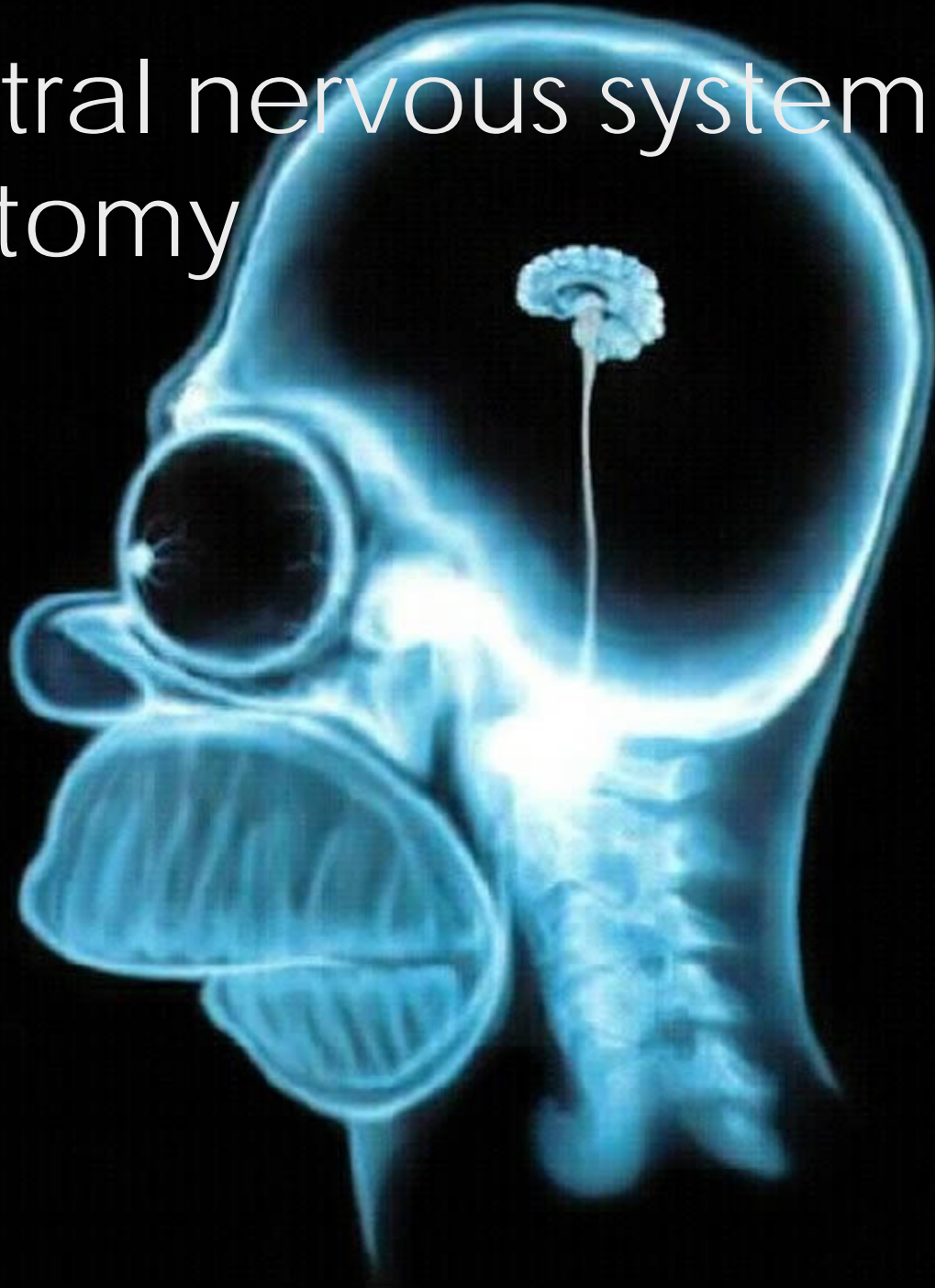




Unconsciousness, head and spine injury

Central nervous system anatomy



CNS

- ▶ Brain + spinal cord
- ▶ Cerebrospinal fluid – bath for CNS, shock absorber, nutrient transporter
- ▶ Brain:
 - ▶ Cerebrum – thought, sensation, voluntary movement
 - ▶ Cerebellum – balance, movement coordinate
 - ▶ Brain stem – basic function (BP regul., breathing)
- ▶ Spinal cord

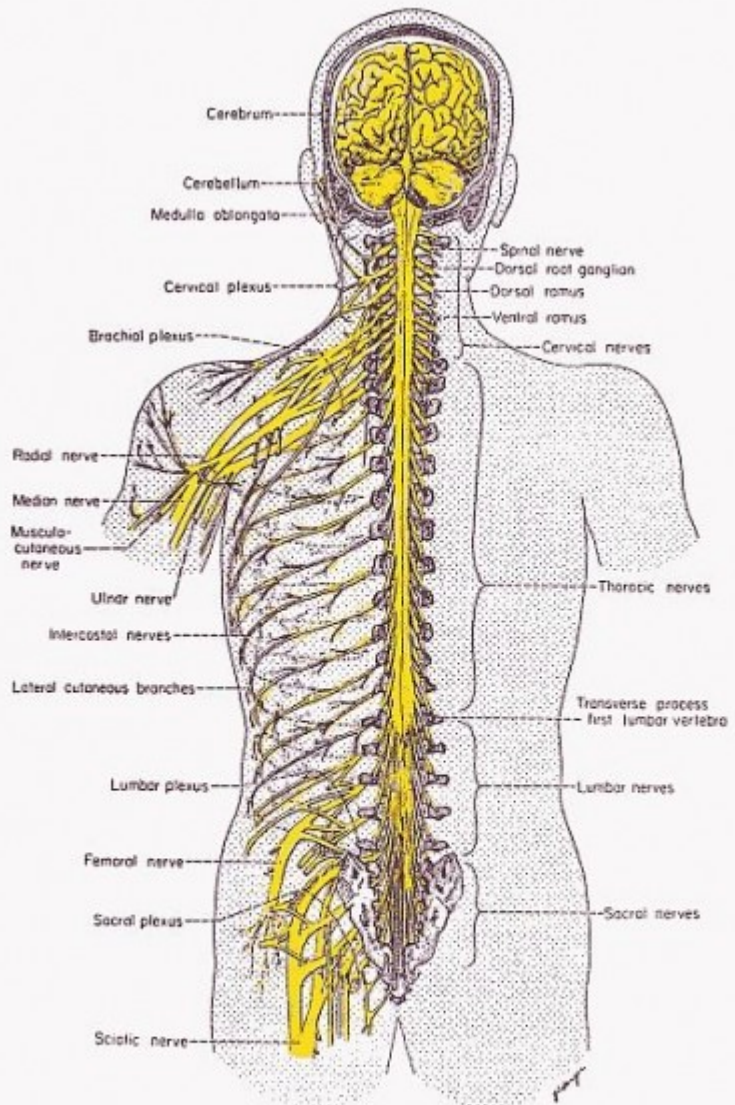
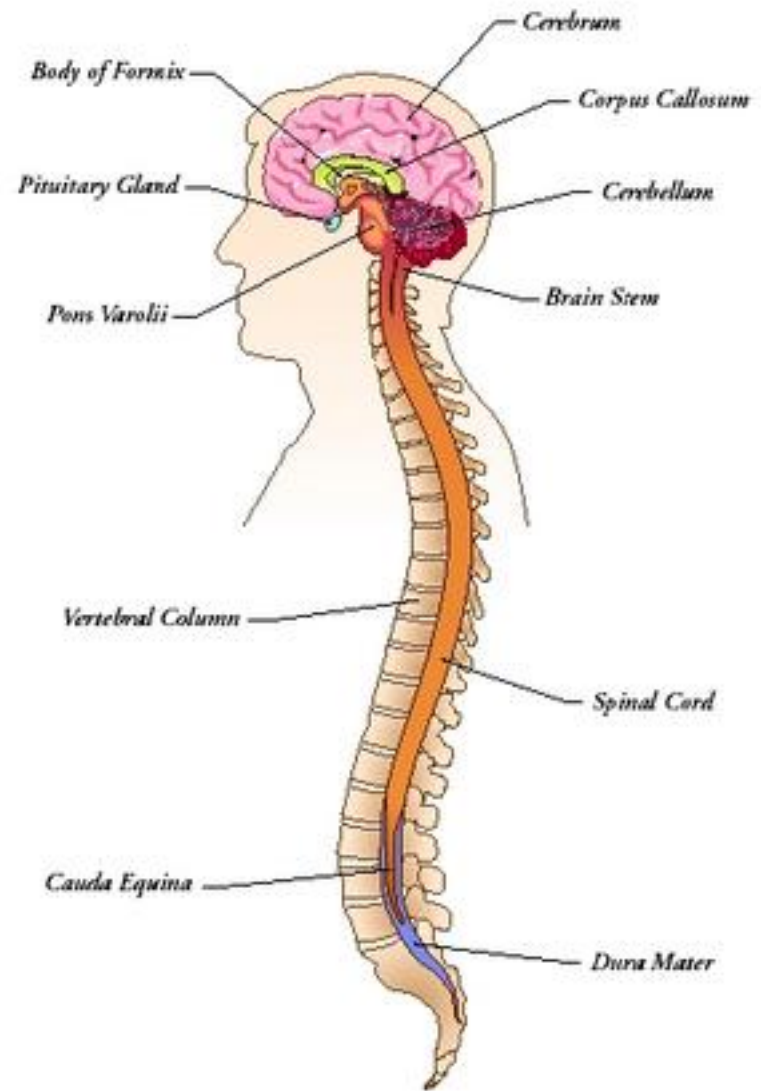


Fig. 2. The human central nervous system, exposed by dissection from the dorsal aspect. Shows the brain, spinal cord and the proximal parts of the spinal nerves.



Impaired consciousness

- ▶ No absolute criteria conscious x unconscious
- ▶ **A**lert – eye open, response
- ▶ **V**oice – response to voice
- ▶ **P**ain- eye opened at painful stimuli
- ▶ **U**nresponsive

Unconsciousness - evaluation

- ▶ Shallow disorder – can be awakened
performs simple tasks, difficult/no verbal
contact, discoordination of motion
- ▶ Deep disorder – no/weak reaction to
pain stimuli
- ▶ Scales – Glasgow Coma Scale GCS

Glasgow coma scale

Glasgow Coma Scale

①

best motor response



none

②



decerebrate

③



decorticate

④



withdraws

⑤



localizes

⑥



obeys

best verbal response



none



incomprehensible



inappropriate



confused



appropriate

eye opening "4 eyes" 



none



to pain



to verbal
command



spontaneous



Remember,
even a toaster
has a GCS of 3!

Coma (loss of consciousness)

Severe cerebral dysfunction,
severe life threatening condition – development of

**airway obstruction,
circulatory disorders**

Coma, loss of consciousness



Causes

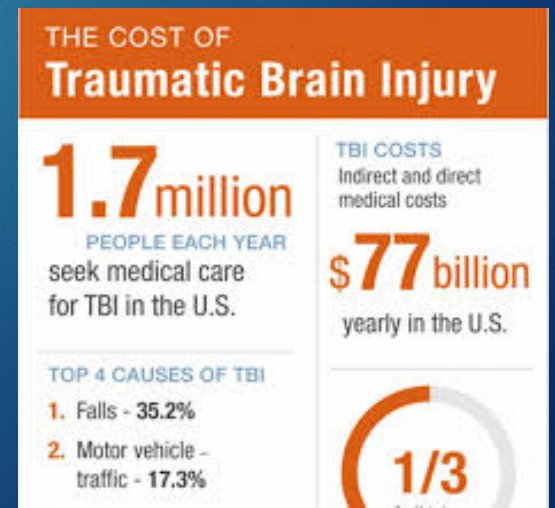
- ▶ **Damage of brain** – trauma, tumor, infection, absces ...
- ▶ **Lack of O₂** – shock, bleeding, stroke, heart attack, poisoning, hypoxia ...
- ▶ **Lack of glucose** – diabetes
- ▶ **Epilepsy**

First Aid

- ▶ Check for **bleeding, chest trauma, stop major blood loss**
- ▶ check for adequate **breathing, head tilt, freeing airway**
- ▶ If no breathing – **Airway Breathing Circulation - CPR**
- ▶ If adequate breathing – **maintain open airway**
- ▶ Do not move the victim if not necessary

Head injuries

- ▶ **Due to:**
 - ▶ violent forces to head
 - ▶ acceleration, deceleration
 - ▶ rapid head movement
- ▶ Large blood loss – intra,extracranially
- ▶ Bone fractures(skull, facial skeletal bones,impressions)
- ▶ Damage of brain tissue



Head injury

- ▶ **Brain damage** – result in impaired consciousness
 - concussion of the brain /commotion/
 - brain contusion
 - brain laceration

Problems :

intracranial bleeding, brain swelling

Signs of serious damage

- ▶ Increasing drowsiness
- ▶ Worsening headache
- ▶ Confusion, strange behaviour, loss of memory
- ▶ Weak arms, legs
- ▶ Visual sensations, visual problems
- ▶ Blood or watery substance leakage from ears, nose
- ▶ Unusual breathing pattern
- ▶ Nausea, vomiting

Concussion = brain shake

- ▶ Temporal disturbance of brain activity
- ▶ No structural damage
- ▶ Signs – temporal confusion, loss of memory, occ. Vomitting, dizziness
- ▶ **Full recovery**

First aid concussion

- ▶ Check for vital signs, assess breathing
- ▶ Apply jaw thrust if necessary
- ▶ **Consider cervical spine injury**
- ▶ If loss of consciousness , call AMB.
- ▶ After recovery watch for subsequent deterioration

Contussion

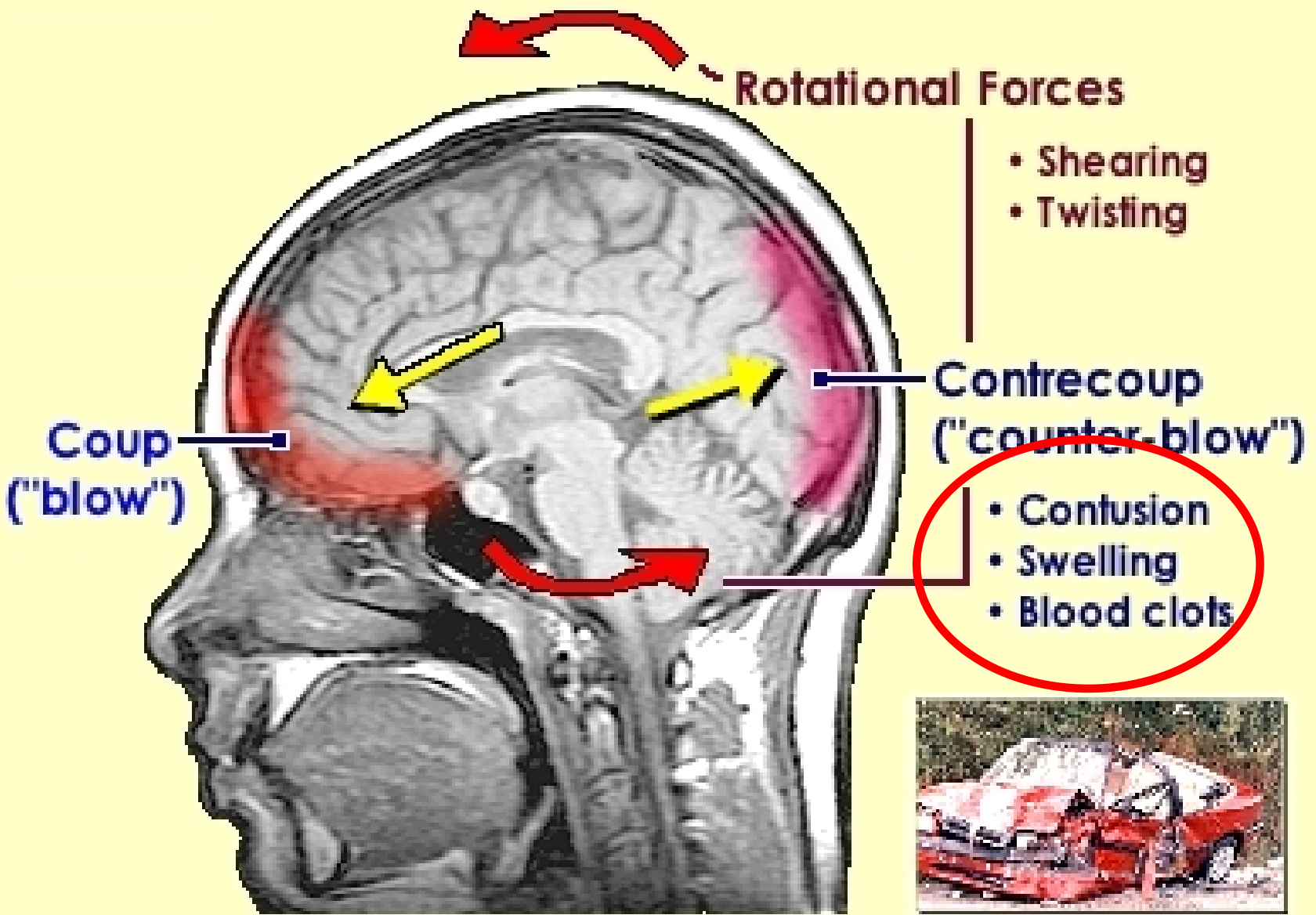
- ▶ Brain tissue **damage at the site of trauma + the opposite site**
- ▶ impaired consciousness, abnormal breathing pattern
- ▶ **different pupil size (anisocory)**





The head strikes a hard object creating a concussion-type injury





Brain compression

- ▶ **Due to**
 - ▶ accumulation of blood (trauma, stroke)
 - ▶ accumulation of water - **Brain swelling**
- ▶ Symptoms can develop hours after injury

Intracranial bleeding

▶ Causes:

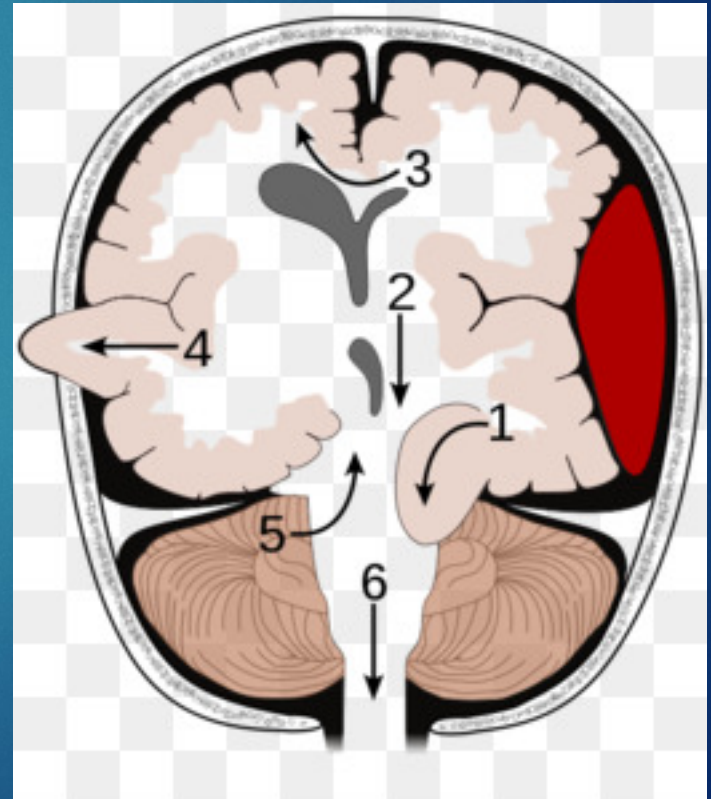
- ▶ Hypertension
- ▶ Rupture of brain vessels aneurysm
- ▶ Trauma
- ▶ tumours

- ▶ **Consequences** – brain damage - loss of consciousness - inadequate breathing – hypoxia – brain swelling - intracranial pressure increase – decreased blood flow – brain hypoxia – damage to neurons – loss of functions – increase of oedema etc...

- ▶ **Severe brain damage can lead to death**

Signs of brain compression

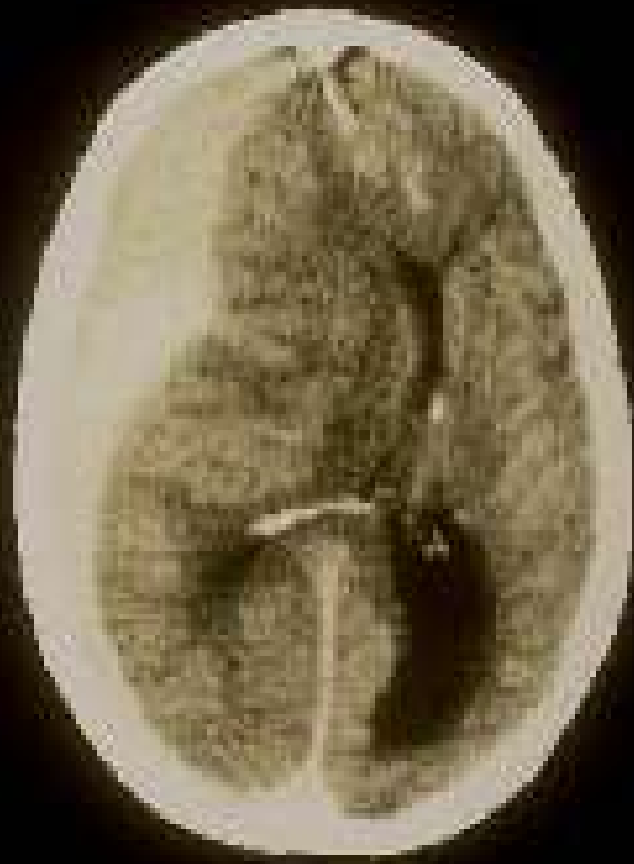
- ▶ Inadequate response
- ▶ Intense headache
- ▶ Slow breathing
- ▶ Slow pulse
- ▶ Unequal pupilar size
- ▶ Half body weakness/paralysis



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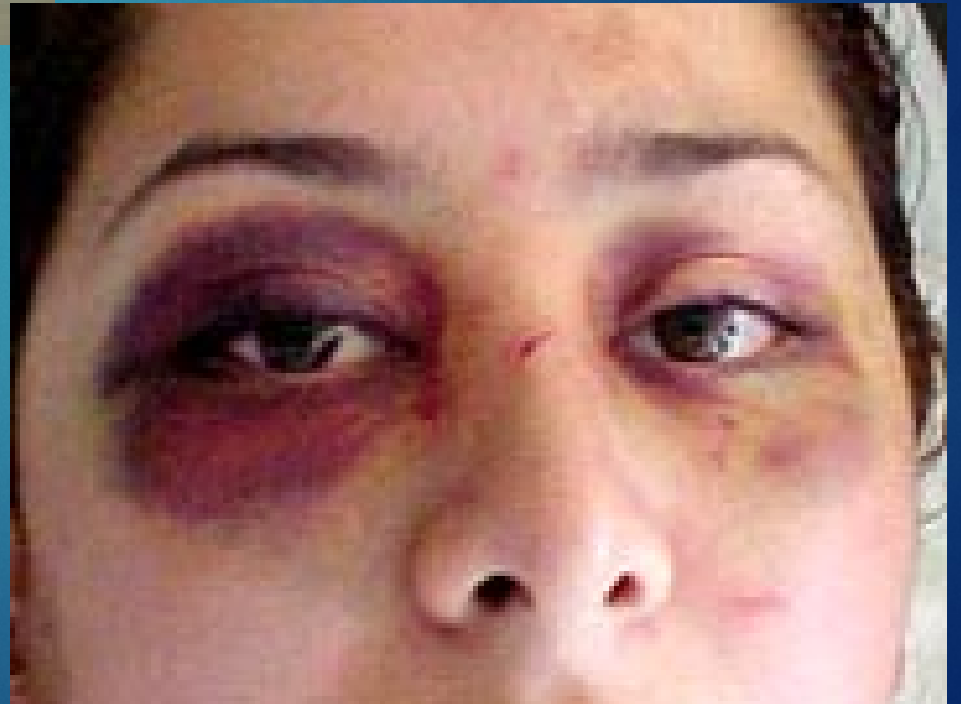


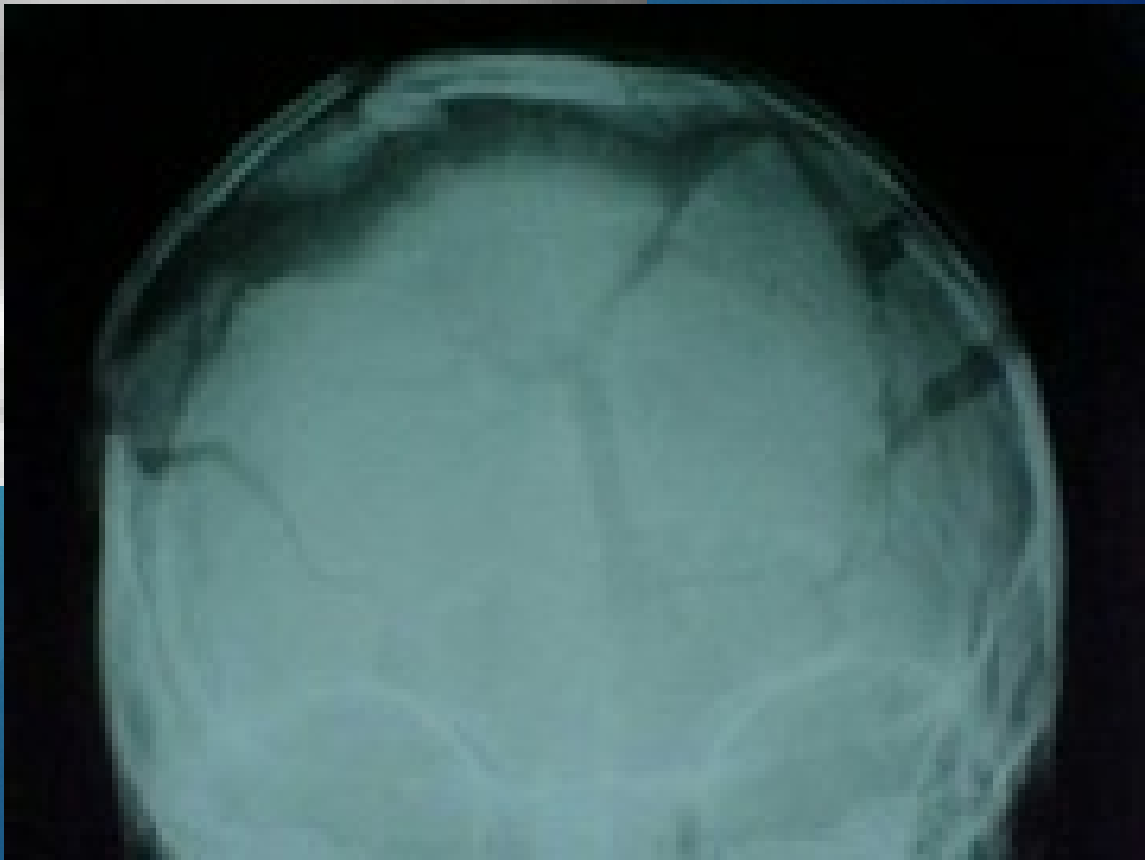
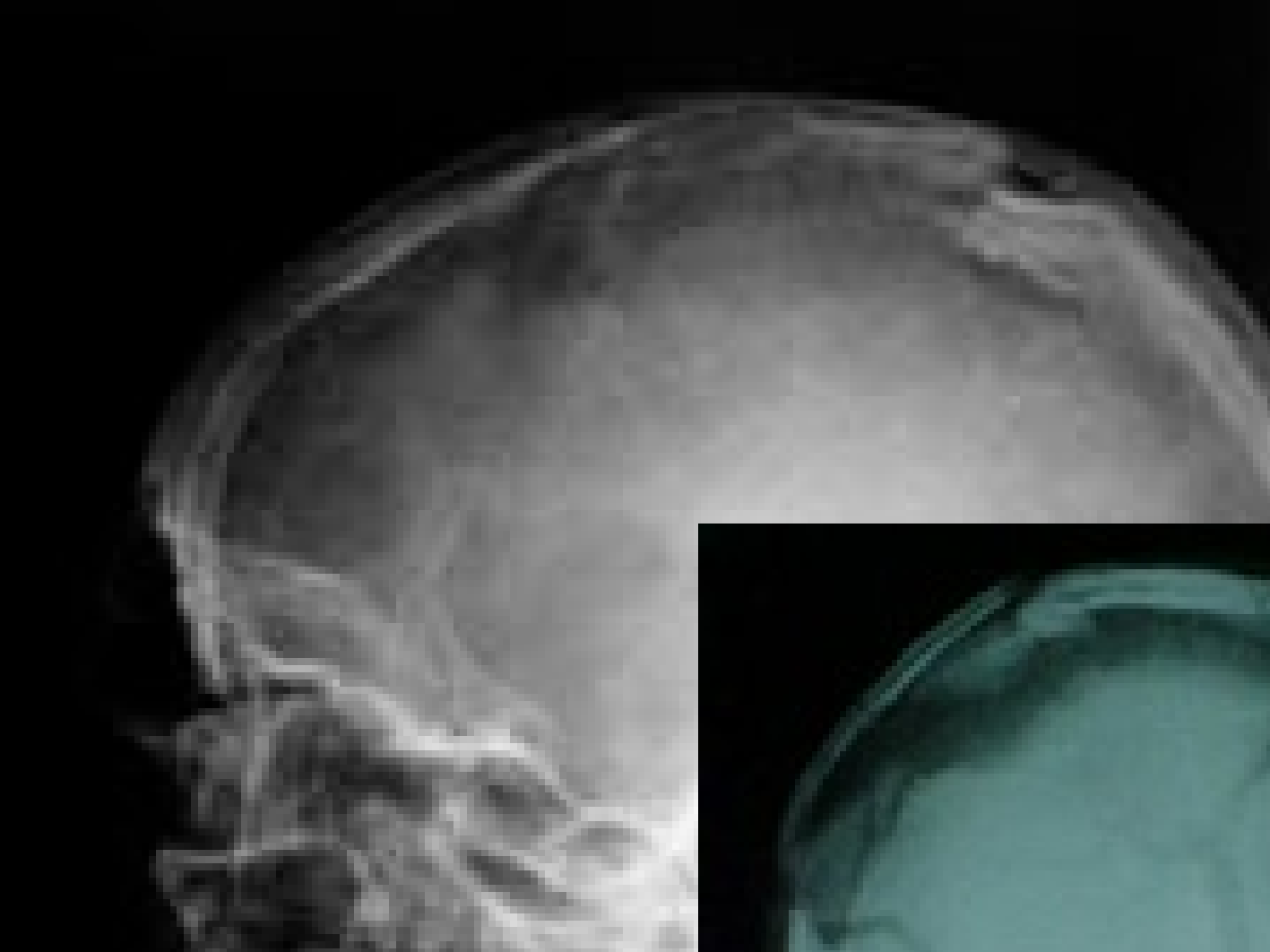
To do ...

- ▶ Do not allow eating , drinking
- ▶ Call for help
- ▶ monitor vital signs
- ▶ **Maintain patent airway**
- ▶ **Stop major bleeding, treat big chest traumatism...**
- ▶ Don't move with patient if it is not necessary!

skull base fractures

















First AID – unconscious patient

- ▶ Check **reactivity**
- ▶ Check **airway / adequate breathing**
- ▶ Check for **bleeding, chest trauma, stop massive bleeding**
- ▶ **No vital signs – CPR**
- ▶ If breathing – **recovery position** (according to other trauma)
- ▶ Call for help
- ▶ **Stay with the patient**, control of vital functions!

First Aid head injury

- ▶ **Stop external bleeding** by direct/ indirect
- ▶ Unconscious – adequate breathing – **stabilised position-prevention of aspiration**
- ▶ **Conscious** – elevated head , back
- ▶ **No oral intake**
- ▶ Regular **vital signs assesment**
- ▶ If possible – immobilisation of the head
- ▶ Always assume that there can be neck spine injury!

Seizures

- ▶ The brain has millions of nerve cells which control the way we think, move and feel.
- ▶ The nerve cells do this by passing electrical signals to each other.
- ▶ If these signals are disrupted, or too many signals are sent at once, this causes a seizure (sometimes called a 'fit' or 'attack')

Epilepsy

- ▶ a *tendency* to have seizures that start in the brain
- ▶ different types of epileptic seizures

Seizure triggers

- ▶ lack of sleep, stress, alcohol and flickering lights (called [photosensitive epilepsy](#))
- ▶ can differ from person to person

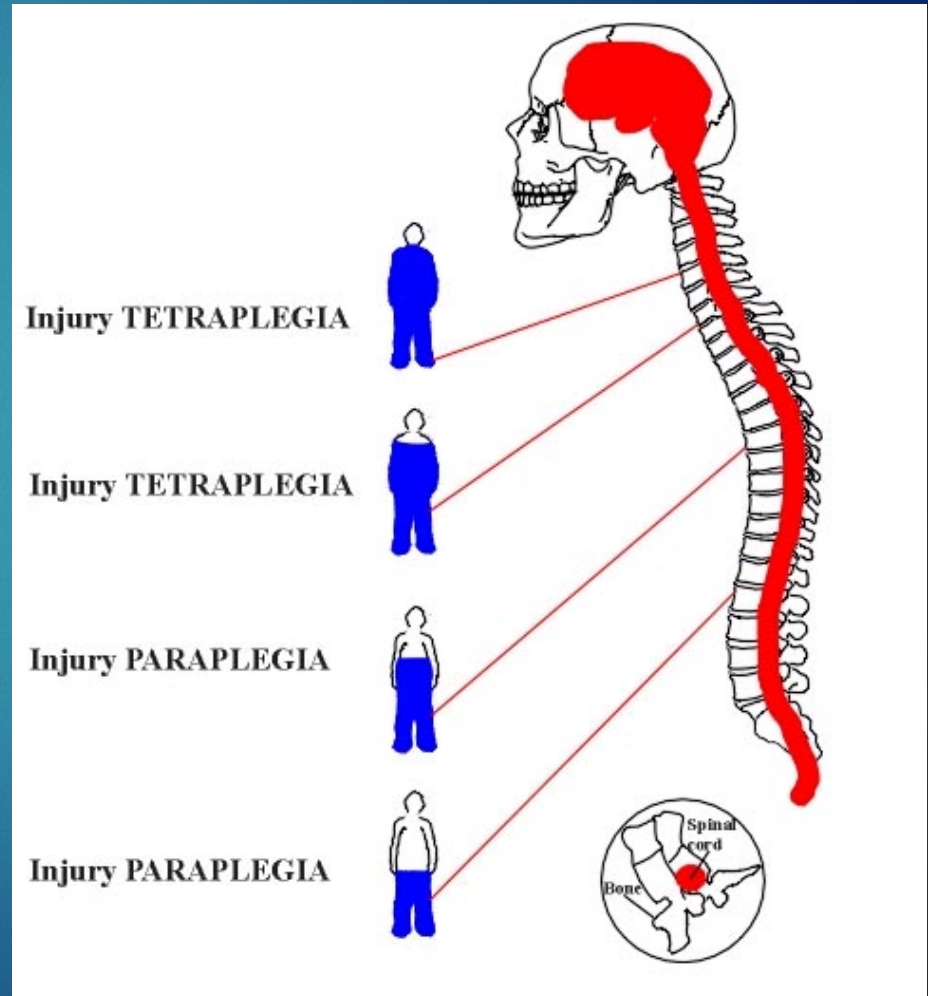
First AID

- **Prevent further injury** (e.g. fall, head hitting etc.)
- during attack **monitor vital functions, eliminate seizure triggers**
- **Call AMB when:**
 - First seizure
 - breathing disorder
 - impaired consciousness more than 15min
 - high temp., small child,
 - Pregnancy

Spinal injury

- ▶ Life threatening if **cervical spine affected**, muscle paralysis
- ▶ **Bad manipulation can worsen the injury**
- ▶ Adequate FA is essential for good outcome

- ▶ Damage of spinal cord causes loss of muscle strength and sensation below the injured area



Causes of spinal injury

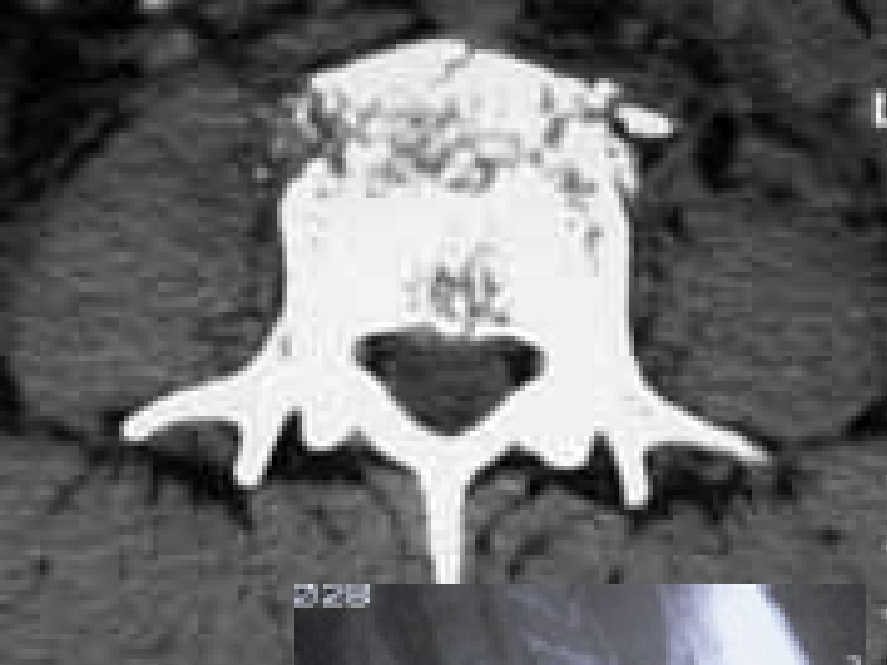
- ▶ Falling from a height
- ▶ Diving into shallow pool
- ▶ Falling from horse, motorbike
- ▶ Sudden deceleration
- ▶ Unusual movement

Causes of spinal cord injury

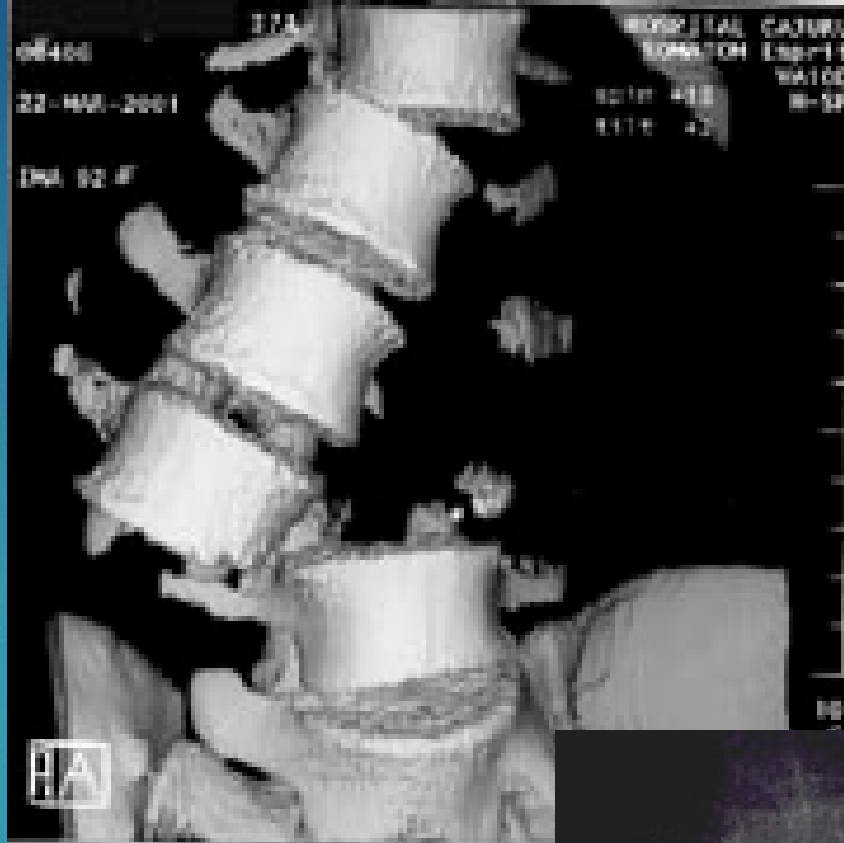
- ▶ Fragments of fractured vertebra cut spinal cord
- ▶ Intervertebral disc displacement – damage to cord by pressure



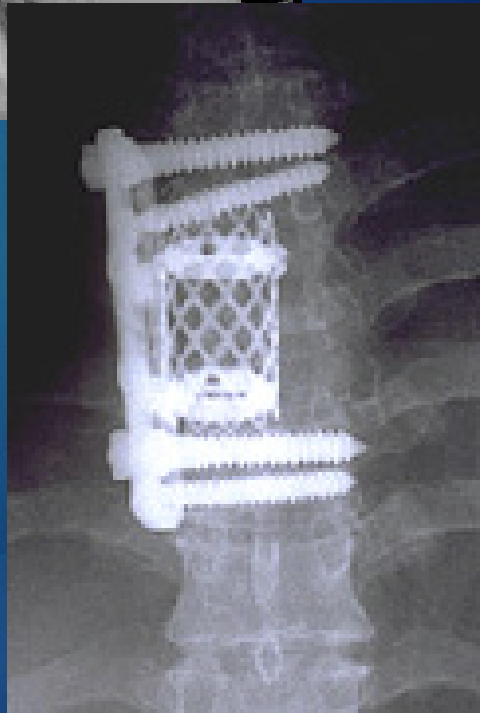




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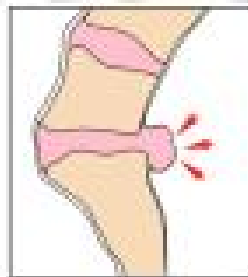


HA



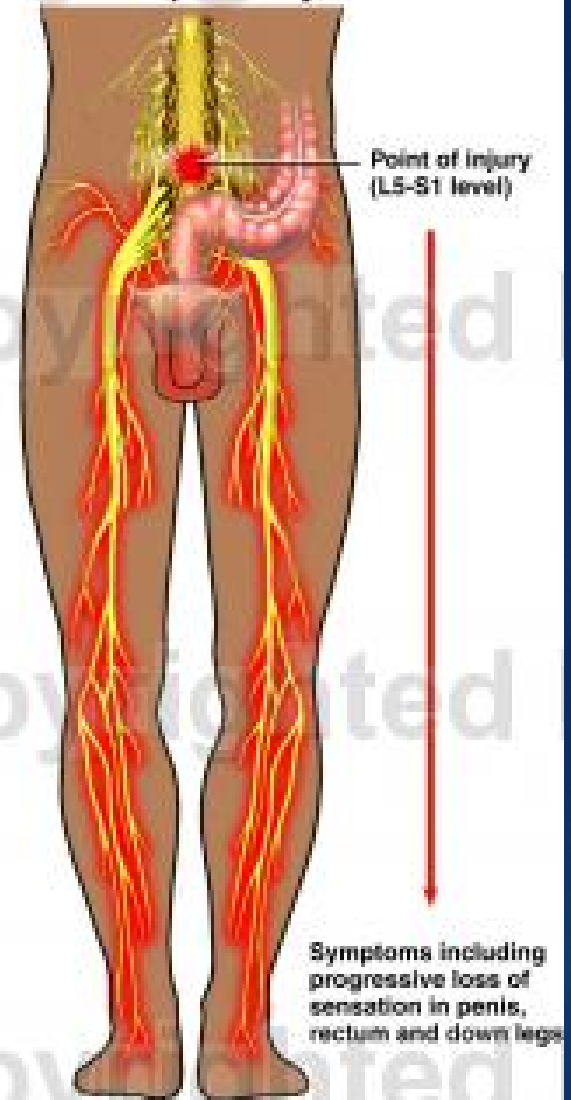
Lumbo-sacral Spinal Injury Following Spinal Manipulation

Mechanism of Injury

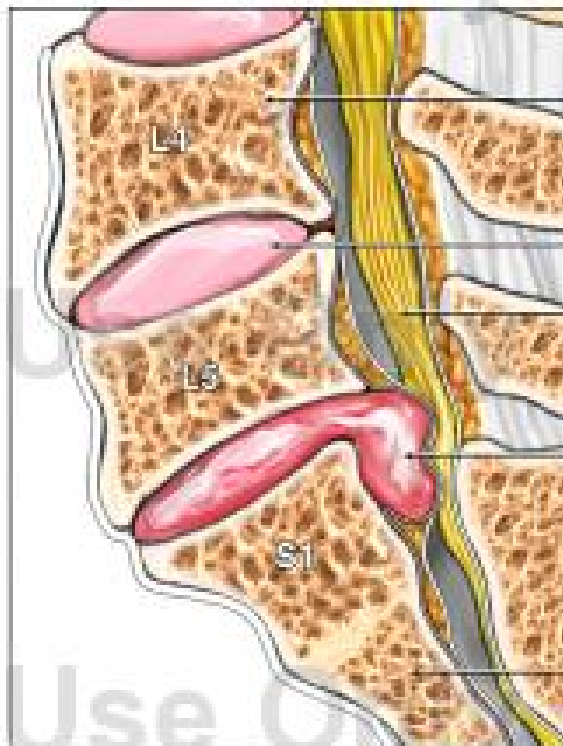


Manipulation of spine extrudes disc material into spinal canal

Cauda Equina Syndrome



Subsequent Condition



Lumbar vertebral body

Intervertebral disc

Cauda equina of spinal cord

Extruded disc herniation filling the entire spinal canal at L5-S1 level and compressing the cauda equina

Sacrum

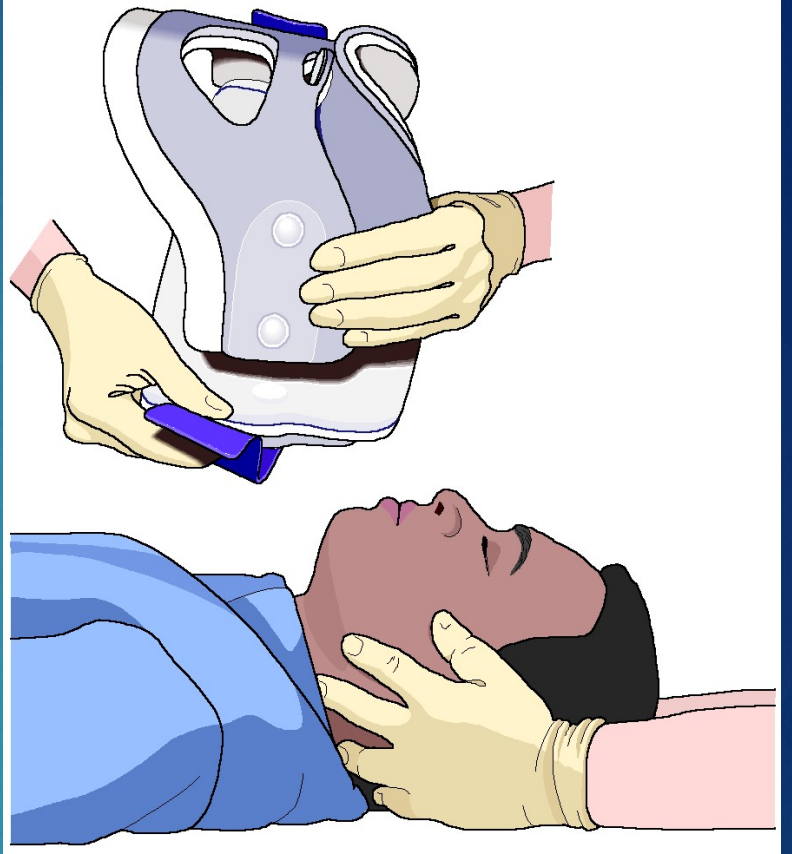
Cut-away view of lumbosacral spine

Signs of spinal injury

- ▶ Pain
- ▶ Disorders of sensation, motoric disorders
- ▶ Incontinence or urine retention, priapism
- ▶ **If unconscious – behave as if spinal injury present**

First AID

- ▶ **No manipulation if not needed!**
 - ▶ If needed do it really carefully, no rotation of spine!
- ▶ **If awake** – try spontaneous movement, sensation.
- ▶ If unconscious – turn to back with no spine rotation
- ▶ Adequate transport





▶ Thoracic,lumbar spine :

- no sitting!
- transfer at hard stretcher
- ***wait for and prefer professional transport using vacuum mat***

▶ Cervical spine:

- patient can have respiratory disorder!
- don't do rotation of cervical spine !!!! Hold the head in narrow position !



Positioning, transport

► On the place of trauma:

1. check and secure vital functions

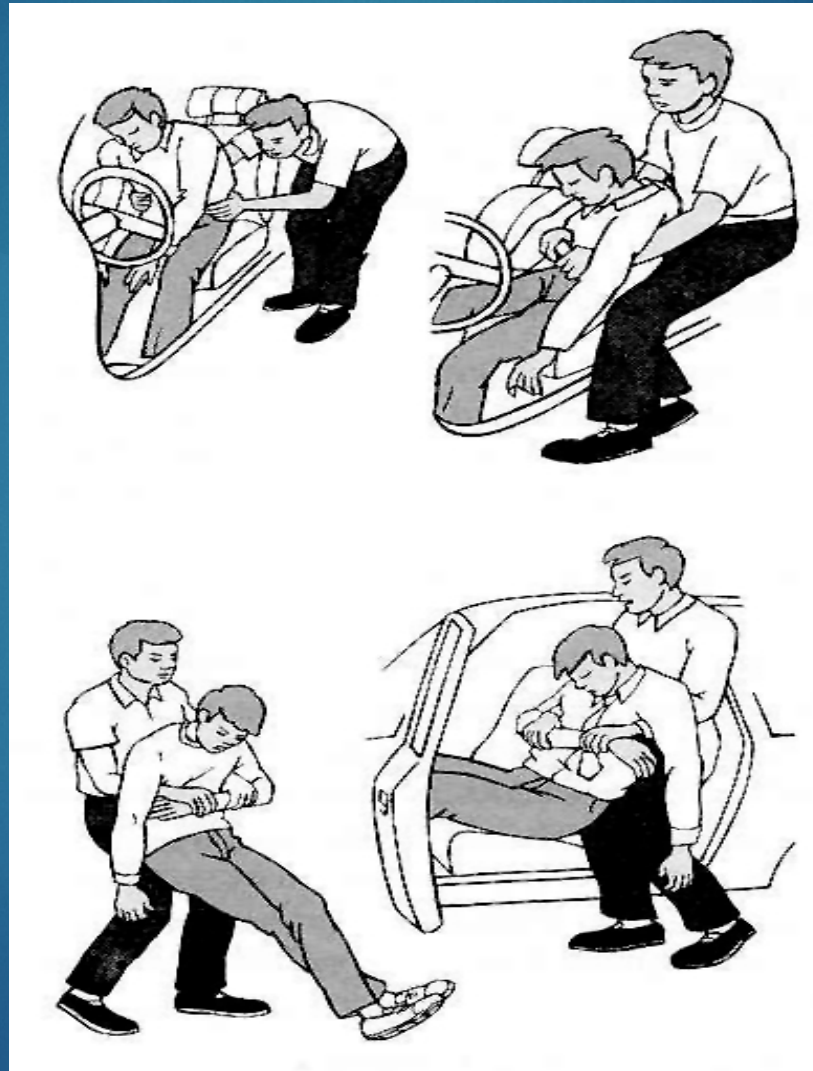
2. stop major blood loss

3. choose the right position for

- first aid
- transport



Getting out of a vehicle

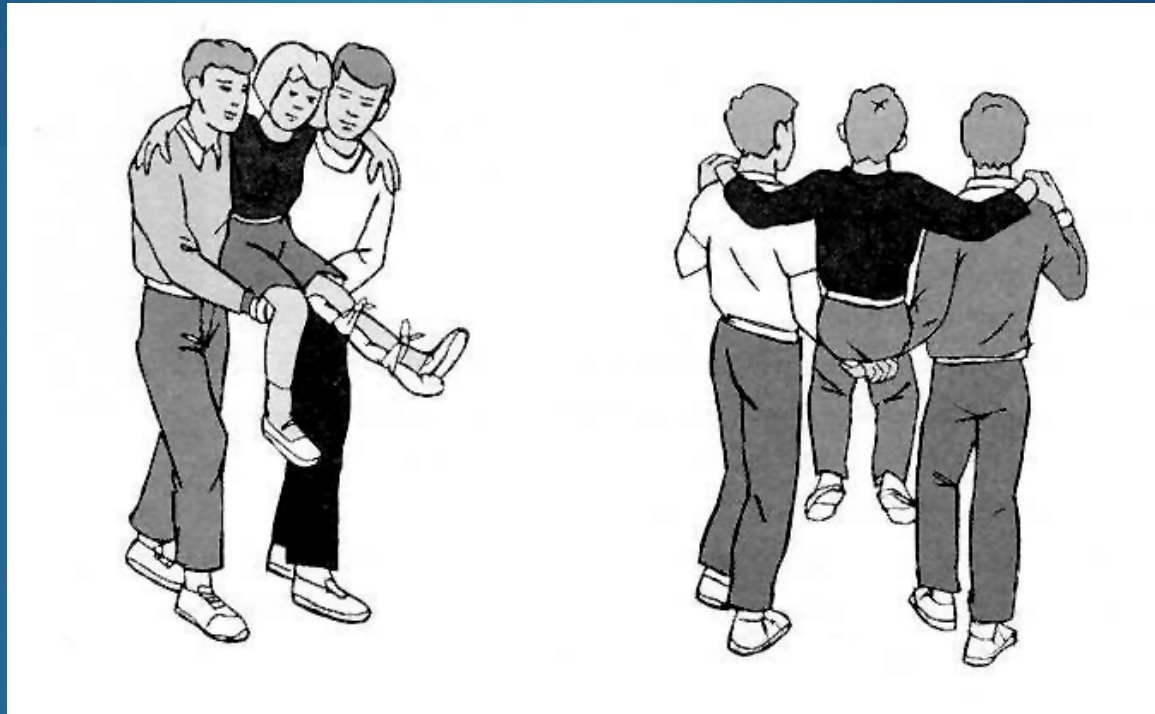


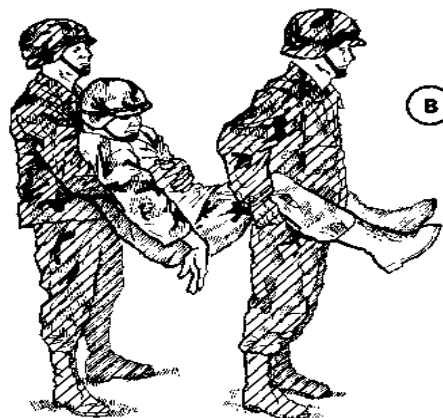
One Man Transport



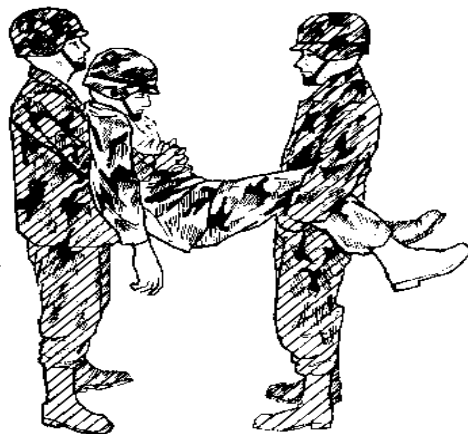


Two Men Transport





B THE BEARERS RISE TOGETHER, LIFTING THE CASUALTY.



C ALTERNATE POSITION—FACING CASUALTY.

NOTE

By altering the carry so that both bearers face the casualty, it is also useful for placing him on a litter.

Figure B-12. Continued.

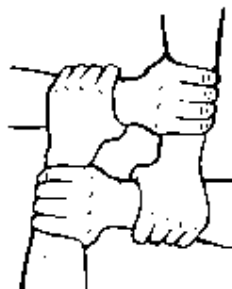


A FRONT VIEW

WITH CASUALTY LYING ON HIS BACK, A BEARER KNEELS ON EACH SIDE OF HIM AT THE CASUALTY'S HIPS. EACH BEARER PASSES HIS ARMS UNDER THE CASUALTY'S THIGHS AND BACK, AND GRASPS THE OTHER BEARER'S WRISTS. THE BEARERS RISE, LIFTING THE CASUALTY.



SIDE VIEW



A EACH BEARER GRASPS ONE OF HIS WRISTS AND ONE OF THE OTHER BEARER'S WRISTS, THUS FORMING A PACKSADDLE.

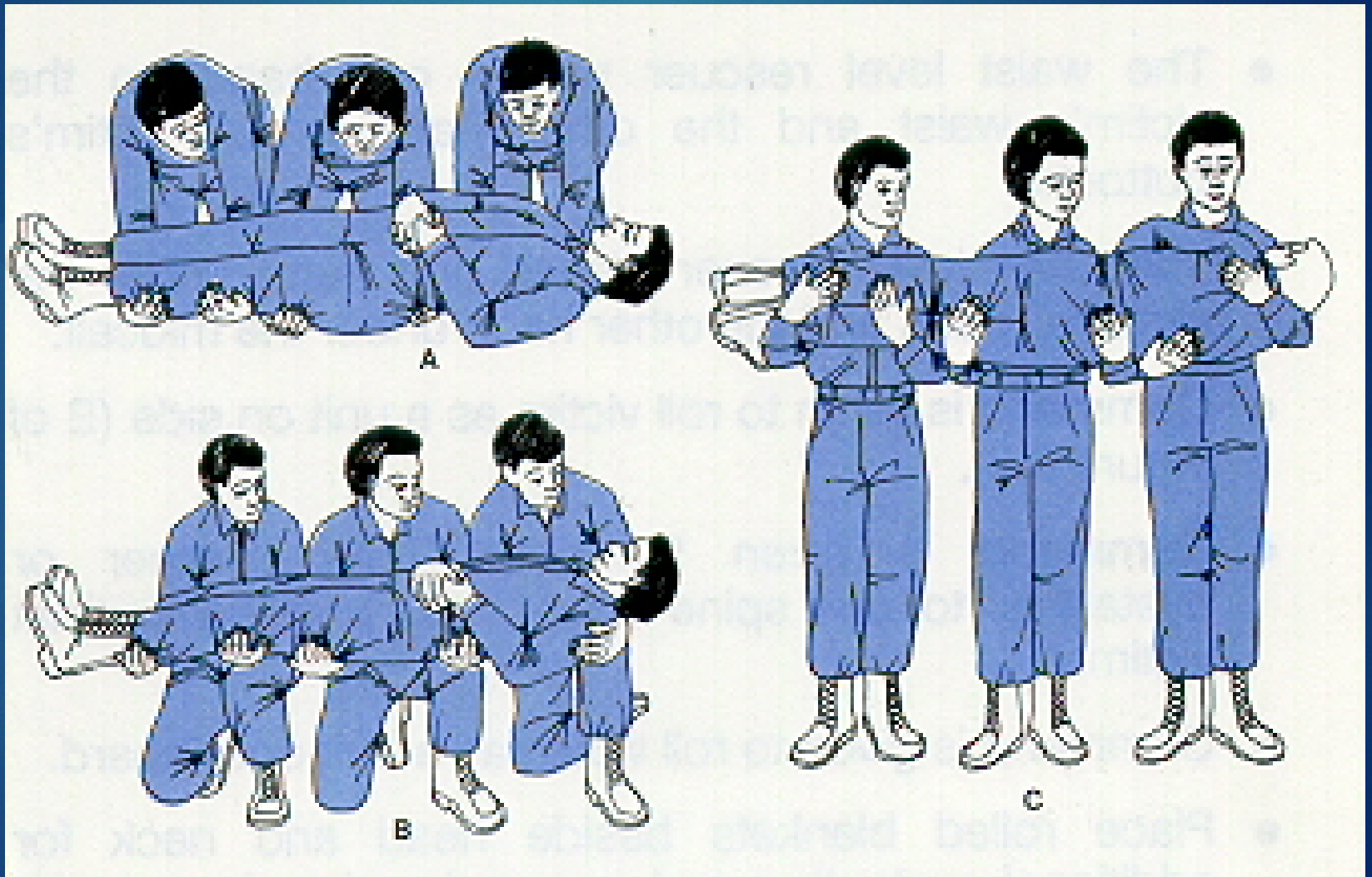


B THE TWO BEARERS LOWER THEMSELVES SUFFICIENTLY FOR THE CASUALTY TO SIT ON THE PACKSADDLE; THEN THEY HAVE THE CASUALTY PLACE HIS ARMS AROUND THEIR SHOULDERS FOR SUPPORT BEFORE THEY RISE TO AN UPRIGHT POSITION.

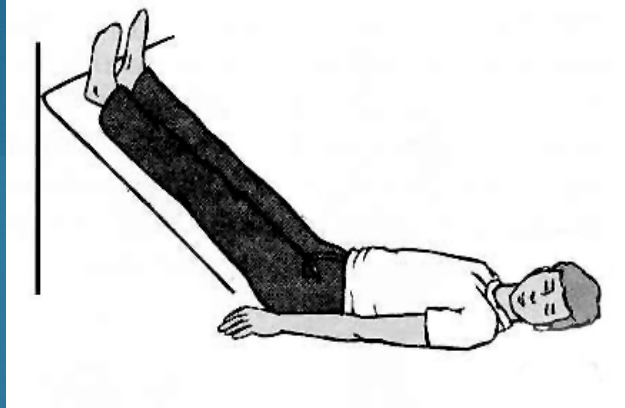
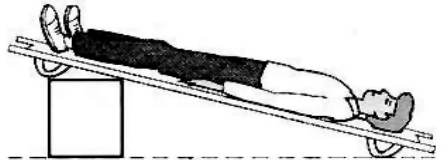
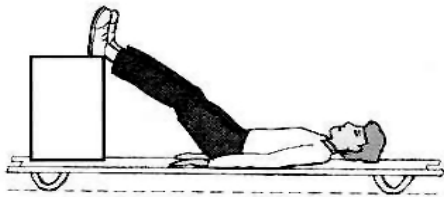
Four-hand seat carry (Illustrated A and B).

Figure B-14. Four-hand seat carry (Illustrated A and B).

More aiders



POSITIONING



Recovery position



*Thank you for your
attention 😊*

