HEAD INJURY -1

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WHAT IS HEAD INJURY

- **Any degree of injury to the head ranging from Scalp laceration to loss of Consciousness to focal neurological deficit is defined as head Injury.**

A **focal neurologic deficit** is a problem with brain function/Nerve/Spinal Cord. It affects a specific location,

such as the left/right side of the face,

right arm, or even a small area such as the tongue,speech, vision, and hearing problems are also considered ***focal neurological deficits***

TRAUMATIC BRAIN INJURY

- **Traumatic brain injury (TBI) can be considered as the combination of primary injury sustained on impact,**

and

not medically modifiable,

and secondary injury developing in the following hours and days

PRIMARY & SECONDARY BRAIN INJURY

- **Primary Injury**

- Primary brain injury occurs during the initial insult, and results from displacement of the physical structures of the brain/ injury caused by mechanical damage
- *NOT PREVENTABLE*

- **Secondary Injury**

- Secondary injury is an *indirect* result of the injury. It results from processes initiated by the trauma. It occurs in the hours and days following the primary injury and plays a large role in the brain damage and death that results from TBI

- *PREVENTABLE to some degree*

AETIOLOGY

- MOTOR VEHICLE ACCIDENTS (RTA)
- FALLS
- ASSAULTS
- SPORTS RELATED INJURIES
- FIREARM RELATED INJURIES

OUTCOME OF HEAD INJURY

- DEPENDS ON SEVERITY OF INJURY

- Death occurs at three (3) points in time after Injury :
- Immediately after Injury
- Within 2 hours after Injury
- 3 weeks after Injury

PATHOPHYSIOLOGY

- **What is Monroe Kellie Doctrine??**
- Basic Principle

- ***The Skull has a fixed volume***

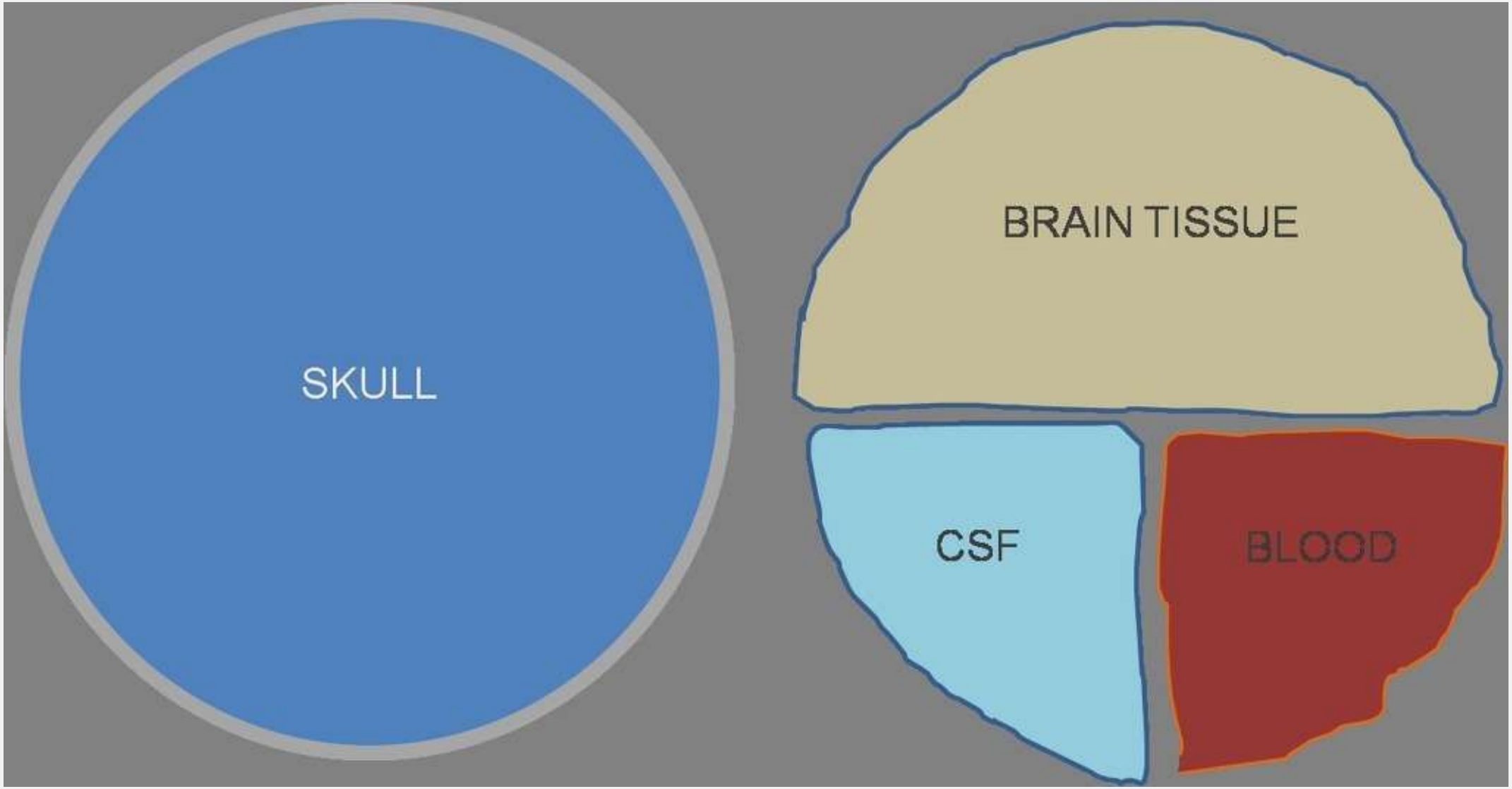
❑The Skull contains

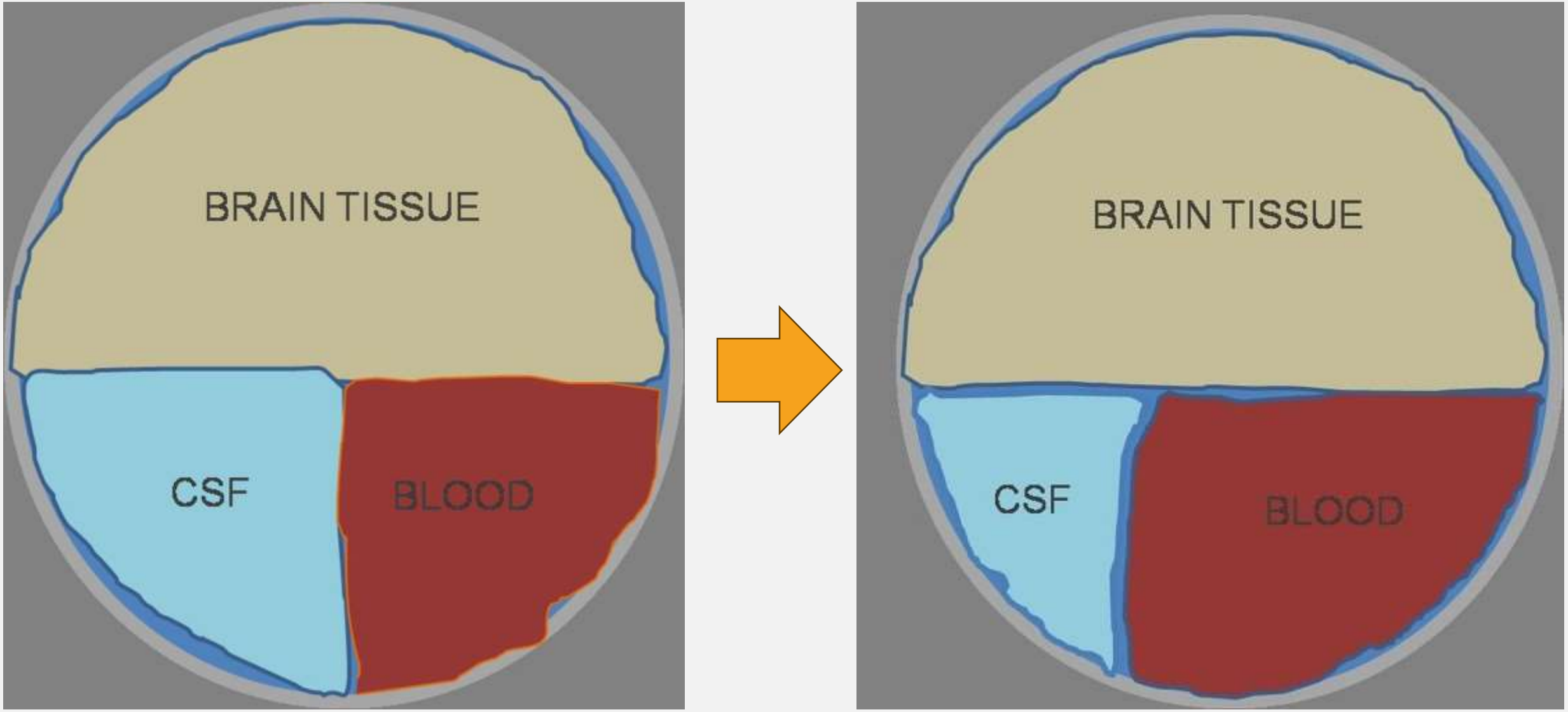
❑ Brain matter

❑Cerebrospinal Fluid

❑Blood

-THEREFORE :An increase in the volume of one must be compensated by a decrease in the volume of the others or an increase in ICP will occur


SKULL
BRAIN TISSUE
CSF
BLOOD


BRAIN TISSUE
CSF
BLOOD
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PATHOPHYSIOLOGY

- **The brain depends on continuous perfusion for oxygen and glucose delivery**
- **Normal cerebral blood flow (CBF) is about 55 mL/min for every 100 g of brain tissue…… (Brain weight)……**
- **Ischaemia results when this rate drops below 20 mL/min, and even lower levels will result in infarction unless promptly corrected**
- **Flow depends on cerebral perfusion pressure (CPP)**

which is the difference between the mean arterial pressure (MAP) and the intracranial pressure (ICP)

- **CPP (75–105 mmHg) = MAP (90–110 mmHg) – ICP (5–15 mmHg)**

BRAIN HERNIATION

- **Brain herniation occurs when something inside the skull produces pressure that moves brain tissues. This is most often the result of brain swelling or bleeding from a head injury, stroke, or brain tumor**

Uncontrolled increases in ICP result in cerebral herniation

herniation of the uncus of the temporal lobe over the tentorium results in pupil abnormalities

usually occurring first on the side of any expanding haematoma.

Cerebellar tonsillar herniation through the foramen magnum compresses medullary vasomotor and respiratory centres, classically producing

CUSHING'S TRIAD

- **HYPERTENSION**
- **BRADYCARDIA**
- **IRREGULAR RESPIRATION**

brainstem death will result without immediate intervention.

GLASGOW COMA SCALE

- The GCS score is the sum of scores on three components, as
- The breakdown of the GCS score into
- eye opening,
- verbal and
- motor components
- should always be recorded and used when communicating the status to other doctors

- A sternal or supraorbital rub or trapezius squeeze represents an appropriate painful stimulus

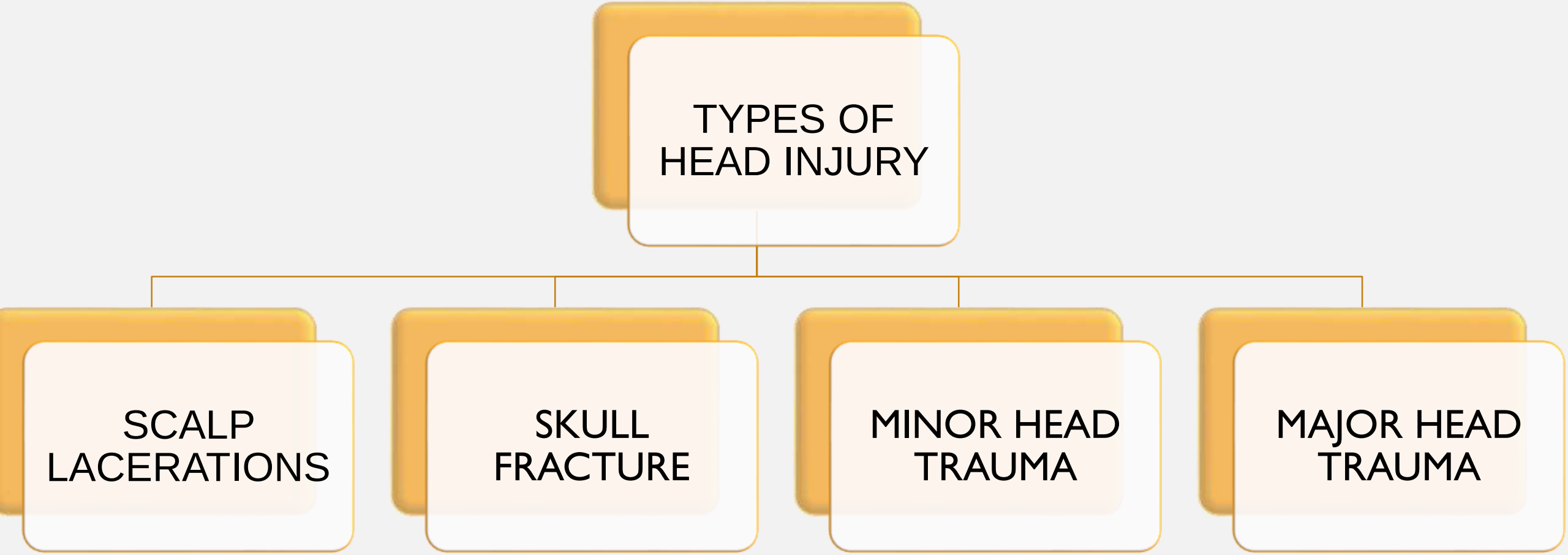
GLASGOW COMA SCALE

Eyes open	Spontaneously	4
	To verbal command	3
	To painful stimulus	2
	Do not open	1
Verbal	Normal	5
	Confused	4
	Inappropriate/words only	3
	Sounds only	2
	No sounds	1
	Intubated patient	T
Motor	Obeys commands	6
	Localises to pain	5
	Withdrawal/flexion	4
	Abnormal flexion	3
	Extension	2
	No motor response	1

PEDIATRIC GCS

Eye opening	Spontaneously	4
	To verbal stimulus	3
	To pain	2
	No response	1
Verbal response	Coos/babbles	5
	Irritable cries	4
	Cries in response to pain	3
	Moans in response to pain	2
	No response	1
Motor response	Purposeful/spontaneous movements	6
	Withdraws to touch	5
	Withdraws to pain	4
	Flexes to pain	3
	Extends to pain	2
	No response	1

TYPES OF HEAD INJURY



HISTORY TO BE TAKEN IN CASE OF PROBABLE HEAD INJURY PATIENT

- Bystanders and paramedics may give vital information on the:
- Preinjury state (Fits, alcohol, chest pain)
- Mechanism and energy involved in the injury (speed of vehicles, height fallen)
- Conscious state and hemodynamic stability of the patient after the accident
- Length of time taken for extrication
- Check the medication history, especially anticoagulants and antiplatelet agents

TYPES OF HEAD INJURY ACCORDING TO GCS

Minor head injury	GCS 15 with no LOC
Mild head injury	GCS 14 or 15 with LOC
Moderate head injury	GCS 9–13
Severe head injury	GCS 3–8

MINOR & MILD HEAD INJURY

After exclusion of associated cervical spine injury, it is important to consider the possibility of a 'lucid interval' that may

precede delayed deterioration due to an expanding intracranial haematoma.

In general, patients with isolated head injuries and without ongoing deficits can be safely discharged from the emergency department

DISCHARGE CRITERIA IN MINOR AND MILD HEAD INJURY.

- GCS 15/15 with no focal deficits
- Normal CT brain if indicated
- Patient not under the influence of alcohol or drugs
- Patient accompanied by a responsible adult
- Verbal and written head injury advice:

seek medical attention if:

- Persistent/worsening headache despite analgesia
- Persistent vomiting
- Drowsiness
- Visual disturbance
- Limb weakness or numbness

- *Patients who do not meet all the discharge criteria will need admission for a further period of observation and/or brain imaging.*

GUIDELINES FOR COMPUTED TOMOGRAPHY (CT) IN HEAD INJURY.

- **Indications for CT imaging in head injury within 1 hour**
- **GCS <13 at any point**
- **GCS <15 at 2 hours**
- **Focal neurological deficit**
- **Suspected open, depressed or basal skull fracture**
- **More than one episode of vomiting**
- **Post-traumatic seizure**
- **Indications for CT imaging within 8 hours**
- **Age >65**
- **Coagulopathy (e.g. aspirin, warfarin or rivaroxaban use)**
- **Dangerous mechanism of injury (e.g. fall from a height, RTA)**
- **Retrograde amnesia >30 minutes**

MODERATE AND SEVERE TRAUMATIC BRAIN INJURY: INITIAL MANAGEMENT

- Resuscitation is performed according to Advanced Trauma
- Life Support (ATLS) guidelines
- A = Airway control including cervical spine immobilization with a stiff collar
- B = Breathing
- C= Circulation
- D= Dysfunction or Disability
- E= External Examination

- ATLS guidelines address a fundamental priority: ensuring uninterrupted perfusion of the brain with oxygenated blood.

This is especially important after a head injury

PRIMARY SURVEY

- **Ensure adequate oxygenation and circulation**
- **Exclude hypoglycaemia**
- **Check pupil size and response and GCS score as soon as possible**
- **Check for focal neurological deficits before intubation if possible**

SECONDARY SURVEY

RESUSCITATION USING ATLS PROTOCOL

- **The history obtained in parallel is key to shaping ongoing management**
- **Neurological Progression**
- **Pupils**
- **GCS**
- **NEUROLOGICAL deficits**

IMPORTANCE OF PUPIL EXAMINATION

- ***The pupil size should be recorded in millimeters and the reactivity documented as present, sluggish or absent***

- **UNCAL HERNIATION can compress the third nerve, compromising the parasympathetic supply to the pupil.**

- **Unopposed sympathetic activity produces a sluggish enlarged pupil, progressing to fixed and dilated under continued compression**

EXAMINATION: SECONDARY SURVEY

- A complete examination of the cranial nerves

Studies have demonstrated an incidence of cervical fracture of up to 10% in association with moderate and severe TBI.

Cervical spine injury must be presumed in the context of head injury until actively excluded

A peripheral nerve examination with documentation of limb tone, power, refaxes and sensation needs to be performed

early to identify spinal pathology. This is especially important in patients who may subsequently be intubated and ventilated

when this assessment will no longer be possible

SECONDARY SURVEY

- Particular attention must be paid to the ***head, neck and spine***

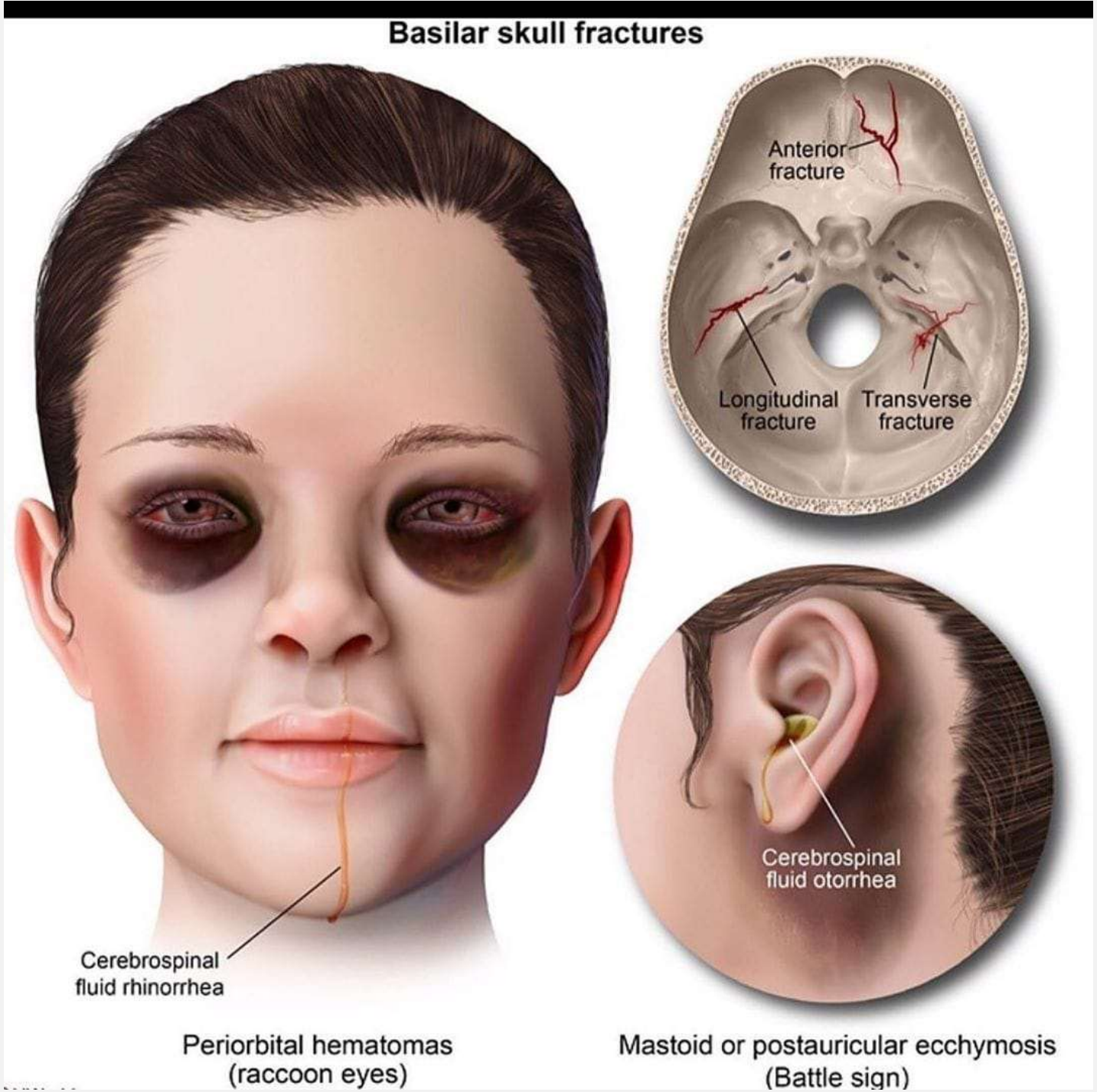
- Examination of the head should include inspection and palpation of the scalp for evidence of subgaleal haematoma and scalp lacerations, which may bleed profusely and potentially overlie fractures.

- Examine the face for evidence of fractures, especially to the orbital rim, zygoma and maxilla.

- Clinical evidence of a skull base fracture may include Battle's sign and 'racoon' or 'panda' eyes (bilateral periorbital bruising).
- Haemotympanum, or overt bleeding from the ear if the tympanic membrane has ruptured,

- and CSF rhinorrhoea or otorrhoea are also highly suggestive of a fracture of the base of the skull

Basilar skull fractures



Periorbital hematomas (raccoon eyes)

Mastoid or postauricular ecchymosis (Battle sign)

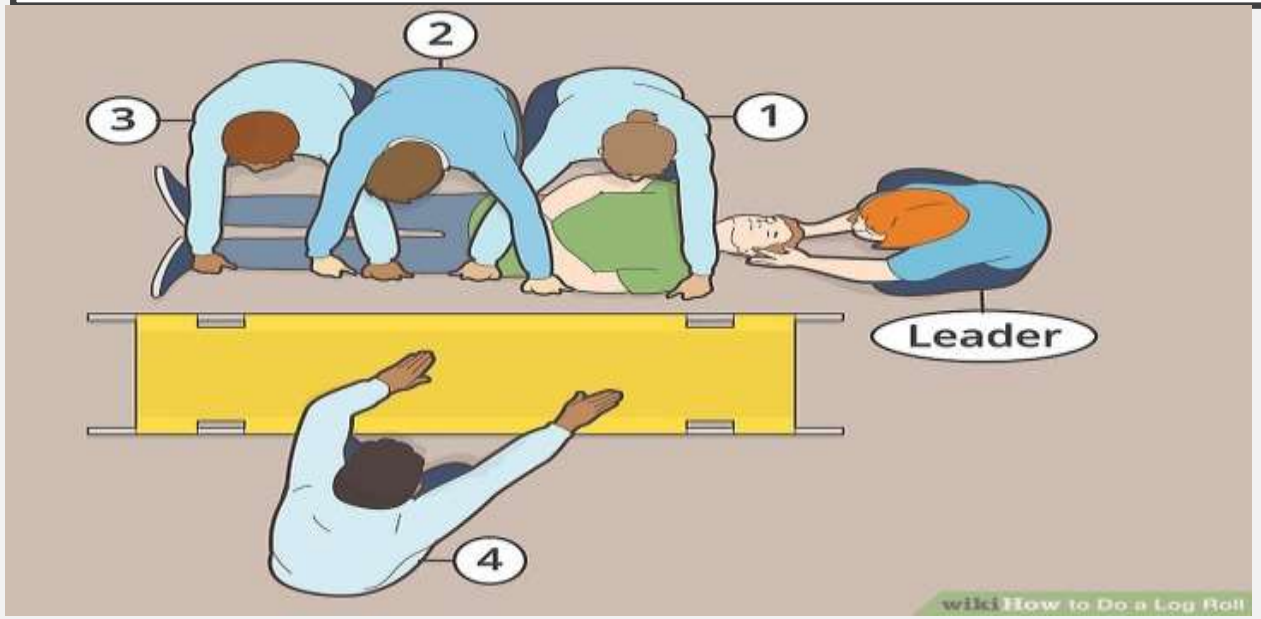
SECONDARY SURVEY

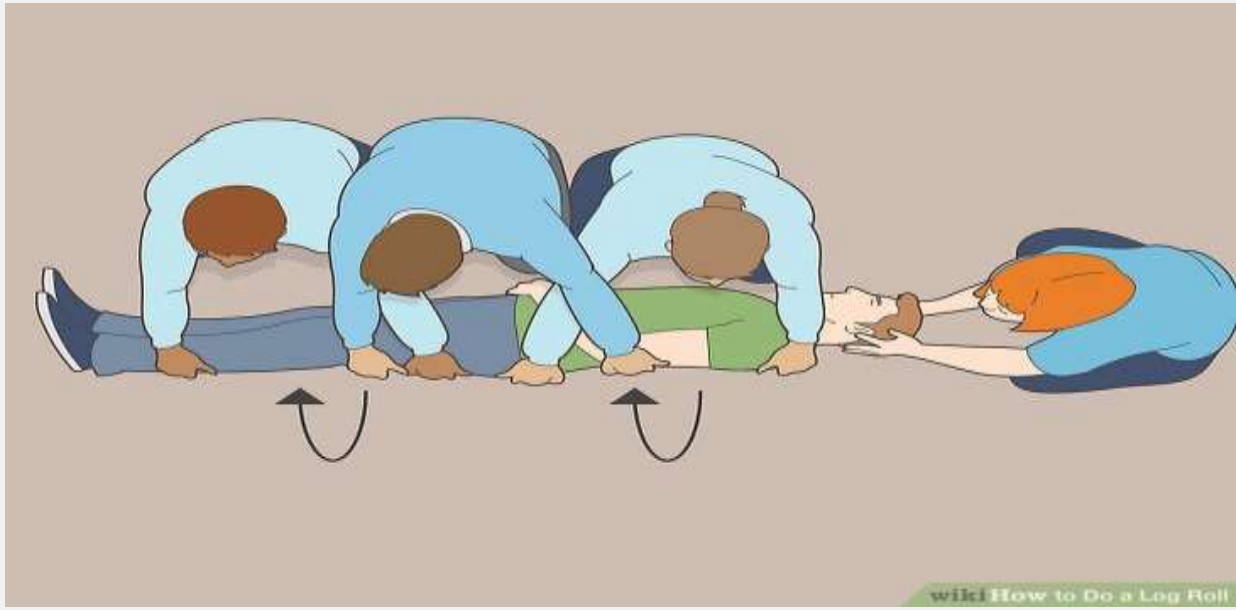
The patient will need to be log-rolled to palpate for thoracic or lumbar deformity, and any cervical collar should be removed

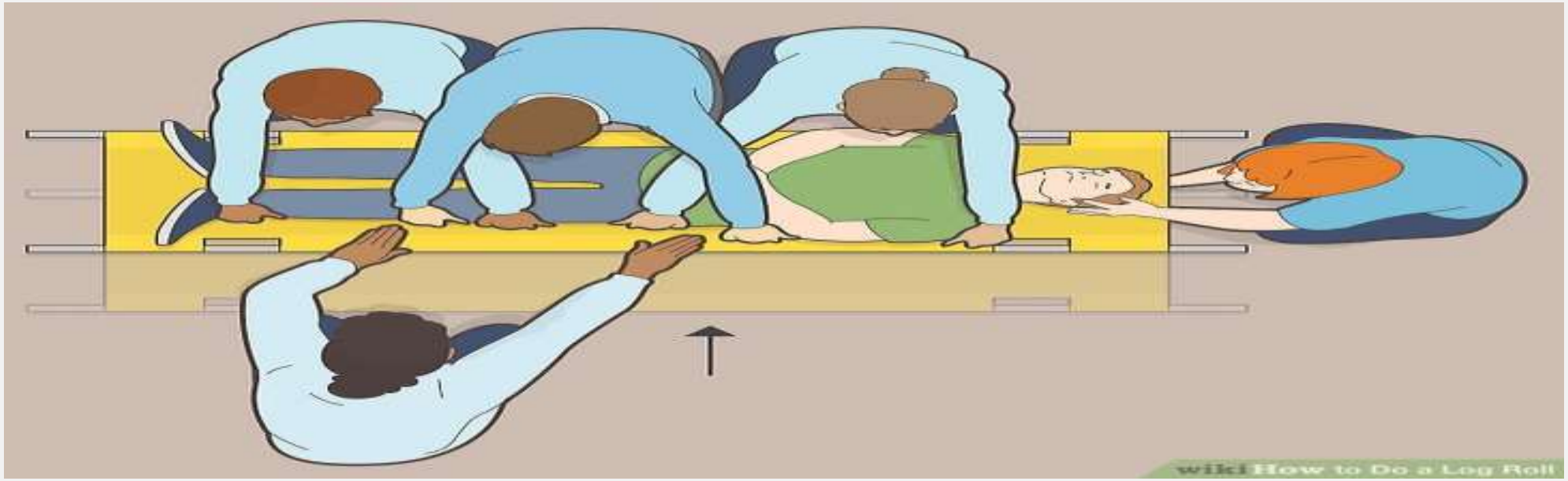
at this stage to allow palpation of the cervical spine before it is then replaced again

A per rectum examination is also performed at log-roll, assessing for anal tone, sensation in the awake patient

LOG ROLL TECHNIQUE







SUMMARY

Battle’s sign, periorbital bruising and blood in the ears/nose/mouth may point to a base of skull fracture

- Cervical spine fractures are common and must be actively excluded
- Log-roll to check the whole spine for steps and tenderness and for a per rectum examination

TO BE CONTINUED……

QUESTIONS???


THANK YOU
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THANK YOU
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