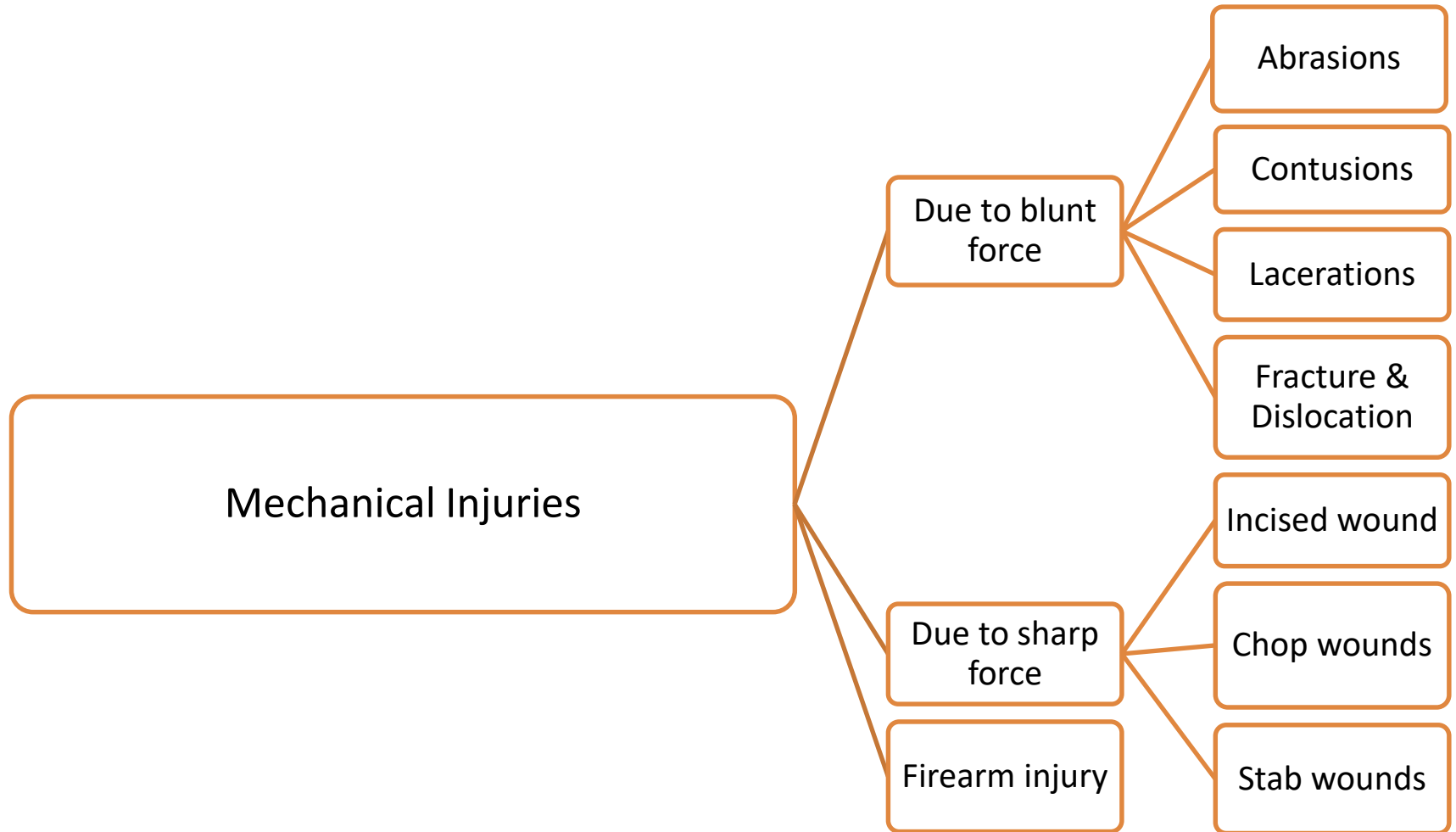


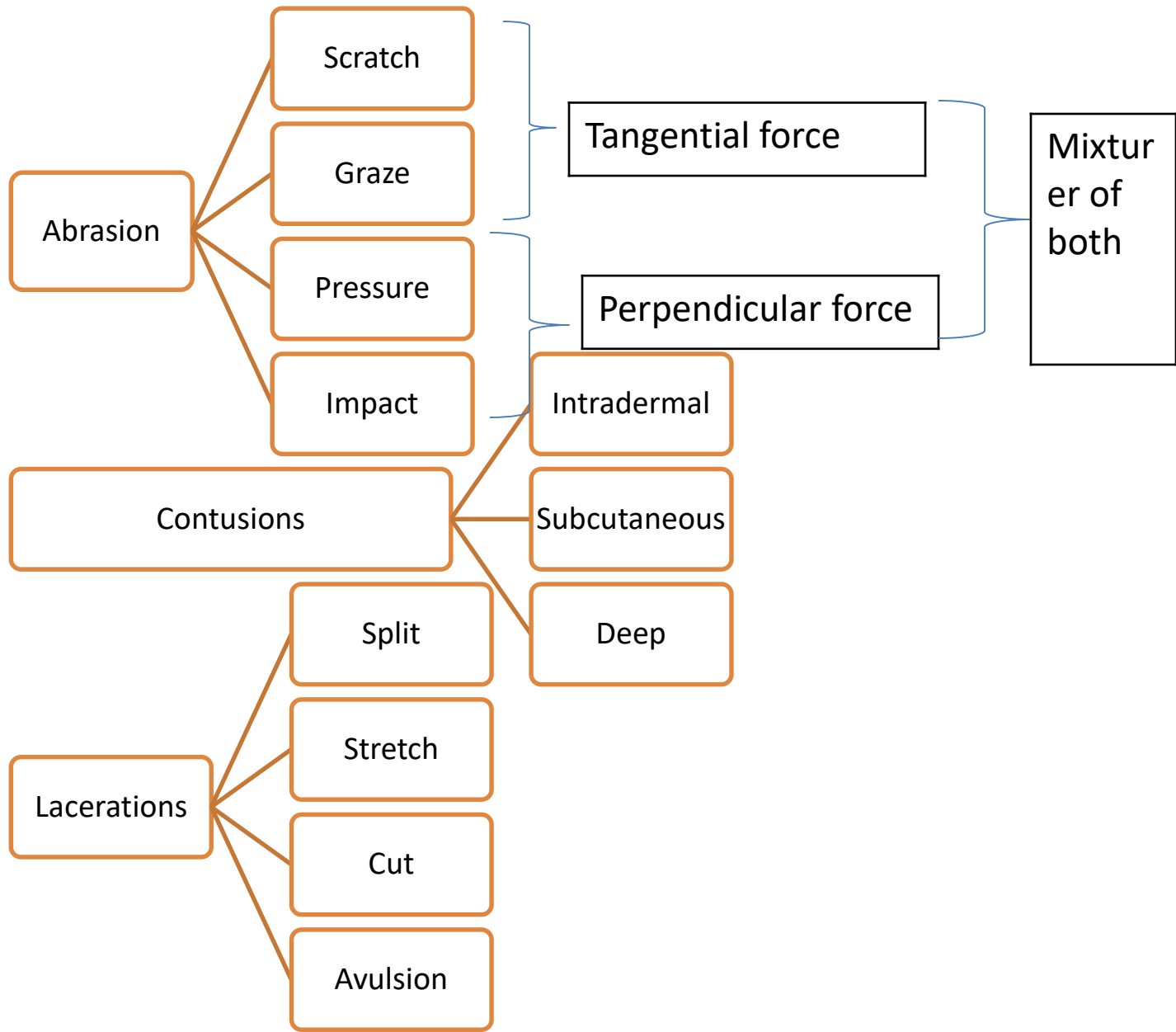
INJURY

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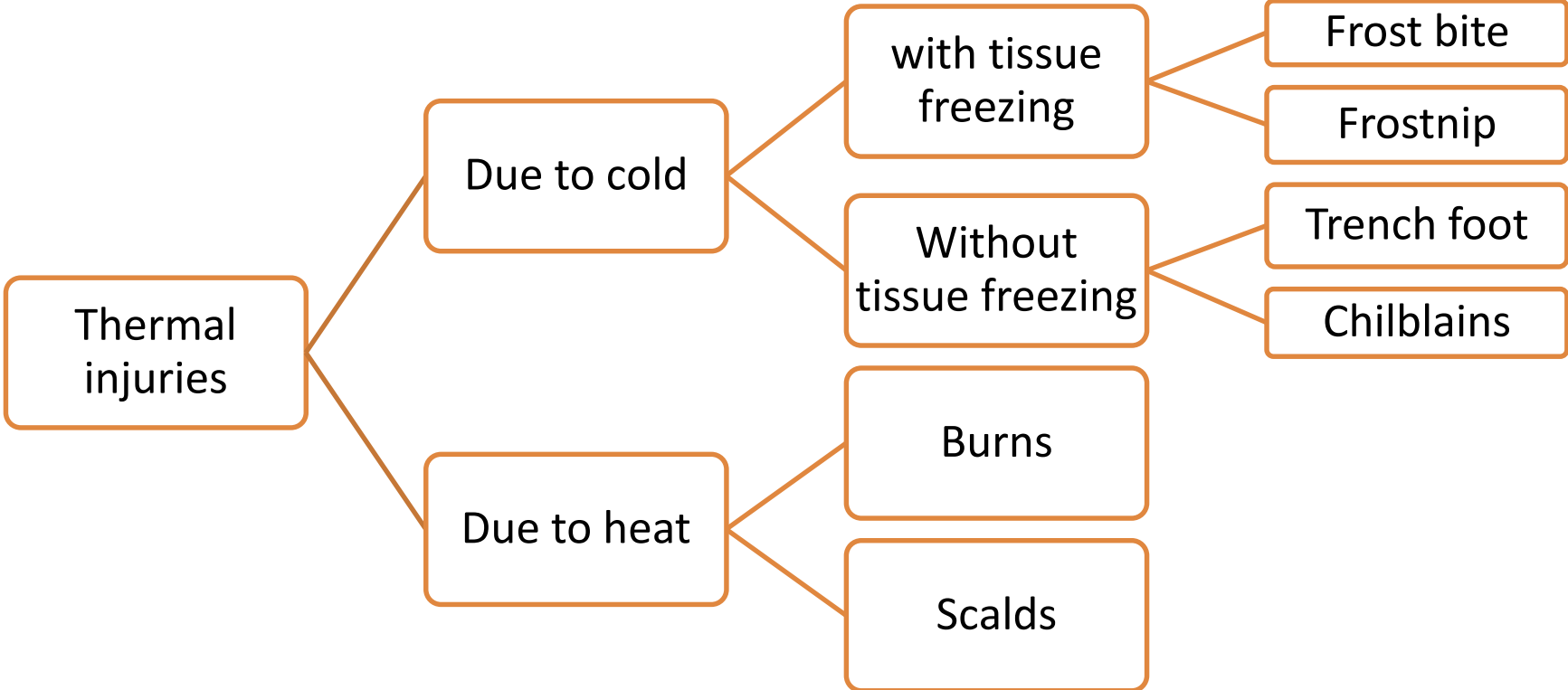
- **Injury** – Any harm whatever illegally caused to any person, in body, mind, reputation or property (S.44 IPC).
- **Wound** – Any breach in the natural continuity of any tissues of the living body.
- **Trauma** – Any physical or psychological injury
- **Torture** – is infliction of intense pain to punish, coerce, or affordable sadistic pleasure.

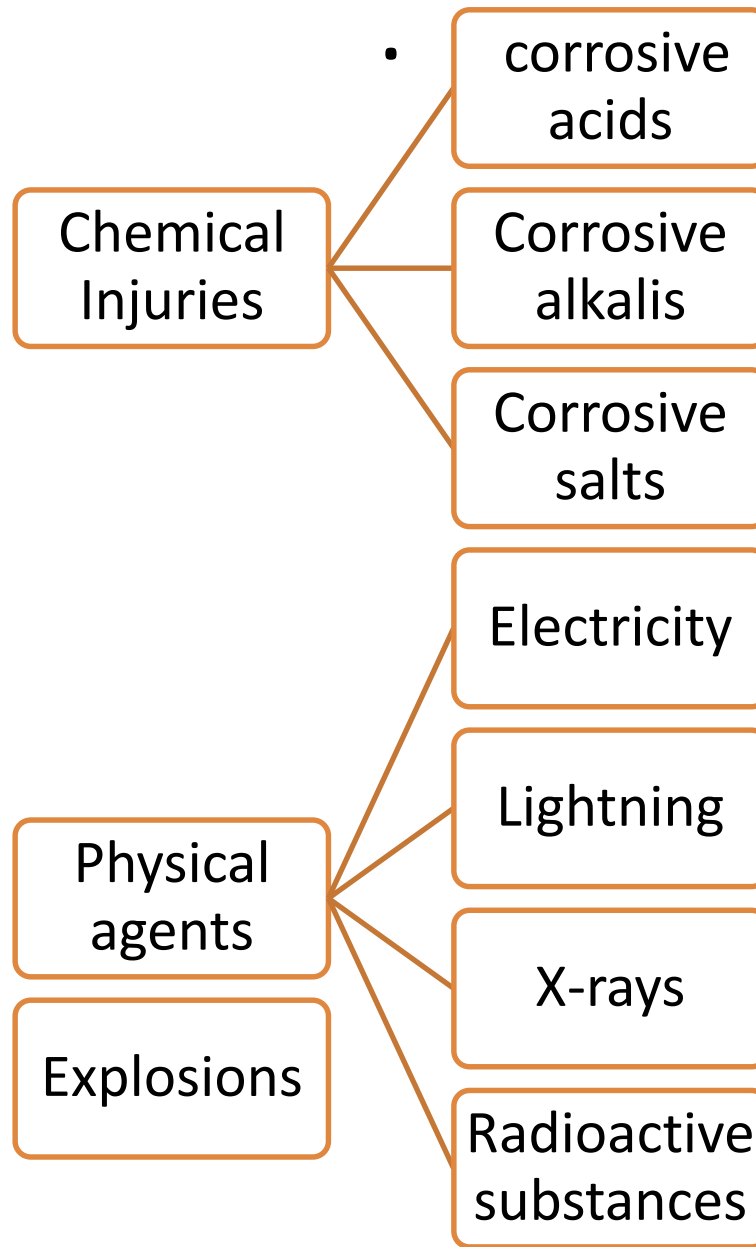
Classifications of Injury

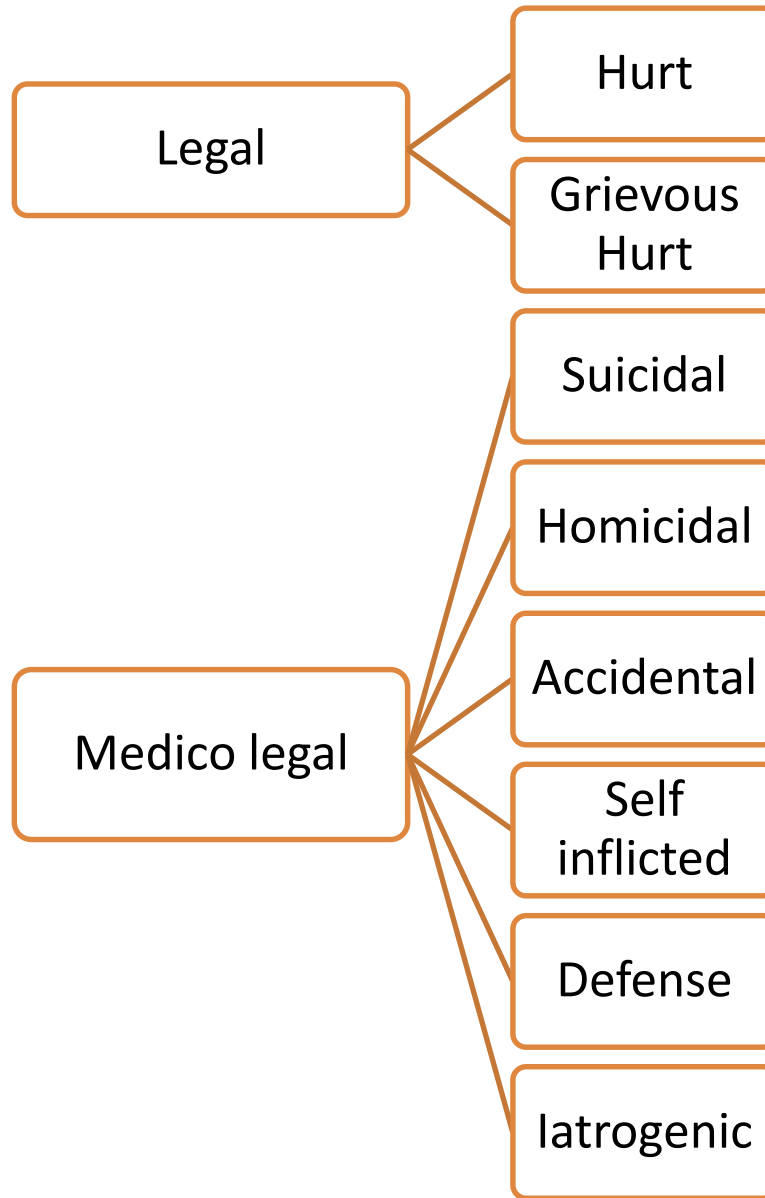




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Grievous Hurt (S.20 IPC, 8 clauses)

- Emasculation
- Permanent privation of the sight of either eye
- Permanent privation of the hearing of either ear
- Privation of any member or joint
- Destruction or permanent impairing of the powers
- Permanent disfiguration of the head or face
- Fracture or dislocation of a bone or teeth
- Any hurt:
 - Which endangers life
 - Which causes the suffer to be during to be during the space of 20 days in severe bodily pain, or
 - Unable to follow his ordinary pursuits

Mechanical injuries

- ❑ Injuries caused by application of physical violence to the body are known as Mechanical injuries.
- ❑ Produced by Blunt, sharp or firearms
- ❑ **Severities and extent depend upon –**
 - Amount of force delivered
 - Time period
 - Region struck
 - Extent of body surface
 - Nature of weapon used

Abrasion

- It is a superficial injury involving only the epidermal layers of skin.
- The outer layers of skin are scratched or removed leaving a bare area with little or no bleeding.
- These heal rapidly in few days and leave no scar
- If the injury extends to sub-epidermal region below dermal papillae, results in superficial scarring, termed as superficial laceration
- Become more prominent when skin dries (dark brown/black)

Scratch Abrasion

- It is a linear injury caused by a sharp pointed object such as pin or finger nail running across the skin having appreciable length but no significant width.
- **Point scratches** produced by tip of knife, pin or razor
- Nails produce curved, **semi lunar abrasion**.
- The direction of scratch is indicated by sharp edge initially and heaped up epithelium/epidermis at the end

GRAZES / SLIDING/FRICTIONAL BURNS /GRAVEL RASH

- It is produced when broad surface of skin slides against a rough surface.
- It is essentially a collection of innumerable scratch abrasions, epithelium heaped up at the end indicates the direction
- Identification of scene of incidence by presence of foreign body (dirt or grit) in the graze. Compared with the scene
- Road traffic accidents (RTA).
- Dragging of body on a ground.
- Glancing kick with a boot

Pressure Abrasion

- Result of more or less perpendicular application of relatively small force for large time periods on body surface, causes crushing of epithelium.
- Ligature marks
- Nail abrasions
- Teeth bite marks
- Shoe bite marks
- Contact lens on cornea
- Nappy rashes

Impact/Patterned Abrasion

- When relatively large force is applied perpendicular to the skin for short duration of time, causes crushing of epithelium and leave a pattern/imprint
- May be slightly depressed unless local edema
- There is an underlying bruise
- Headlamp rim and radiator grill mark
- Tire mark
- Bicycle chain mark
- Cat-o-nine tails
- Muzzle impression or recoil impression

Age of Abrasions

OBSERVATION	TIME
BRIGHT RED	FRESH
RED SCAB (DRIED BLOOD/SERUM)	12-24 HOURS.
REDDISH BROWN SCAB	2-3 DAYS
DARK BROWN SCAB (HEALING FROM PERIPHERY)	4-7 DAYS
SCAB FALLS OFF (COMPLETE HEALING)	10-14 DAYS

Difference between Antemortem and Postmortem Abrasion

FEATURES	ANTEMORTEM	POSTMORTEM
Site	Anywhere on body	Usually over bony prominences
Color	Brownish on Drying	Yellow on drying
Margins	Blurred due to vasoconstriction	Sharp
Exudation	More, scab slightly raised	Less, below skin level
Vital reaction	Present, congestion	Absent, no congestion
Sign of repair	Present	Absent
Bleeding	Present,	Absent

MEDICO-LEGAL SIGNIFICANCE

- They indicate site of impact and direction of force.
- They may be the only external evidence of serious internal injury.
- Pattern abrasions are helpful in connecting the crime with the object which produces them.
- The age of the injury can be known.
- In open wounds, dirt, dust, grease or grit are usually present which may connect the injuries to the scene of crime.
- Manner of injury may be known from its distribution
- In throttling, curved abrasion due to finger-nails are found on the neck.
- In smothering, abrasions may be seen around the mouth and the nose.
- In sexual assaults, abrasions may be found on the breasts, genitals, inside of the thighs and around the anus.
- Abrasions on the face or body of the assailant indicate a struggle.



Scratch Abrasions



Graze Abrasions



Pressure Abrasions



Imprint Abrasion

Bruise (Contusion)

- A **Bruise** is hemorrhage into the tissues underneath the skin, due to rupture of vessels (arterioles, venules and veins) by the application of blunt force, without breach of covering tissue (skin or capsule).
- When the effusion of blood is in other tissues and organs (muscles, lung, heart, brain, spleen etc.), called a **Contusion**
- Bruise is usually situated in the dermis, subcutaneous tissue and sometimes in the fat layer

Causes

- ❑ **Spontaneous** – Diseases of blood, blood vessels, scurvy, leukemia etc.
- ❑ **Traumatic** – Bruises are caused by blunt force e.g. iron rod, lathi, stone, cricket bat, hockey stick, whip, boot, accidental, RTA, firm griping of weak person etc.
- ❖ Painful, tender, crushing and tearing of s/c tissues; usually no destruction of tissues.
- ❖ If abrasion and contusion occur together then it is called **abraded contusion** or **contused abrasion**.

- ❑ **Petechial hemorrhage** is pin point red or blue spot due to rupture of small capillaries .
 - 0.1 – 2 mm in size
- ❑ **Ecchymosis** occurs due to fusion of large number petechie increase in size and joins to form Ecchymosis.
 - 2-5 mm in size
- ❑ **Bruise** is effusion of blood under skin with discolored in center to reddish, bluish, in appearance. Flat surface.
 - more than 5 mm in size
- ❑ **Hematoma** is appreciable bleeding due to damage of large blood vessels.
 - More than 5 mm in size
 - Lesion raised above the surface of skin
- ❑ **Mongolian spot** is hyper-pigmented spot in lumbo-sacral region.

Diagnostic features

- Shape may not correspond the shape of causative object
- Reddened area when fresh
- Margin blurred
- Pain
- Swelling
- Size varies from pinhead to an extensive hematoma

Classification

- 3 types depending on locations:
 - **Intradermal bruise**
 - Bleeding occurs in dermis
 - Extravasted blood is small
 - Due to superficial position pattern is distinct
 - Vehicle tire pattern and stomping
 - **Subcutaneous bruise**
 - Bleeding occur in subcutaneous tissue
 - Most common type and appear soon after injury
 - **Deep bruise**
 - Bleeding in deep subcutaneous tissues, just above muscle or between muscle bundle
 - Appear after 2-3 days after injury (delayed bruising)
 - IR photography
 - examination after 48 hours

FACTORS MODIFYING APPEARANCE OF BRUISE

- Site of Injury
- Vascularity of area
- Age
- Sex
- Color of skin
- Obesity
- Embalming
- Nature of disease
- Clothing

Gravity shifting of blood

- The extravasated blood may move along tissue planes under gravity influence and gets collected at a distant place (gravity shifting).
- A bruise round the tissues of the eyes & eyelids may result called as **Spectacle Hematoma**, It occurs due to -
 - A blow to the orbit
 - Fractured orbital roof
 - A blow to the forehead
 - A fall on the vertex

▪ **BATTLE'S SIGN**

- A bruise behind the ear called **Battle's Sign** may result from fall on the vertex or fracture of the base of the skull rather than a direct blow behind the ear.
- Blow on forehead or fall on vertex - Black eye/ raccoon eye.
- Fracture of head of femur – bruise on lateral aspect of lower thigh.
- Blow on outer part of thigh - Bruise around knee.

Patterned Bruising

- A pattern bruise is that which reflect the pattern of the striking object
- Also known as railway track bruise/tram line bruise
- Intra-dermal bruise display distinct pattern bruise
- May tell about the striking object
- Vehicular accidents
- Tire marks
- Muzzle impression
- Love bites

Mechanism

Weapon hits the pliable surface



Edge of the weapon drag the skin downward



Tearing of marginal blood vessels



Weapon is removed



Oozing of blood give railway track appearance



Centre remains undamaged

Age of bruise

(changes are seen from periphery to centre)

COLOUR	TIME OF INJURY	PIGMENT
Fresh (Red)	Fresh	Oxygenated Hemoglobin
Red to blue	One day	Deoxygenated Hemoglobin
Bluish black to brown	2-4 Days	Hemosiderin
Green	5-7 Days	Haemotidin
Yellow	7-10 Days	Billirubbin
Completely disappears	14 Days/ 2weeks	Normal

Age of Bruise (Microscopic)

- ❑ Microscopic examination (blood pigments)
- ❑ **Mechanism:** Blood, due to disintegration of RBC by haemolysis, releases hemoglobin that breaks down into haemosidrin, haemotoidin & bilirubin by the action of histiocytes & tissue enzymes.
- **Hemosidirin within macrophages:** not less than 24-48 hours.
- **Hemotoidin within Macrophages:** not less than 3 days.
- **Bilirubin extra cellular:** not less than 7 days

Antemortem vs. postmortem bruise

Trait	AM Bruise	PM Bruise
Time	During life	Within 2-3 hrs after death
Swelling	Present	Absent
Damage to epithelium	Present	Absent
Size	Proportion to force used	Small
Extravasations of blood	More	Less
Site	Anywhere	Bony prominence
Tissue underlying bruise	Tissue stains are permanent	Stains not permanent
Histological finding	Inflammatory reaction present	Absent
Color changes	Seen	Always dull bluish
Histochemical finding	Enzymatic reactions	Absent

True bruise vs. Artificial bruise

Findings	True Bruise	Artificial Bruise
Cause	Blunt force	Juice of Plant
Situation	Any part	On accessible parts
Color	Changes of color	Dark brown
Margins	Less defined	Well defined
Shape	Shape of weapon	Irregular
Swelling, Redness, & Ecchymosis	Present with slight swelling	Not present
Contents	Blood	Serum
Itching	Absent	Present
Chemical Tests	Negative	Positive

Hypostasis vs. Bruise

Features	Hypostasis	Bruise
Cause	PM changes	Blunt force injury
Collection of blood	Within the blood	Outside the vessels
Extent	Extensive	Localized
Site	Most dependent part	Anywhere on body
Blanching	Blanching if not fixed	No blanching
Incision	No staining of s/c tissues	Blood Stained s/c tissues
Swelling	Absent	May be
Epidermis	Not damaged	May be abraded
Area	Merge with surrounding	Clearly defined
Microscopic	RBCs within blood	RBCs outside

MEDICO-LEGAL SIGNIFICANCE

- Indicates offending object (blunt)
- Gives idea about degree of violence
- Time of injury
- Motive/purpose of injury
- In throttling, pressure of pads of finger indicate homicide
- Bruise on back of fingers, hand & forearms (Defensive act)
- Multiple small bruise on arms just below shoulders (Force full grasping during struggle)

- **Suction petechie:** bruising on the cheeks breast. (Sexual intercourse & love bites)
- Bruise on the medial aspect of thigh, vulva & around anus indicate forceful sexual intercourse
- Bruising of cervix shows dilatation cervix
- Bruising of buttocks indicate torture
- **Self inflicted:** artificial bruised area produced by rubbing marking nut juice or Calotropis, or root of plumbago over skin



Bruise



Spectacle Bruise



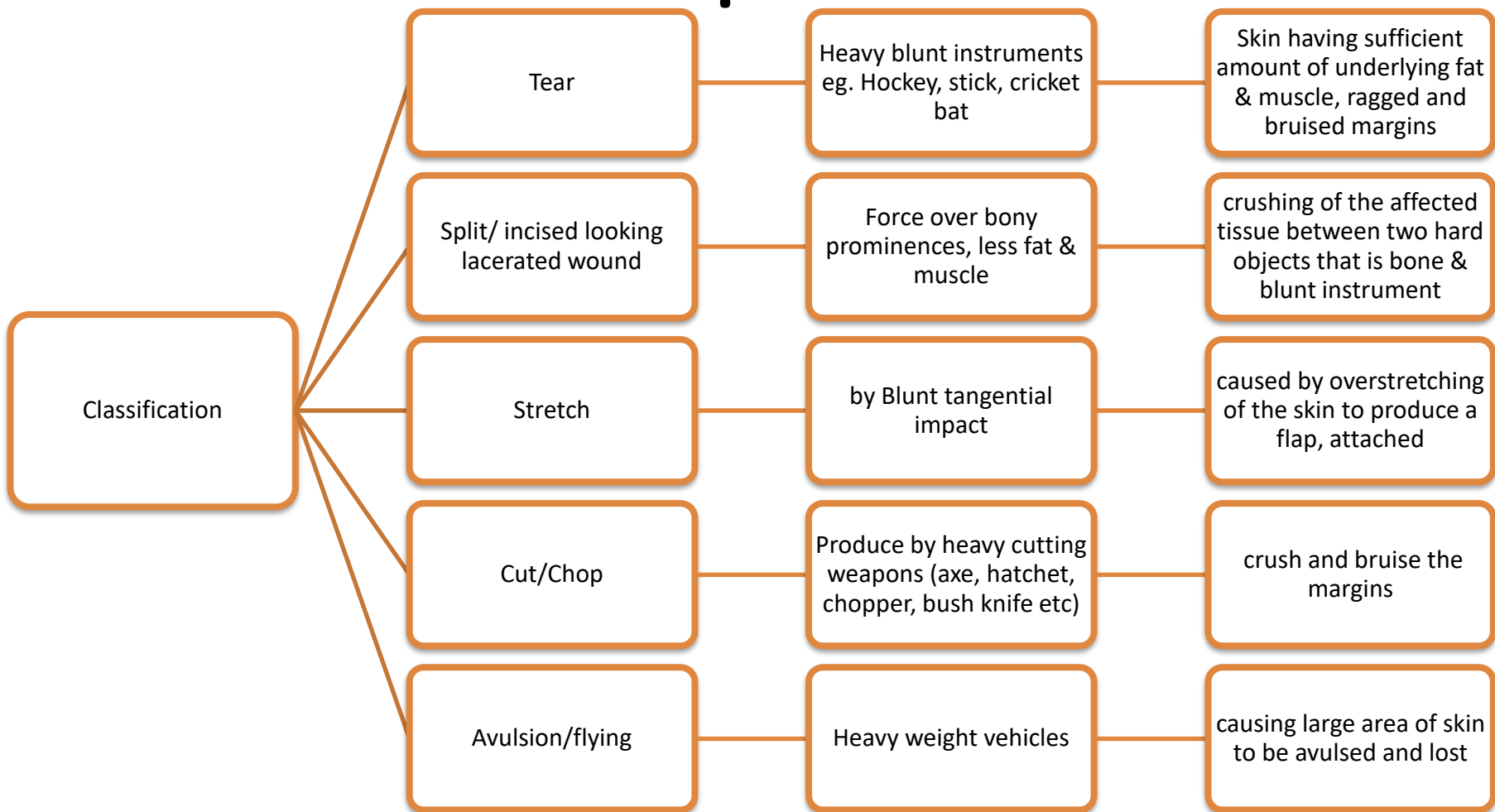
Pattern Bruise

LACERATION

- ❑ A laceration is a rupture or tear or a split in the skin, mucous membrane, muscle, any internal organ or underlying tissues as a result of application of blunt force
- ❑ **CAUSATIVE WEAPON:** Blows with club, stones, bricks, punch, kicks, iron bars.
- ❑ Besides blows from blunt objects lacerations are also caused by:
 - Fall on hard surfaces
 - Machinery
 - Traffic accidents
- ❑ Hemorrhage less in laceration

Diagnostic Features

- Margins - frequently abraded, irregular, ragged.
- Edges - irregular, ragged, inverted, swollen, bruised.
- Angles - torn, irregular.
- Depth (base) - uneven, non uniform depth, strand of tissue found, bridging/ crossing over at the varying depths indicate blunt force used.
- Hairs bulbs - crushed.
- B. Vessels - crushed.
- Skin - flapping.
- Foreign material usually found



Incised vs. Incised looking lacerated wound

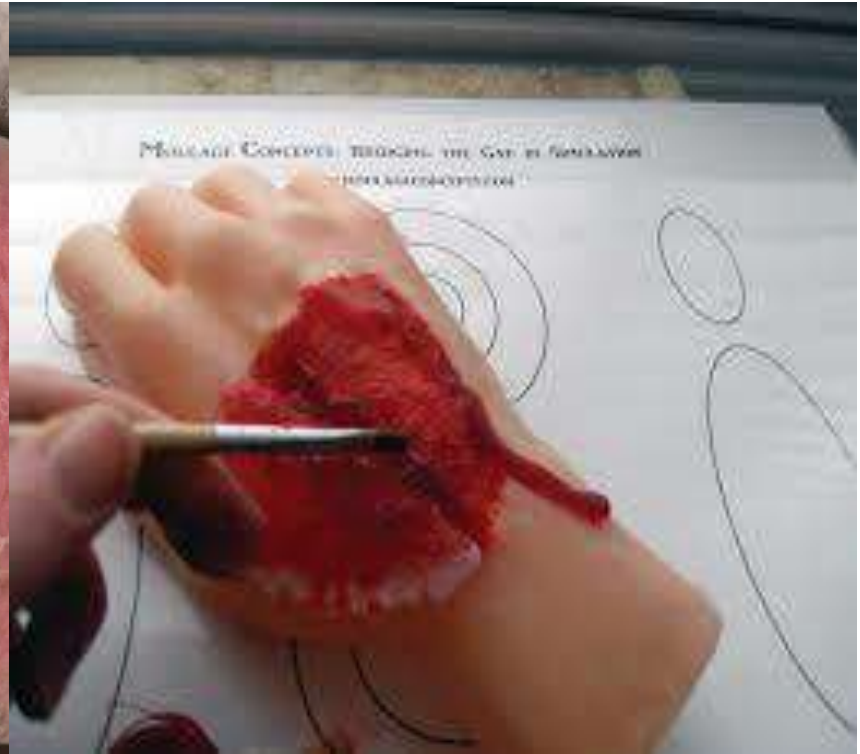
Criteria	Incised	Incised looking lacerated
Margins	Clean cut	Ragged and bruised
Edges	No/minimal bruising	Heavily bruised
Blood vessels	Clean cut	crushed
Tissues at the base	Muscles and nerves clean cut	Continuity observed
Hair	Clean cut	crushed

True incised vs. True lacerated

Criteria	True incised	True lacerated
Edges	Clean cut	Ragged
Margins	Bruising absent	Bruised
Injuries to BV and tissues	Clean cut	crushed
Hair	Clean cut	crushed
Bleeding	More	less

Medico-Legal Importance

- Abrasions, bruise and laceration found together
- Manner of production
- Shape & size – may not correspond to the weapon used
- ❖ Linear – long thin object
- ❖ Irregular or Y shaped – object with flat surface
- ❖ Curved – convexity to the direction of force
- ❖ Stellate – blunt round object
- ❖ Crescentic – blunt object with edge
- ❖ Semi-circular – head against hard object
- ❖ Patterned laceration
- ❖ Swallow tail at one end – tearing at an angle



Lacerated Wounds

Incised wound

❑ An incised wound (cut, slash, slice) is an open wound resulting from a cut or an incision in the skin or underlying tissues, caused by a weapon with sharp cutting edge when it is drawn across the skin.

❑ Causative weapons:

- **Light cutting weapons** - knives, razor, blades, scissors, broken glass peaces
- **Heavy cutting weapons** - daggers, swords, axe chopper

❑ Characteristics –

- ❖ Length – greatest dimension, no relation with weapon
- ❖ Width - may be greater than edge of weapon due to –
 - Retraction of tissue
 - Shaking of blade
- ❖ Margins - clean cut, well defined, everted
- ❖ Shape - usually spindle shape, depends on weapon
- ❖ Directions – deep at beginning, shallow at end (**tailing**)
- ❖ Beveling cut – weapon applied at angle
- ❖ Hemorrhage – more b/c vessels clean cut, spurting on arterial cut

❑ **Suicidal:** found on certain elective sites

- Sides + Front of neck
- Front of wrist (Radial Artery).
- Front of thigh (Femoral).
- Front of chest (Heart).

❑ **Feature:**

- Multiple,
- Super-imposed,
- Parallel of Varying depth
- Found on Opposite side of the working,
- Hesitation or Tentative cuts

Hesitation cuts or tentative cuts

- It refers to the preliminary cuts made by a person intending to commit suicide by a cutting instrument before gathering a sufficient courage to make a final deep incision
- These are generally small, multiple superficial cuts found at the commencement of incised wound & merging with the main incision.

Suicidal cut throat vs. homicidal cut throat

Features	S cut throat	H cut throat
Place	segregated lonely	Not necessary
Scene	Undisturbed	Disturbed
Selection of weapon	Light, sharp edge	Heavy with sharp edge
Presence of weapon at the scene	Present	Usually absent
Clothes	Orderly. Blood stained on anterior portions of clothes.	Deranges suggesting scuffle. Blood stained on back of neck
Farwell letters	Mostly present	Absent. If present, compare hand writing
Personality trait	Depressed	Normal.

Cadaveric spasm	HANDS CLENCHED holding INSTRUMENT	Hands may be clenched, contains belonging of the assailant
Defense wounds	Absent.	Present
Distribution of injuries	Confined to certain elective site (neck).	Additional injuries over the body.
Wound complex. Site	Left side of neck in right-handed person or vice versa.	Both side & mid line
Level	Higher level above the thyroid cartilage.	Lower level below the thyroid cartilage
Tentative cuts	Present at the commencement	Nil.
Direction of wound	Obliquely down wards & medially	Transverse, upwards & laterally
Depth of wound	Gradual deepening, shallowing with tailing.	Bold deep cut without tailing



Incised Wound



Hesitation Cuts

Chop wounds

- Chop wounds are deep gaping wounds caused with sharp splitting edge of heavy weapon like axe, sword, meat cleaver
- Margins moderately sharp with abrasions and bruises
- Destruction of underlying tissue and organs
- Depth may be same throughout
- Head, face, neck, shoulders and extremities are most attacked area
- Injuries to underlying bones
- Majority homicidal in nature

Stab wound

- ❑ It is the wound caused by a sharp pointed weapon driven in the body or body is pressed or fall against instrument, the depth of wound being the greatest dimension
- ❑ Weapons such as an arrow, dagger, knife, nail, needle, screw driver, spear etc.
- ❑ **Puncture wound** - when a weapon enters into the tissues or muscle and terminate, no exit wound
- ❑ **Penetrating wound** - when a weapon enters into the body cavity and terminate, no exit wound
- ❑ **Perforating wound** - when a weapon enters into the body (or cavity) and exit (large, inverted & small, everted margins respectively)

□ Characteristics –

- **Length** - may correspond to width of weapon
- **Width** - may correspond to thickness of weapon
- **Depth** – may be less, equal or more than corresponding length of weapon, greatest dimension
- **Margins** –
 - Sharp edged weapon – clean cut margins – incised stab wound
 - Rounded edges weapon – contuse & lacerated margins – lacerated stab wound

WEAPON	SHAPE OF WOUND
Single sharp edged weapon	Wedge shape
Double sharp edged weapon	Elliptical shape
Rounded pointed	Circular
Pointed square	Cruciate
Double edged blunt	Circular with bruising
Instrument twisted before with drawl	Triangular or cruciate or fish tail injury

Medico-Legal Importance

- Concealed puncture wound indicate homicide
- Depth of wound indicate intensity of force
- Direction and dimension of wound indicate relative position of assailant an victim
- Manner of production can be estimated
- Multiplicity of wound
- Shape of wound
- Time of attack

- **Hara – kiri** is a suicidal stab wound on abdomen used for one time capital punishment.
- The victim inflicts a single large wound on the abdomen with a tanto or wakizashi, while in sitting position or falls forward upon it, and pulls out intestine
- Excessive bleeding → sudden ↓ed in intra-abdominal pressure → ↓ed cardiac return → sudden cardiac collapse → death

- **Defense wound** caused as a result of immediate reaction of victim to save himself/herself from the attacking weapon either by raising the arm or by grasping the weapon.
- Indicate homicide, Victim was alive & conscious

Weapon	Type	Location	
		Active Defense wound	Passive Defense wound
Blunt	Abrasion/ bruise/laceration	Palm of hand, forearm	Dorsum of hand, Ulnar border of forearm
sharp edged	incised wound	Palm of hand, forearm	Dorsum of hand, Ulnar border of forearm

Fabricated (self-inflicted) injury

- ❑ The wound inflicted on the body, by the person himself or by another to misguide the investigators with some malafied intentions
- ❑ Motives:
 - To bring a charge against a person or to implicate an innocent person in false charge
 - To accuse police of maltreatment during custody
 - Murdered misguiding the investigators that killing was in self defense
 - Falls charge of rape
 - To make a simple injury more serious
 - To get leave from service

❑ **Elective sites:** Accessible/non vital areas, Top of head/fore head, outer side of left arm, Front of left forearm, front of chest/abdomen, front & outer part of thigh

❑ **Weapons used:** Sharp edge light cutting weapon, Chemicals, {Blunt weapons, Fire arms (shot gun) – rarely}

❑ **The wound:**

- Superficial, multiple, made half heartedly.
- Seen on accessible, non-vital less functioning areas.
- Caused by light, cutting instruments.
- Shot guns are used.
- Cartridge discharging small pellets is used.
- Wound may be incised & pellets are kept manually.
- After x-ray (certificate) they are removed

Sources and suggested reading:

- Textbook of Forensic Medicine and Toxicology, Anil Aggrawal, APC publication
- Review of Forensic Medicine and Toxicology, Gautam Biswas, JAYPEE publication
- The Essentials of Forensic Medicine and Toxicology, Dr. K S Narayan Reddy and Dr. O P Murthy, The Health Science Publisher
- Textbook of Forensic Medicine and Toxicology, P C Dikshit, PEEPEE publications
- Research papers
- Google images
- E-PG Pathshala/inflibnet

A photograph of a cream-colored sticky note with the words "Thank You" printed in a large, bold, black serif font. The note is placed on a light-colored wooden surface with vertical grain. A black fountain pen with gold-colored accents is positioned diagonally to the right of the note.

**Thank
You**