REGIONAL INJURIES

Dr. Anu Singh

ROAD TRAFFIC ACCIDENTS

In road traffic accidents , injuries may be sustained to:

1. Pedestrian
2. Cyclist/ motorcyclist
3. Occupants of a vehicle

Injuries to pedestrian:

- A pedestrian may sustain following types of injuries , this mechanism of injury is called as **Waddle's triad.**

1. **Primary impact injuries.**
2. **Secondary impact injuries**
3. **Secondary injuries.**

1.Primary impact injuries:

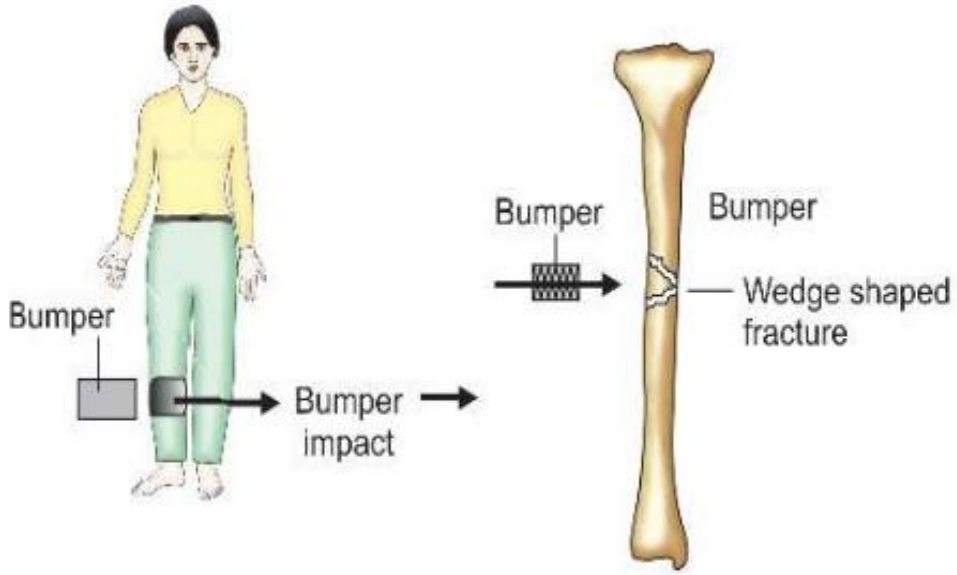
- These are injuries caused by vehicle when it first struck or hit the person (pedestrian).
- The importance of primary impact injury is that the body of victim may bear design / pattern of vehicle in form of imprint abrasion or patterned bruise.
- Common part of vehicle which may struck or hit a person includes:

1. Bumper
2. Wing
3. Grill
4. Headlight
5. Fender
6. Radiator
7. Door handle

The body part which bears the injury depends upon the position of person such as:

1. Was the pedestrian struck by front of car / vehicle?
2. Was the pedestrian struck by side of car / vehicle?
3. Was the pedestrian standing on the road ?
4. Was the pedestrian walking on road?
5. Was the pedestrian lying on road ?

- If the victim is struck by front of the vehicle them the person may sustain bumper injuries on legs .
- The injury comprises of damage to skin & fracture of bone **(Bumper fracture).**
- Bumper fracture usually involves **tibia.**
- **The fracture is wedge shaped with base of triangular fragment indicating the site of impact and apex pointing the direction of vehicle.**



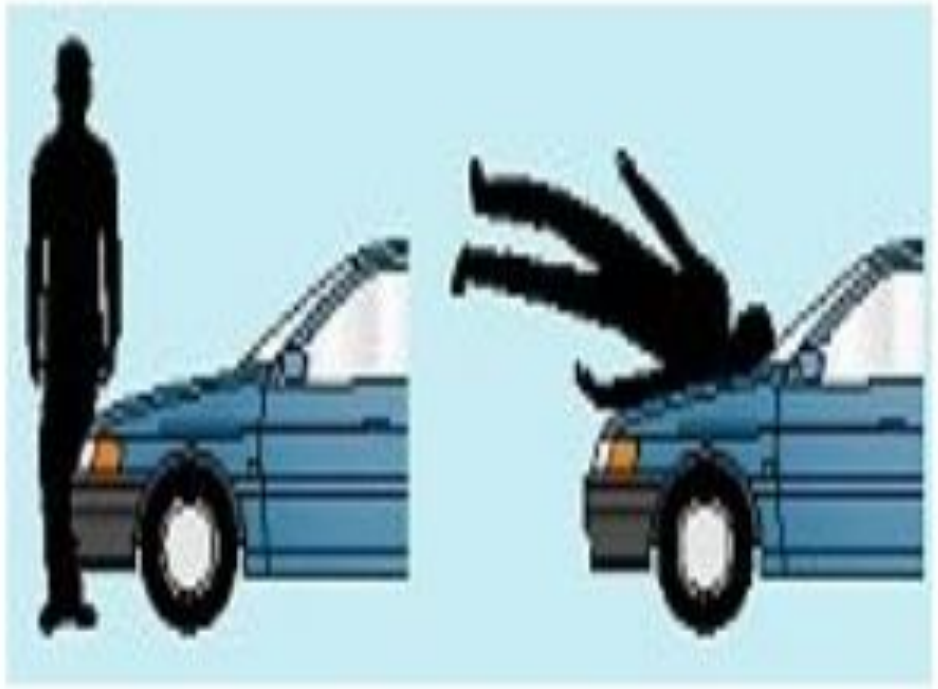
Bumper injuries:

1. If bumper injuries are at different levels on the two legs or absent on one leg , it indicates that the person was **walking or running when hit by car / vehicle.**
2. If bumper injuries are at same level on both legs , it indicates that the person was **standing**.
3. The level of bumper injury varies with the height of bumper of different vehicle , it means that the offending vehicle can be identified.

- Similarly grill and head light rims , radiator may produce pattern injuries.
- The findings of primary impact injury are important to find out the relative position of pedestrian and vehicle & kind of vehicle involved in the incident .

2. Secondary impact injuries:

- After sustaining primary impact injury , the person may be lifted off the ground and thrown on the vehicle . Thus these secondary impact injuries are resulted from the impact of body of a person and the vehicle for a second time .
- Here the person may strike to windshield or bonnet or placed on top of car/ vehicle.
- After the second impact injuries , the victim will be thrown on ground .



3.Secondary Injuries:

- These are injuries that occur after secondary impact injuries when the victim is thrown off the vehicle on the ground .
- Thus , these are injuries that are sustained by a person when falls on the ground.
- Here , the victim sustains secondary injuries from the ground . **Head injury is more common** though injuries to other part may occur.
- Sometime, the victim may be runover by the same vehicle or another vehicle.

Bumper impact → Primary impact injury

Hood and Windscreen impact → Secondary impact injuries

Ground impact → Secondary injuries

Injuries sustained by motorcyclist

- Injuries sustained by motorcyclist are much more serious than car travelers because:

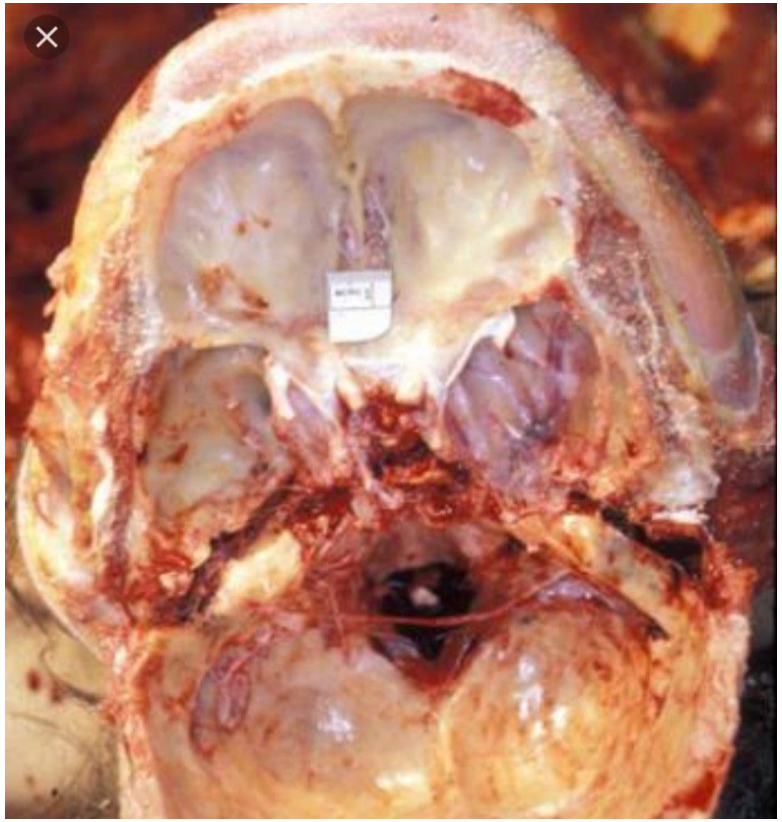
1. Inherent instability of two wheeler.
2. Unprotected and lack of protective gear.
3. Rash and negligent driving

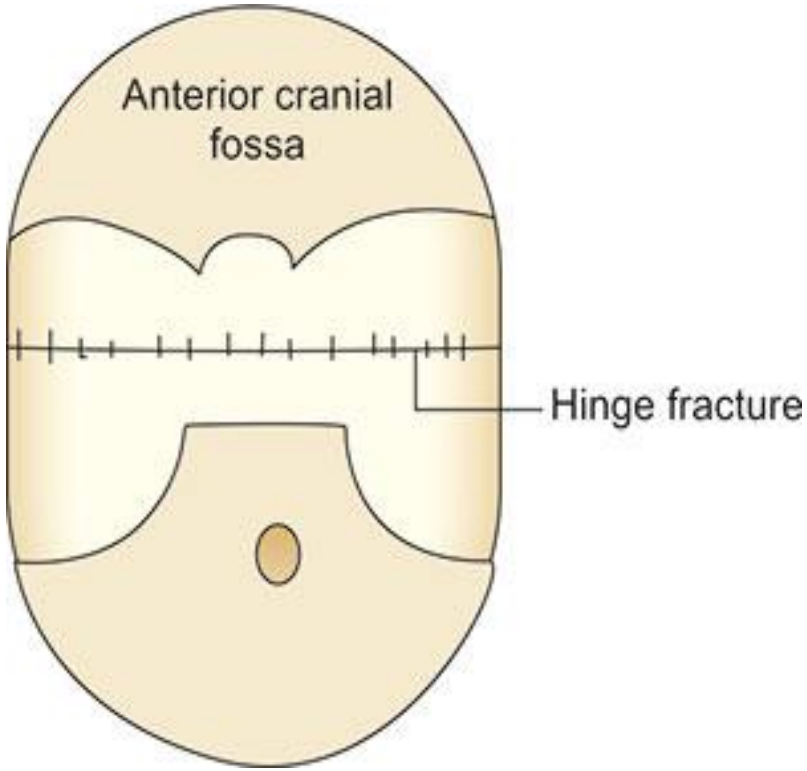
Any part of body may sustain injury but two regions are more affected and are:

1. **Head** : injury sustained to head is common in motorcyclist followed by **thoracic and abdominal region** . Fall on road surface and sustaining injury to lateral part with fracture of temporo-parietal bone is more common.
2. **Fracture occurring in skull** of motorcyclist can be summarized as :

- Fall on side with side impact to head causes basal skull fractures especially hinge types (also called as **Motorcyclist fracture**).
- Impact on face causes : **fracture of facial skeleton**.
- Impact on forehead : **sagittal fracture of base of skull .**
- Impact on chin : **Mandibular fracture**
- Impact on crown of head by fall may cause : **ring fracture.**

Motorcyclist fracture:





- Legs : are often injured in primary impact I.e dash with other vehicle or fixed structure or the leg may be trapped in the motorcycle frame.
- In non-fatal injuries, this is frequently injured part of body.

➢ **Tail getting or Under running :**

Rarely seen in motorcyclist & in this condition motorcyclist drives his two wheeler into the back of a truck or some other heavy vehicle . This occurs due to sudden and unexpected stoppage of the truck .

In such accidents , head and shoulder of motorcycle rider are smashed against the tail board of truck .

In extreme cases , there may be decapitation.

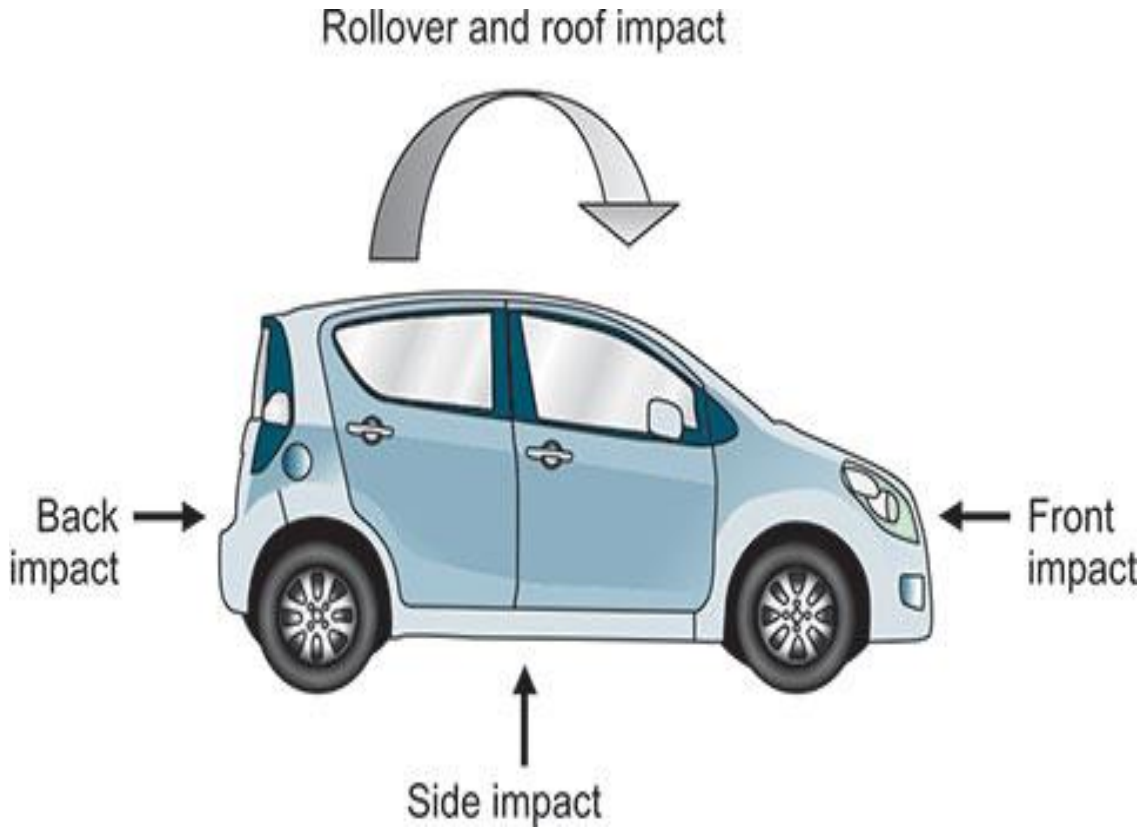
Injuries sustained to occupant of vehicle:

- In vehicular accidents cases, the occupants of vehicle may sustain different patterns of injury according to the position of the occupant . The occupant of car can be divided into :

1. Driver
2. Front seat passenger
3. Rear seat passengers

In collisions , a vehicle may sustain following sort of impact :

- Front impact
- Back impact
- Side impact
- Rollover and roof impact

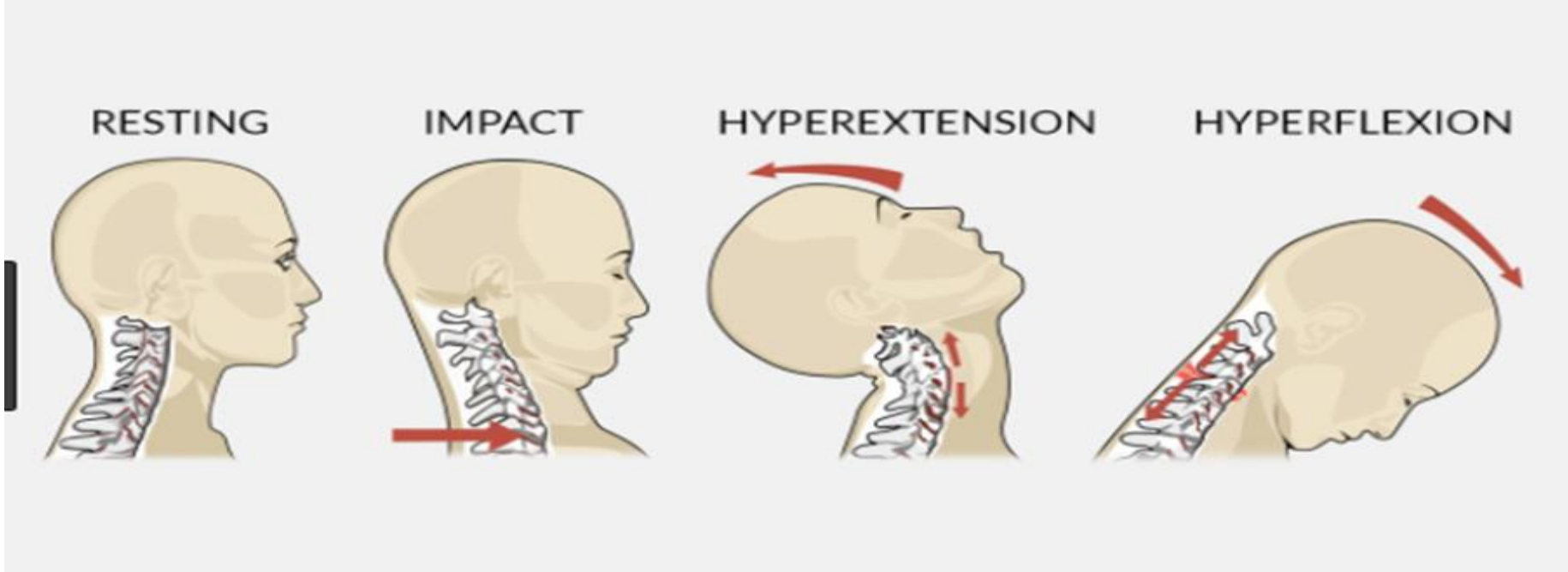


Front Impact (Injuries sustained to occupant without seat belt or protected air bags)

- When a car collide with other vehicle or stationary object , there is deceleration of car. Initially ,the force is transmitted through the lower limbs of the driver from foot to hip .
- Transmission of energy will strain the lower limb as its weakest point & that weak point could be ankle ,knee, femur or hip.
- The hip is considered as the weakest part of the lower limb .
- The flexed knee may also hit the dashboard and the energy can be transmitted through the femur upwards or through the tibia downwards .

- After this the unrestrained (without seatbelt) driver may slide forwards and his legs strikes the fascia / parcel shelf/ dashboard area, his abdomen or lower chest strikes the steering wheel . The head flexes and strikes the windscreen or windscreen rim or side pillar .
- At times , the windscreen may perforate or break and ejects out the driver from the car over bonnet or on the ground . Also it may happen , the door gets open and driver ejects out through open door . The driver and passengers sustains polytrauma and injuries over head commonly .

- **Impact over leg** causes: abrasion , laceration and fracture .
- **Impact over abdomen or lower chest** : steering wheel and internal injury : rupture of liver , spleen , fracture sternum ribs , cardiac contusion , hemothroax etc.
- **Injury to spine** : fracture in cervical region so called **Whiplash injury .**
- **Face** may sustain injury due to windscreen . When injury occurs the glass brokes and shatter into small cubes , these glass cubes may cause "V" shaped lacerations. These are called as **dicing injuries or sparrow foot lacerations.**

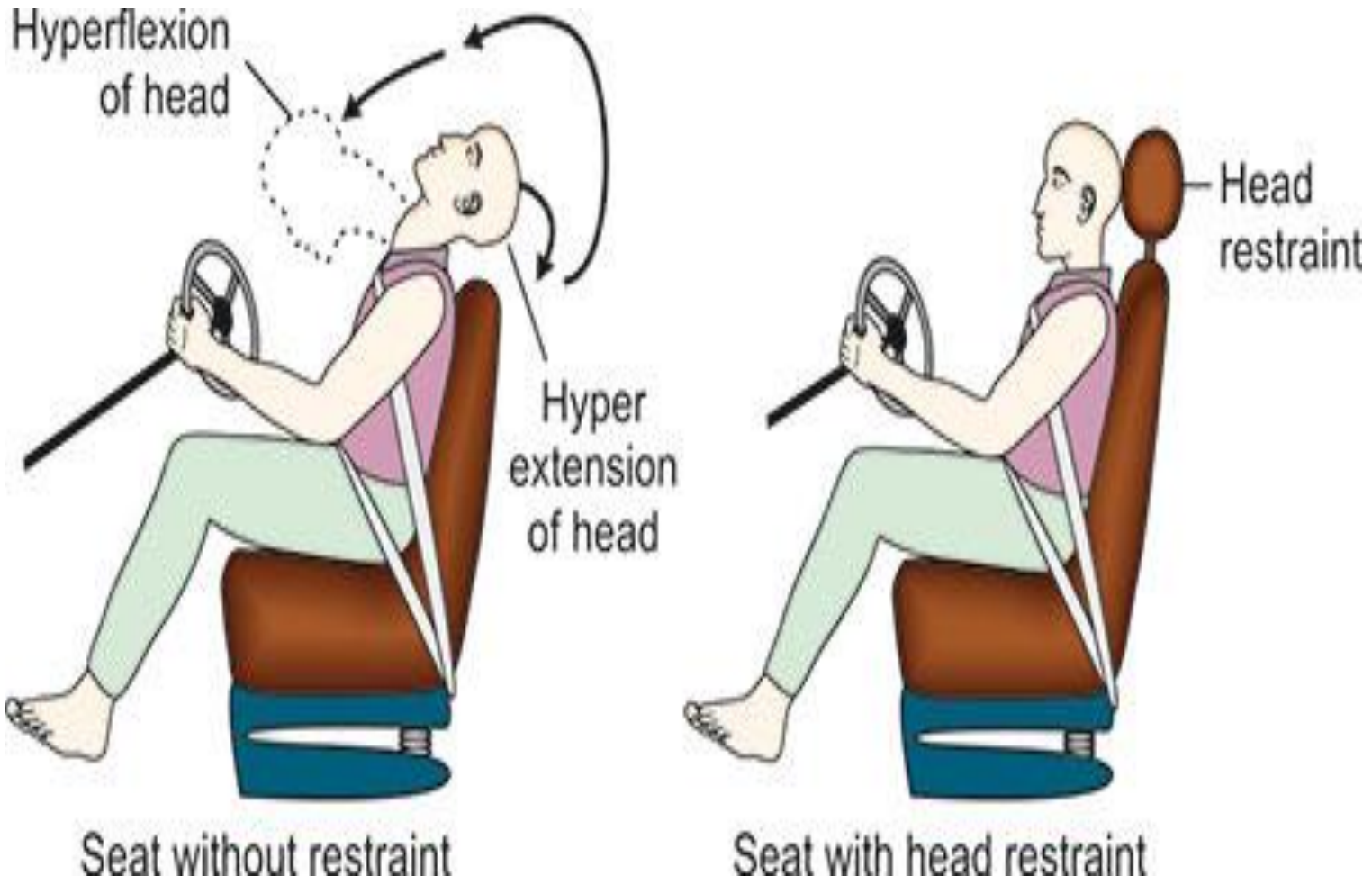


Dicing injury or sparrow foot lacertions

Steering wheel impact

Back impact :

- If a car is hit from backside , the accelerates and may lead to hyperextension of head.
- If the driver is restrained , then the hyperextended head strikes the back of seat and causes rebound flexion of head , such movement is called **WHIPLASH** , causing whiplash injury .
- Such injuries are more common where seat do not have head restraint.
- Presence of head restraints prevents hyperextension and hyperflexion of head . It also prevents collision between front and back seat passengers.


Hyperflexion of head
Hyper extension of head
Head restraint
Seat without restraint
Seat with head restraint

Seat Belt injuries :

- Though seat belts prevent injuries and reduce death rate , however at times cause injuries.
- Following are types of seat belts :

1. Lap strap type
2. Shoulder diagonal type
3. Diagonal plus lap strap
4. Shoulder harness

A

B

C

D

- Seat belt injuries may be simple or fatal .
- Contusion due to seat belt is common & may occur over chest and abdomen.
- If single lap strap type belt are worn : cause **rupture of mesentery** or intestine .
- Bladder can be ruptured.
- Aorta : compressed due to active flexion over lap type strap or belt.
- Lumbar spine : compression type fracture.

Passenger injuries :

- **Dashboard injury :** patella# , distal end of femur#.
- **Steering injury :** sternum, rib# , aorta tear – transverse - Ladder pattern tear .
- **Windshield injury :** Sparrow feet mark on face .
- **Whiplash injury :** Injury to spinal cord (lower cervical segment).
- **Airbag injury :** Facial bruising , # of arm
- **Seat belt injury :** m/c site : mesentry

AIRCRAFT INJURIES

- Most aircraft accidents occur on landing and takeoff .

- The sudden deceleration on crashing causes breakup of the aircraft and injuries to the occupants .

- **Crash accidents**
- **Flight accidents**

Crash accident

- Fracture of spine especially thoracic spine ar vey common .
- These are hyperflexion injuries .
- The forward momentum throws the head on the back of front seat causing facialinjuries.
- **Fracture of base of skull :** especially ring fracture.
- **Fracture of lower legs** due to seat displacement is typical of the landing time accident .
- **Fracture of femur and internal injuries** : due to vertical decceleration : indicate deep stall type of accident.
- Intrathoracic injuries.
- Rupture of liver, spleen , kidney & abdominal aorta .
- Death may be due to : burning or CO poisoning.

Flight Accidents :

- If door or window breaks , cabin pressure falls and anoxia may produce death.
- Injuries varies from total disintegraion of body to relatively minor injuries.
- When a plane breaks up at high altitude , fragmented bodies may be distributed over wide area.

Autopsy :

- Preservation of blood speciemens from all casualties for COHb and alcohol estimation and lactic acid estimation .
- **Brain lactic acid levels exceeding 200mg% indicate hypoxia.**
- Collection of urine , bile viscera: detection of any poison.

RAILWAY INJURIES

Mode of injury :

- Suicidal
- Accidental

Suicidal

Accidental

FALL FROM THE HEIGHT

Factors influencing the pattern of injury :

1. Height
2. Orientation of body at point impact
3. Surface impact.
4. Deecleration

- Most common fracture : **calcaneum fracture**
- **< 5 storeys :** Calcaneum fracture , lumbar fracture.
- **> 5 storeys :** calcaneum fracture , ring fracture , cervical vertebrae fracture.

Q1:Which of the following fracture result commonly due to falling from height ?

a) Ring fracture
b) Hinge fracture
c) Spider web fracture
d) Pond fracture

Q2: Name the type of skull fracture?

a) Depressed fracture
b) Hinge fracture
c) Pond fracture
d) Comminuted fracture

Q3:Spinal injuries are immediately fatal if fracture occurs above the level of which cervical vertebrae:

a) 7

b) 6

c) 5

d) 4

Q4: Regarding cervical spine injury , which of the following is true:

a) Hyperextension injury is more dangerous than hyperflexion injury .
b) Hyperflexion injury is more dangerous than hyperextension injury.
c) Both are likely to cause the same level of damage to the cervical spine.
d) Cervical spine is the least commonly injured part of spinal cord.

Q5:Most commonly injured part of the spinal cord:

a) Lumbar spine
b) Cervical spine
c) Thoracic spine
d) Sacral spine

Q6:Ladder run tears of the aorta are seen in?

a) Decleration trauma
b) Acceleration trauma
c) Rotational stress
d) Compressive force

Q7: A pedestrian is hit by a car , hurled up on the windshield , following which his head strikes the road . The latter is an example of?

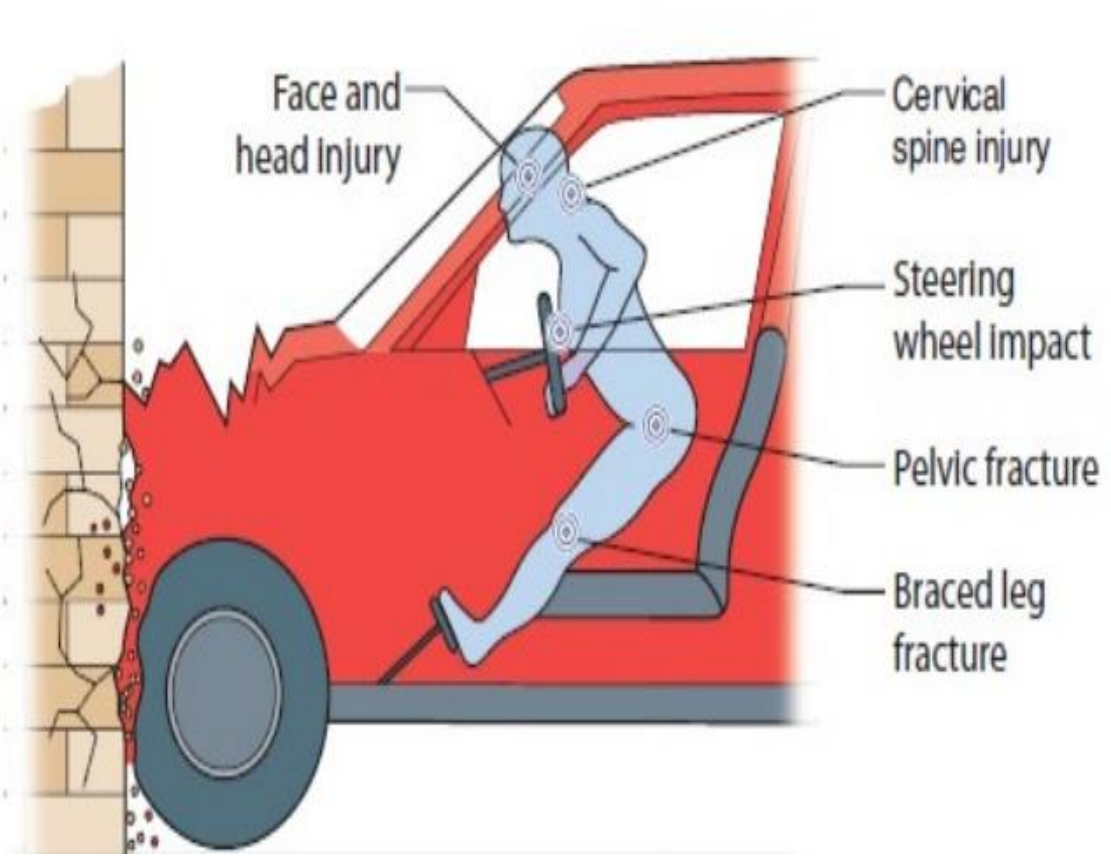
a) Primary impact injury
b) Secondary impact injury
c) Secondary injury
d) Quaternary impact injury

Q8: In road traffic accident , the shattered windshield glass produces:

a) Sparrow foot marks
b) Crow's feet sign
c) Bird's feet sign
d) All of the above

Q9:Which of the following is not a major point of injury to the unrestrained driver of a vehicle in a deceleration impact ?

a) Lumbar spine injury
b) Cervical spine injury
c) Pelvic fracture
d) Leg fracture



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