hours –

red
flush
with a
scab



2-4
days –

Red
scab



5- 6
days –

Dark
scab



7-10
days –

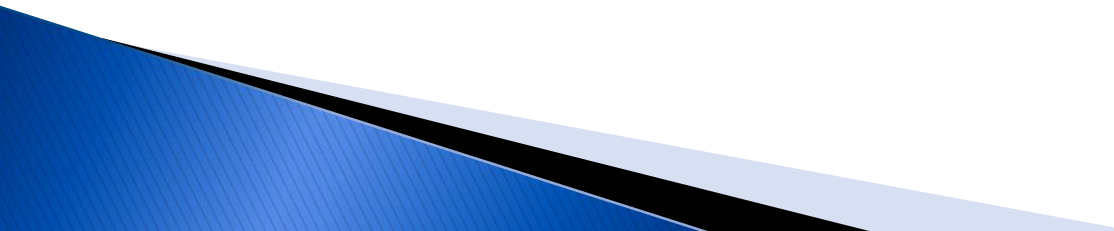
scab
falls

Medico Legal significance of abrasions

- ▶ A 14 year old girl is produced for medico legal examination with an alleged history of abuse.
- ▶ She was bitten, dragged on the floor by her step mother.
- ▶ On examination there are abrasions on the body.
- ▶ List the type/s of medico legal information which you can gather during your examination.



Medico Legal significances of abrasions

- ▶ Identification of causative weapon
 - ▶ Assault vs fall
 - ▶ Reconstruction of event (relative positions of assailant and victim, direction of drag)
 - ▶ Idea about type of crime (physical child abuse)
 - ▶ Dating of injury and event
 - ▶ Compatibility of given history with the examination
- 

Contusions

- ▶ A contusion is extravasation, infiltration and coagulation of blood in the tissues following traumatic rupture of small arteries and veins.



Patterned contusions

- ▶ Tire mark
- ▶ Whip mark
- ▶ Shoe soles
- ▶ Love bites



Colour change in contusions

Soon after: red



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graph TD; A[Soon after: red] --> B[24hrs: blue/purple]; B --> C[48hrs: bluish black]; C --> D[4-5 days: green]; D --> E[7-10 days: yellow];
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24hrs: blue/purple

48hrs: bluish black

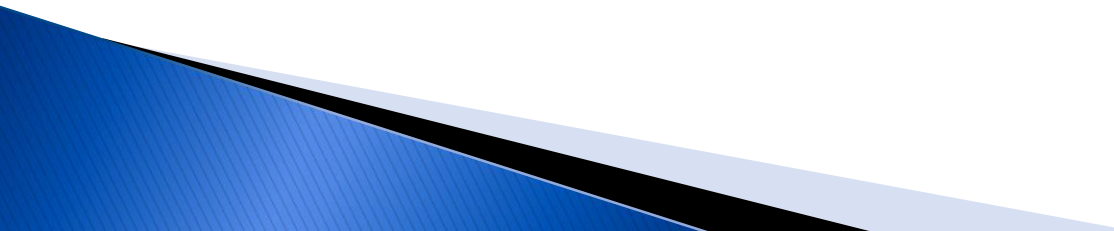
4-5 days: green

7-10 days: yellow

Colour change in contusions



Appearance of the contusion d/o

- ▶ Complexion of the person
 - ▶ Amount of extravasated blood
 - ▶ Fragility of the vessels
 - ▶ Bleeding and clotting time
 - ▶ Depth of the contusion
- 

Important facts

- ▶ Deep contusions may appear later
- ▶ Contusions may appear away from the site of trauma due to gravitation of blood.

◦ Frontal contusions	→	Periorbital area
◦ Upper arm	→	Elbow
◦ Thigh	→	Knee

Important facts

- ▶ Contusion with collection of blood is referred to as haematoma
- ▶ Contusions are accentuated in patients with bleeding tendencies.



Contusions with special significance

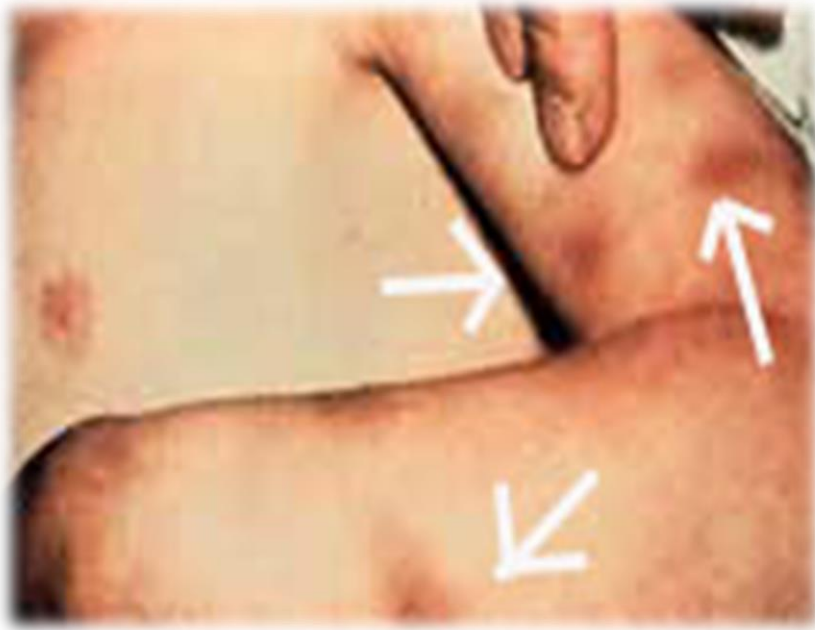
Finger pulp contusions

Tram line contusions

Suction bruises

Periorbital haematoma

Shape of the contusion



Finger pulp
contusions

Smothering, manual strangulation, sexual abuse, child abuse

Shape of the contusion

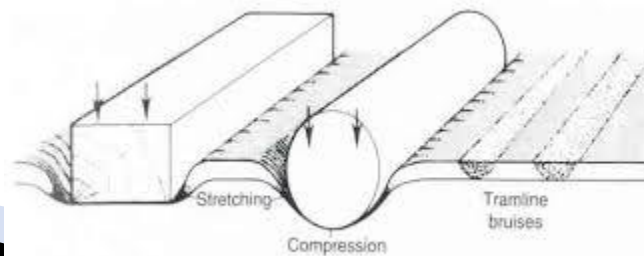


Tram line contusions

Assault with canes, batons, PVC pipes,

Tram line contusions

- ▶ These are caused by blunt object with circular or rectangular cross section.
- ▶ There are two parallel lines with intervening normal skin.
- ▶ Parallel lines are due to extravasated blood.
- ▶ Intervening normal skin indicates the width of the weapon.
- ▶ If it is pliable may encircle the body. (whip)



Type of contusion



Suction bruises

Cause for injury



Black eye

**Fractured orbital roofs,
gravitational movement of blood
from a forehead injury
direct trauma**

Post mortem artifacts and contusions

Hypostasis

Princeloo Gordon artifacts

Decomposition

Post mortem artifacts and contusions

- ▶ Gravitation of blood within the vessels after death.



Hypostasis



Contusion

Contusion vs hypostasis

Hypostasis	Contusion
Seen on most dependant areas	Found on any part of the body
Bilateral and symmetrical	Unilateral, asymmetrical
Blood is within the vessel	Blood is out side the vessel
Easily washed away	Difficult to wash away
Not associated with injuries	Associated with abrasions, lacerations
Blanch on pressure	Does not blanch

Post mortem artifacts and contusions



- ▶ Rupture of pharyngo-oesophageal plexus during evisceration
- ▶ Special neck dissection will minimize the artifact.

Princeloo Gordon artifacts

Post mortem artifacts and contusions

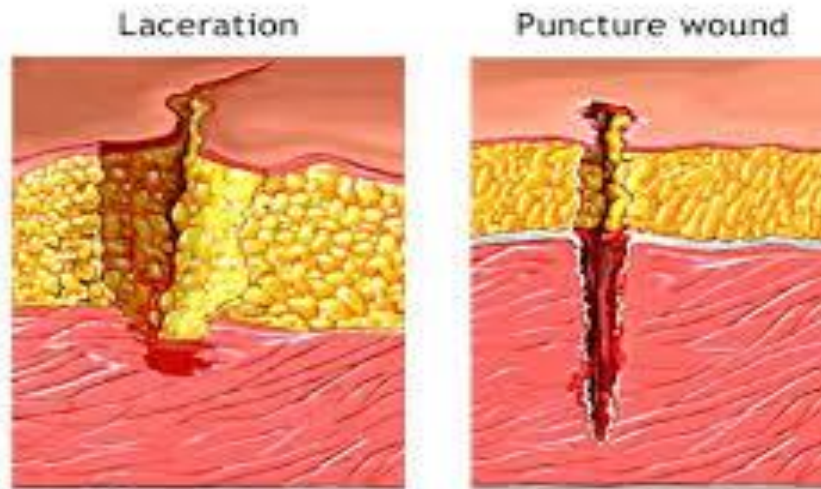


- ▶ Blood inside the vessels will come out staining the tissues.

Decomposition

Lacerations

- ▶ Discontinuity of tissue due to blunt force trauma.
- ▶ It can be seen on skin, subcutaneous tissue, muscle or any internal organ.

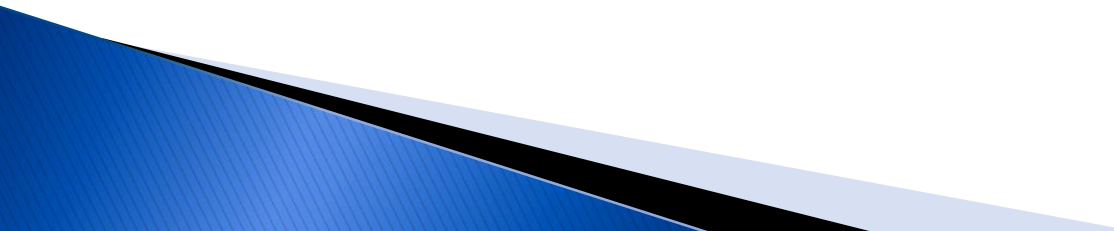


Features of laceration

- ▶ Has irregular bruised margins
- ▶ Ends are torn
- ▶ Foreign matter is present within the injury
- ▶ Blood vessels torn
- ▶ Floor is uneven
- ▶ Hair bulbs are crushed



Types of lacerations

- ▶ Split lacerations
 - ▶ Torn lacerations
 - ▶ Degloving lacerations
 - ▶ Crush lacerations
 - ▶ Stretch lacerations
- 

Types of lacerations



Split lacerations

- **Splitting of the skin due to compression between two hard surfaces (weapon and bone)**
- **Margins may be regular with minimal contusions**

Types of lacerations



Torn lacerations

- **Projecting object is dragged along the skin tearing the skin**
- **Road traffic accidents and machinery accidents**

Types of lacerations

Degloving lacerations



- Skin get separated from underline tissue due to grinding action
- Run over injury

Types of lacerations



Crush lacerations

- Crush injury causes fragment of bone to protrude out through the skin
- Crush injury to the head or limb

Types of lacerations



Stretch lacerations

- Heavy blunt impact on a localized area will cause over stretching of the skin

Shape of lacerations

- ▶ Shape of the laceration indicate the shape of the striking surface.

Stellate



Crescentic



Linear

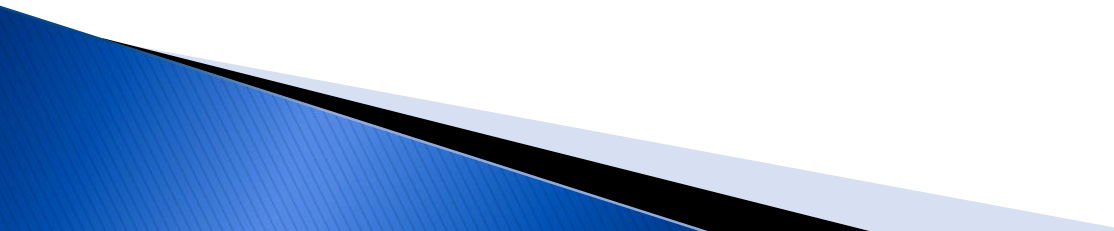


“Lacerations”

- ▶ These injuries are not pure lacerations as the mechanical trauma is not blunt force.
- ▶ Perforated lacerations by fire arms
- ▶ Blast lacerations by expanding gases
- ▶ Cut lacerations by blunted cutting weapons



Summery

- ▶ Blunt force trauma
 - ▶ Abrasions
 - ▶ Contusions
 - ▶ Lacerations
 - ▶ Medico legal significances of above injuries
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Thank you