TRAFFIC INJURIES

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I. ROAD TRAFFIC ACCIDENTS

- pattern of injuries, fatal and otherwise varies, depending upon wheter the victim is a vehicle occupant, a motocyclist, a cyclist or a pedestrian and other circumstances (see further)

A) PEDESTRIANS

- most common road fatalities

A/ knocked down - either projected forward/sideways or scooped-up
B/ ran over

Injuries:

- **primary** – due to impact of the vehicle

- **secondary** – due to striking the ground or other object after being knocked down, **more often lethal** than the primary injuries


LOOK TWICE SAVE A LIFE
PEDESTRIANS ARE EVERYWHERE!

- **the front bumper** usually strikes first, hitting the victim at or just bellow knee level – typical **fractures of shin bones (tibia, fibula) – „bumper fractures“**

- **further primary injury** is often to the thigh or hip **caused by radiator grille, lamps or bonnet striking the body**

- if the vehicle is large (a bus or a truck) => the primary injuries may be at a higher parts of body – chest, arms head

- **importancy of describing the „level“ of the injury** (distance from heels of the victim)

- pedestrian is usually **knocked down** by front bumper (fender) or front corner of the vehicle

  => the victim may be **projected forward** or sideways

1/ at **low speeds** (up to 20 kph) – the body can be thrown violently away (causing primary injuries, possibly fatal even at 10kph)

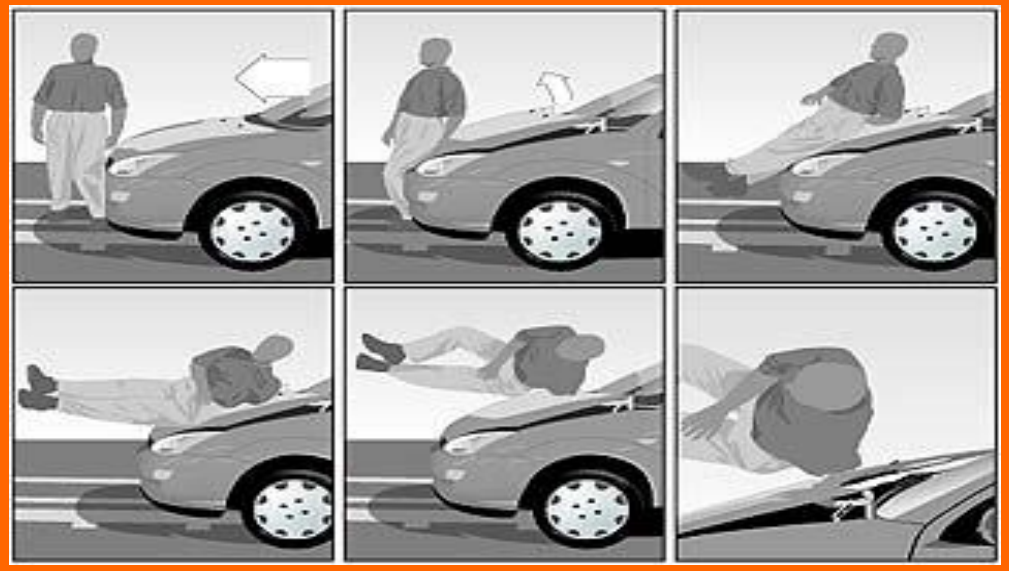
2/ at **higher speeds** (eg. 60-100 kph) the body may be flung out in the air and come flying a considerable distance before striking the ground or other objects

  => **secondary injuries occur due to striking the ground or other objects**

Scooping-up

- when shins of the victim are hit and the body is hurled up onto the bonnet

- victim is thrown violently onto the bonnet and may suffer further primary injuries by **striking the head against the windscreen, its rim or side-pillars** and may even be thrown into the car



- at high speed => scooped-up pedestrian may come flying above the roof of the car and strike the ground/road behind the vehicle

Injuries

* **lower limbs – very common**
* **head/nape**
* **spine/spinal cord**
* **chest** (esp. to descending thoracic aorta)
* **abdomen** (esp. to the liver, spleen and mesentery)
* **upper limbs**

- abrasions, lacerations, haematomas, fractures, ruptures of organs, crushing of muscles, décollement (flaying injury) …
- blunt trauma

Running-over

- injuries occur due to **wheel(s) running over the body**

- injuries **to the head, chest, pelvis or abdomen** due to gross distortion – ruptures of internal organs and gross fractures of the skull, ribs, sternum, pelvis and spine are common …

- **flaying injury** - where the wheel rotates against a body on the ground => large area of the skin and subcutaneous tissue may be ripped of – leg,arm or scalp

- **pattern imprints** of different parts of the vehicle in intradermal bruising eg. **tyre marks** – abrasions or intradermal bruising may occur on the skin

- paint fragments in lacerations, abrasions …

- **hit-and-run accidents** – pattern of injuries may help to identify the type of the vehicle

B) CAR OCCUPANTS

- the driver, the front-seat passenger, rear-seats occupants

1/ most of car crashes are **frontal – car rapidly stops** (eg. hitting immovable structure, another vehicle)**,** causing severe **deceleration** of vehicle and its occupants

2/ less common - the vehicle is hit **from behind (rear impact)**, causing **acceleration** of vehicle and its occupants

3/ **side-impacts**

4/ "**roll-overs**"

- in any vehicle …car, light van, truck, bus (severity of injuries varies)
- pattern of injuries varies according to the position of the occupant, restraining by seatbelts, airbags, velocity etc.

In typical „violent deceleration“ in frontal crashes:

1/ **front-seat occupants**, esp. if unrestrained by seat-belts in a car without the airbags:

- the **face and head** hit the windscreen glass or side-pillars – facial lacerations from a shattered windscreen – „sparrow foot“ marks

  - the occupant may smash the glass with his head and may be **ejected out** of the vehicle (secondary injuries due to hitting the ground/object)

- the **chest** may be crushed against the dashboard or steering wheel => rib, sternal, lung, heart and liver damage (contusion, laceration…)

- the **knees** may be injured or fractured, striking the dashboard

- the **legs**, esp. those of the driver (who is pressing the pedals) may be fractured by transmitted stress – this can also dislocate the hip and fracture the pelvis

- hyperflexion and hyperextension injury to the **cervical and thoracic spine** often occurs

- complete or partial **tear of the thoracic aorta** at the termination of descending part of its arch is common

- a front seat passenger often suffers worse injuries than the driver, as they are less prepared for the impact than the driver

2/ **rear-seat passengers** are also liable to injury, but not so sever as those in the front

- if unrestrained by seatbelts, they may be **thrown against the backs of the front seats**, or against the front-seat occupants and - projected over them - to hit the windscreen and thrown out through the glass

- also they may be injured against any internal fittings of the car

- the doors often burst open and the occupants may be **ejected onto the road** and suffer severe or fatal (secondary) injuries, including the “running-over” injuries caused by other vehicles

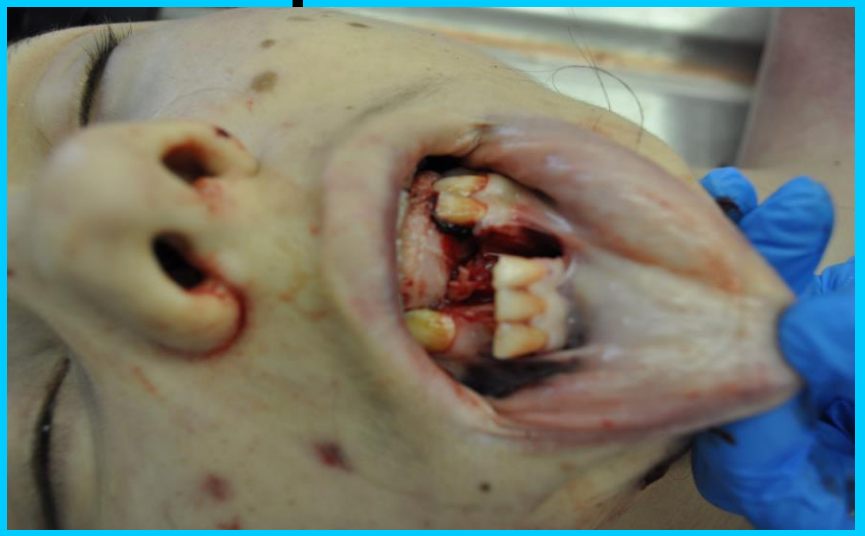
- **airbags** are very good protective system, **seatbelts** should be used (significantly reduced G forces)
- in Czech republic – belting is mandatory

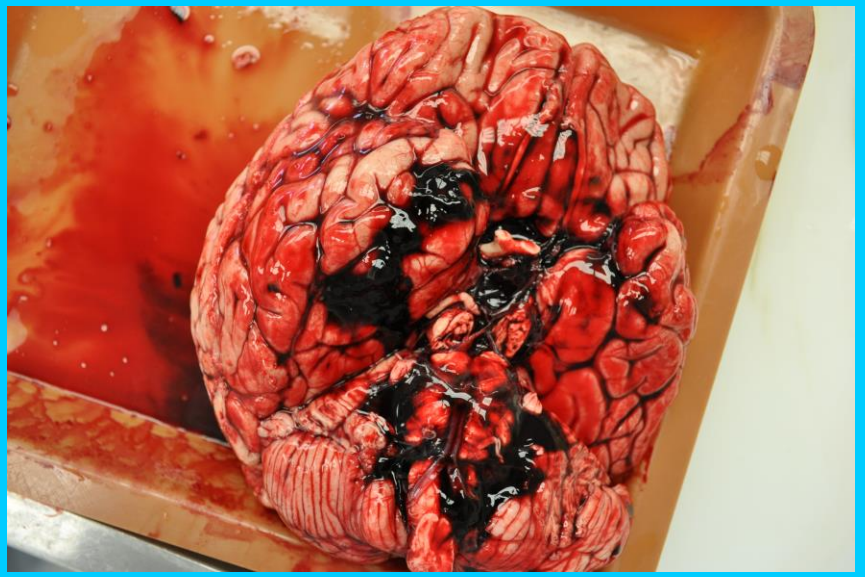
- if the occupants are unrestrained and airbags inflate => severe damage of the cervical spine and spinal cord, facial bones fractures


Force distributed
over large area.


27 10:10 AM

Front-seat occupant





C) MOTOR CYCLE AND BICYCLE INJURIES

- most injuries to **motor cyclists** are due to projection from the machine onto the road due to the high speed and instability of two wheeled vehicle

Injuries: head, spine and spinal cord, aorta and legs - very common

- there is relatively good protection of the head and cervical spine by the crash-helmet – but: the **thoracic** part of the spine may be damaged by transmitted forces from violently moving head, usually at T3-T4 level

„tail-gating“ = where the motor cyclist crashes the rear of the truck (slips under the truck) => severe head injuries, even decapitation

BICYCLE INJURIES

- very common, severity is usually smaller due to the low speeds

1/ **primary injuries** – cyclist hit by a vehicle

2/ **secondary injuries –** common, falling from a relatively high riding position

PROTECTION: helmet

II. RAILWAY INJURIES

- relatively **common**

- mostly **accidental**, at crossings or to children playing on the railway, but **many suicidal**

- no specific injuries … high frequency of **very severe mutilation (gross injuries)** – dilaceration, decapitation, traumatic limb amputation etc.

- body is usually soiled by **axle grease and dirt** from the wheels and track

- where passengers fall from a moving train => multiple injuries due to repeated impacts and rolling

- **suicide –** victims usually place their head on a rail

  => then the neck is partially or completely transected – the black soiling at the crushed amputation side is usual

- **railway workers**, especially the shunters, may be fataly injured, being squeezed between the buffers of two trucks

  => usually the chest may be completely crushed, but just **traumatic asphyxia** without rib fractures may occur as well

- electrocution
- tube/metro
- toxicology (alcohol, drugs)