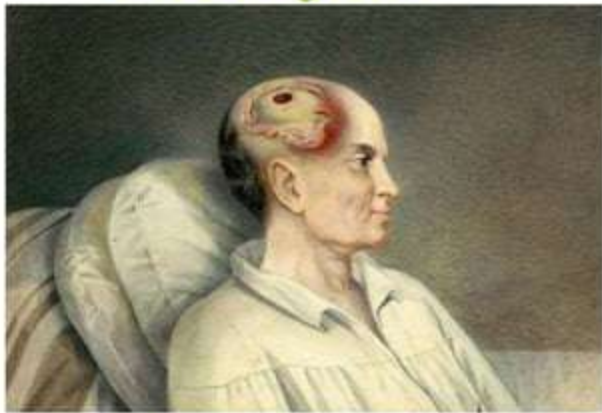


# HEAD INJURY



**PRESENTED BY:  
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## DEFINITION:

Traumatic brain injury is an insult to the brain that is capable of producing physical, intellectual, emotional, social, & vocational changes.



## INCIDENCE

- ▶ In U.S. head injury is experienced every 15 sec.
- ▶ Head injury occurs in about 7 million American every year.
- ▶ Among these head injured people > 500,000 are hospitalized 100,000 experience chronic disability & about 2000 are left in a persistent vegetative state.

# CAUSES

- ▶ Motor vehicle accidents
- ▶ Falls
- ▶ Sports related injuries, assaults.

## **Risk factors:**

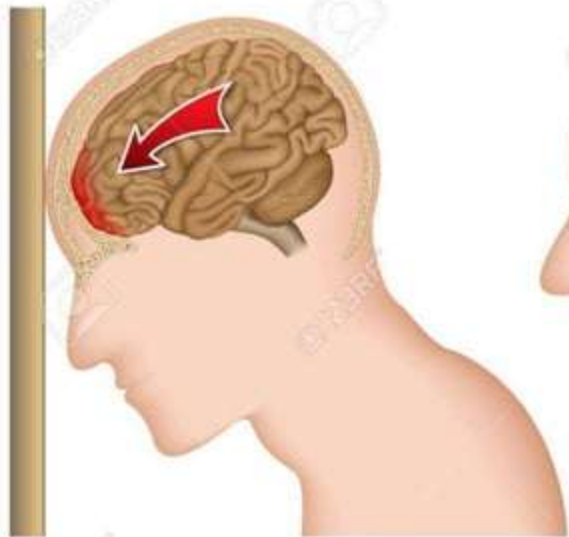
- ▶ Driving with alcohol
- ▶ Driving without seatbelts.

## MECHANISM OF INJURY

Head injuries are caused by a sudden impact force to the head or interstitial forces within the skull. three mechanism contribute to head trauma:

► **Coup-countercoup injuries:**

French word coup means blow. This diagnose indicates that the client has sustained a combined injury at the point of impact & an injury on the side of the brain opposite from the movement of the brain within the skull.



### 1. Primary Impact - Coup

The brain strikes the skull on the side of impact.



### 2. Secondary Impact - Contrecoup

Impact posterior area of skull.

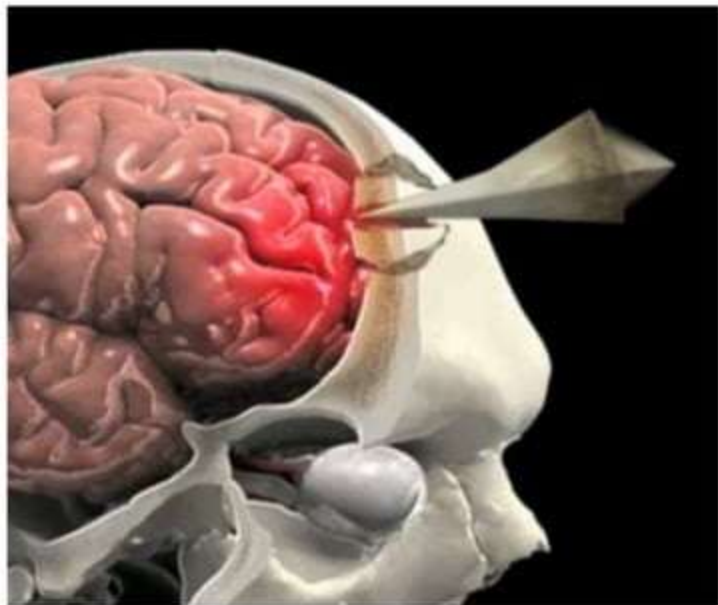


## CONTI...

### Penetrating trauma:

- ▶ Penetrating injuries are a form of primary injury & include head wounds made by foreign bodies or those made by bone fragments from the skull fracture. The damage caused by penetrating injuries often relates to the velocity with the skull & brain. Bone fragments may cause injury to surround structure & rupture of major blood vessel causes hematoma.





## CONTI...

### Scalp injury:

- ▶ Scalp injury can cause lacerations, hematomas & contusions or abrasions to the skin.

### Skull fracture:

These are often caused by a force to # the skull & cause brain injury.

These are 3 types:

- ▶ Linear skull fracture : appears as thin line on the x-ray & do not require treatment.
- ▶ Depressed skull fracture:
- ▶ May be palpated & are seen on the x-ray.

## CONTI....

### Basilar skull fracture:

- ▶ Occurs in bones over the base of the frontal & temporal lobes. these are not observable on the plain x-ray but may be manifested as ecchymosis around the eyes & CSF leakage from the ear & nose.

### Brain injury:

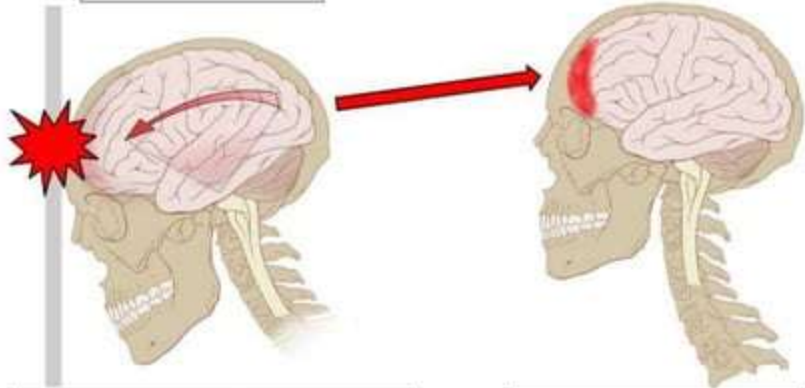
- ▶ It is classified into open head injury- are those that penetrate the skull.
- ▶ Closed injuries: are from blunt trauma.

## CONTI...

- ▶ **Concussion:** is head trauma that may result in loss of consciousness for 5 min or less & retrograde amnesia.
- ▶ **Contusions:** with contusion the brain itself is damaged often with multiple areas of small hemorrhage & bruised areas in brain tissues.

Concussion: A traumatic brain injury that changes the way your brain functions.

This can lead to bruising and swelling of the brain, tearing of blood vessels and injury to nerves, causing the concussion.



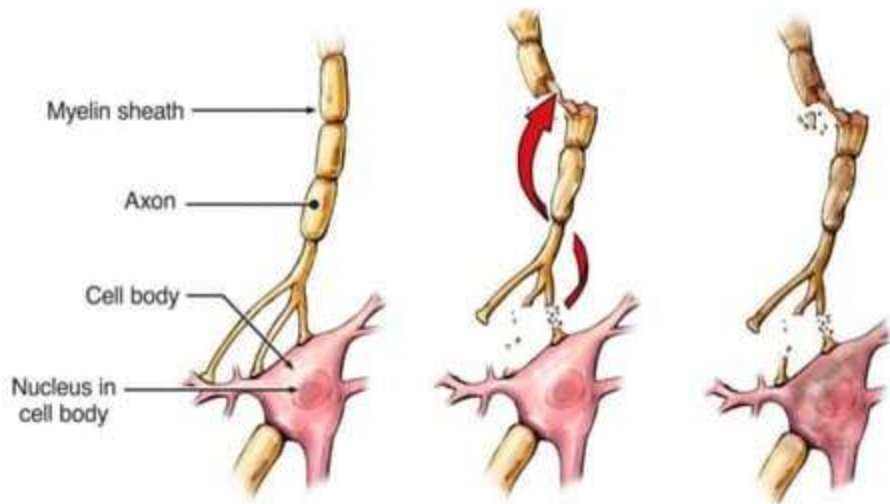
The brain is made up of soft tissue and is protected by blood and spinal fluid. When the skull is jolted too fast or is impacted by something, the brain shifts and hits against the skull.

Most concussions are mild and can be treated with appropriate care. But left untreated, it can be deadly.

## CONTI..

### Diffuse axonal injury:

- ▶ Is the most severe form of head injury because there is no focal (localized) lesions to remove. It is divided into mild, moderate & severe. it begins with immediate loss of consciousness, prolonged coma, abnormal flexion or extension posturing, hypertension & fever.



## CONTI...

### Focal injuries:

#### Epidural hematoma:

Also called an extradural hematoma forms between the skull & the dura matter. The classic manifestations are-the client is unconscious after head trauma.

- ▶ The client awakens is quite lucid.
- ▶ Loss of consciousness, pupil dilation on the same side as that of the hematoma.
- ▶ The client lapses into a coma.



## CONTI..

### Subdural hematoma:

- ▶ Is collection of blood in the subdural space (i.e. between duramater & subarachnoid mater). Tearing of bridging veins over the brain causes most subdural hematomas.

### Intracerebral hematomas:

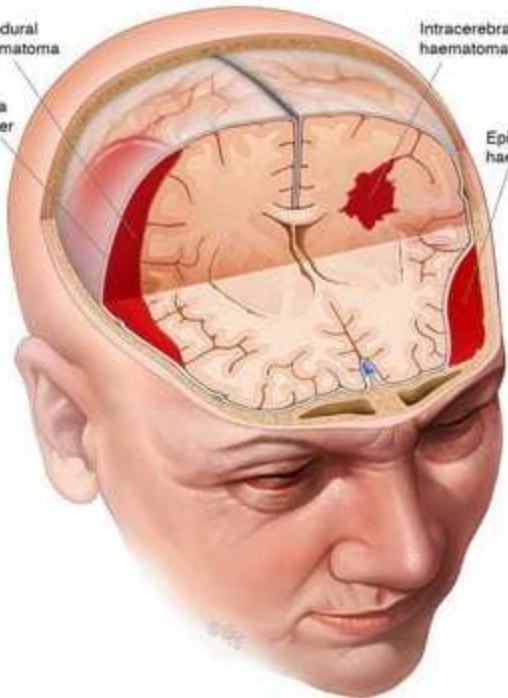
- ▶ They are caused by bleeding directly to the brain tissue & may occur at the area of injury, it carries a poor prognosis.

Subdural  
haematoma

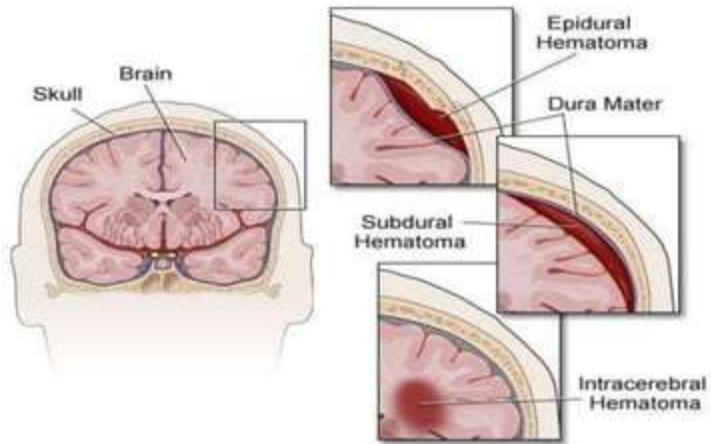
Intracerebral  
haematoma

Dura  
mater

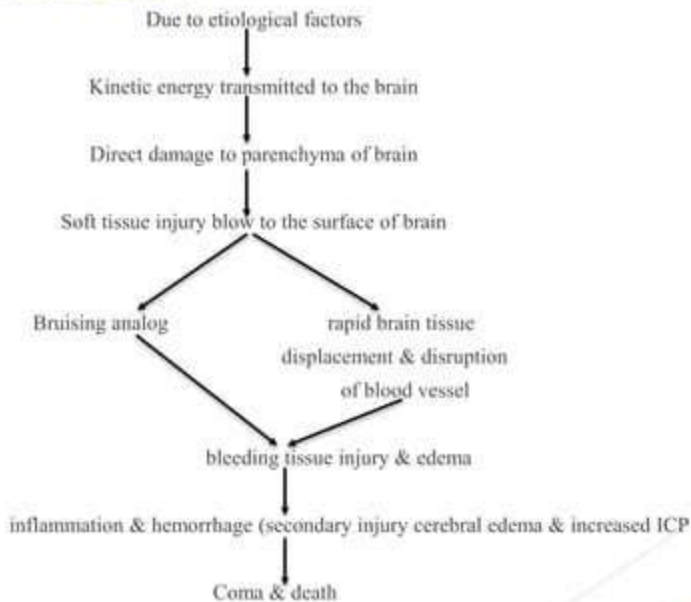
Epidural  
haematoma



## Intracranial Hematoma (ICH)



# PATHOPHYSIOLOGY



# CLINICAL FEATURES

## 1) Skull fracture:

- ▶ Clinical signs are-
  - CSF or other fluid draining from the ear or nose.
- ▶ Evidence of various cranial nerve injuries.
- ▶ Blood behind the tympanic membrane.
- ▶ Periorbital ecchymoses (bruises around the eye)
- ▶ Later the bruise over the mastoid process (battle's sign)

## CONTI...

### Indications of cranial nerve & inner ear damage may be noted as follows:

- ▶ Vision changes from optic nerve damage
- ▶ Loss of sense of smell from olfactory nerve damage.
- ▶ Squint(to narrow the palpebral opening of the eyelids to block light or improve focus) or fixed dilated pupil.
- ▶ Facial paresis or paralysis
- ▶ Vertigo (damage of otolithus inner ear)
- ▶ Nystagmus (from damage to the vestibular system)

## CONTI...

### 2) Concussions:

- Loss of consciousness for 5 min or less.
- Retrograde amnesia, post-traumatic amnesia.
- Headache.
- Dizziness.
- Nausea & vomiting
- No break in the skull or dura, no visible damage is seen.

## CONTI....

### 3) Contusion:

- ▶ These are associated with serious injuries including cervical fractures.
- ▶ Brain swelling & edema may cause increase ICP & herniation syndrome.

### Cerebral contusion:

- ▶ An agitated confused head injury client who remains alert may have a temporal lobe contusion.
- ▶ An aphasic head injury client may have fronto-temporal contusion.



## CONTI...

### Brain stem contusion:

- ▶ An altered LOC for hours, days to week.
- ▶ Damage reticular activating system causes permanent coma.
- ▶ Respiration may be normal , very rapid.
- ▶ Pupil are usually small, equal & reactive.
- ▶ Loss of normal eye movement.
- ▶ Client may respond to light or noxious stimuli.

# MANAGEMENT:

## GOALS-

- Prompt recognition & treatment of hypoxia & acid-base disorders.
- Control of increasing ICP.
- Stabilization of other conditions.

## INITIAL MANAGEMENT

- ▶ ABC.
- ▶ There is a high association of cervical fracture with head injury; therefore the client must be immobilized at the scene of injury & possible complication of cord injury is prevented by using a cervical collar or sand bags.
- ▶ If intubation is necessary, a jaw thrust manure must be used rather than neck flexion to open the airway without possible injury to the spine.
- ▶ Baseline assessment to the client's motor & sensory function is obtained at the scene of the accident.
- ▶ Intervention include achieving oxygenation & lowering the ICP & hyperventilation by mechanical ventilation or with bag mask device.
- ▶ An I/V line is placed & fluids are given to stabilize the BP to systolic pressure over 90 mm of Hg.
- ▶ A complete history including mechanism of injury is important to determine the probable extent of injury.
- ▶ Open head wound should be covered & pressure applied to control bleeding unless there is depressed or compound skull fracture.

## CONTI..

- ▶ Do not attempt to remove foreign objects or any penetrating objects from the wound.
- ▶ Uncomplicated scalp wound are anesthetized with a local anesthetic agent, cleansed & sutured.

### Ongoing management:

- ▶ Ongoing are to maintain cerebral perfusion & reduce ICP is the focus of critical care.
- ▶ The cerebral metabolic rate is reduced with sedatives morphine (opioids), paralytic agents, antipyretics, barbiturates & hypothermia.

## SURGICAL MANAGEMENT

- ▶ **Craniotomy:** An epidural clot may be surgically evacuated through burr holes or a craniotomy. During surgery the wound may be drained & bleeding vessels ligated.
- ▶ Compound depressed skull fractures are immediately treated surgically. The scalp, skull & devitalized brain are debrided, & the wound is cleaned thoroughly.
- ▶ Simple skull depressions are treated electively by bone tissues, removing fragments & repairing lacerated dura.

## CONTI...

### PRE-OP NURSING MANAGEMENT:

- ▶ Before surgery ICP is reduced as much as possible.
- ▶ Baseline neurologic data are documented.
- ▶ Informed consent need to be obtained from the family if the patient is unconscious & confused.

## NURSING CARE PLAN

- ▶ Ineffective airway clearance r/t decrease level of consciousness, loss of protection of airway.
- ▶ Ineffective tissue perfusion (cerebral) r/t edema from traumatic brain injury.
- ▶ Acute confusion r/t traumatic brain injury, hospitalization in an unfamiliar environment.
- ▶ Deficit or excess fluid volume r/t need for fluid resuscitation after traumatic brain injury or need for diuresis.

## CONTI...

- ▶ Hyperthermia r/t traumatic injury or infection.
- ▶ self care deficit r/t unconsciousness.
- ▶ Urinary retention r/t traumatic brain injury affecting neuronal control of the bladder.





Thank  
you!!