

Lecture# 3  
semester# 2

# Head injury

:by

lecturer

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2<sup>nd</sup> Class

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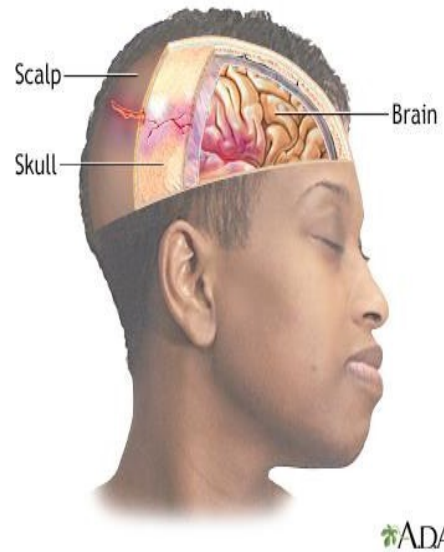
## Head injury

- is a broad classification that includes injury to the scalp, skull, or brain.
- A head injury does not necessarily mean a brain injury is present.
- Motor vehicle accidents are the most common cause followed by alcohol and drug ingestion, assaults, and sports related accidents.



## Types of head injury

- SCALP INJURY
- SKULL FRACTURES
- BRAIN INJURY



## SCALP INJURY

- Isolated scalp trauma is generally classified as a minor injury. Because its many blood vessels constrict poorly, the scalp bleeds profusely when injured.
- Trauma may result in an abrasion (brush wound), contusion, laceration, or hematoma beneath the layers of tissue of the scalp (subgaleal hematoma).

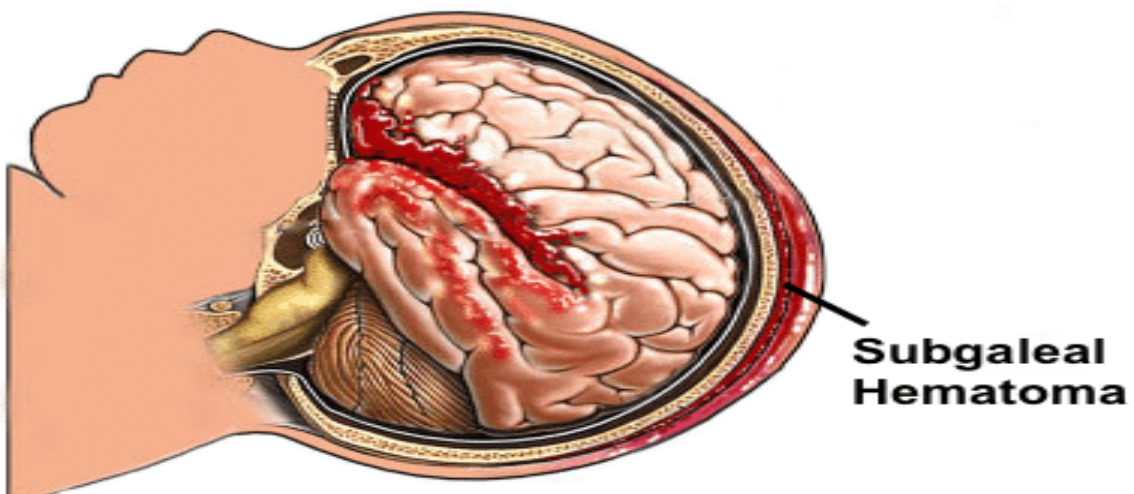


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## SCALP INJURY

- A large avulsion (tearing away) of the scalp may be potentially life-threatening and is a true emergency.
- Diagnosis of a scalp injury is based on physical examination, inspection, and palpation.
- Scalp wounds are potential portals of entry for organisms that cause intracranial infections. Therefore, the area is irrigated before the laceration is sutured, to remove foreign material and to reduce the risk for infection.
- Subgaleal hematomas (hematomas below the outer covering of the skull) usually reabsorb and do not require any specific treatment.

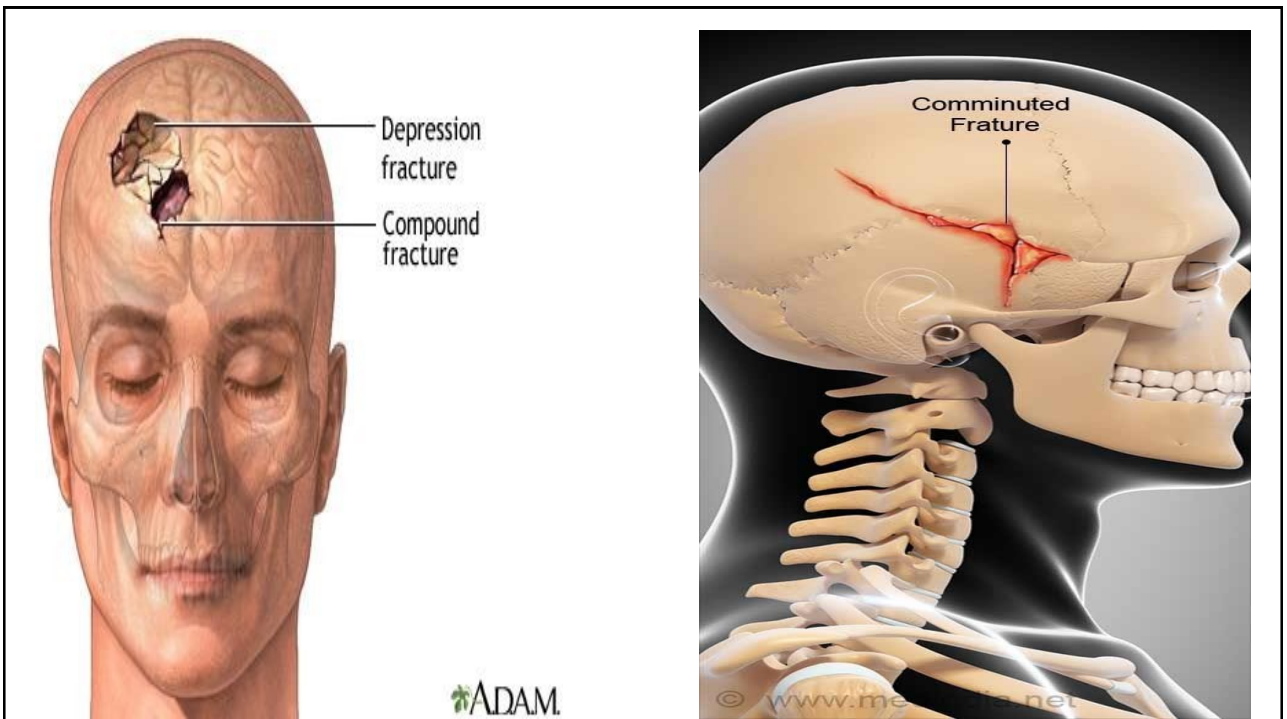
## Subgaleal hematomas



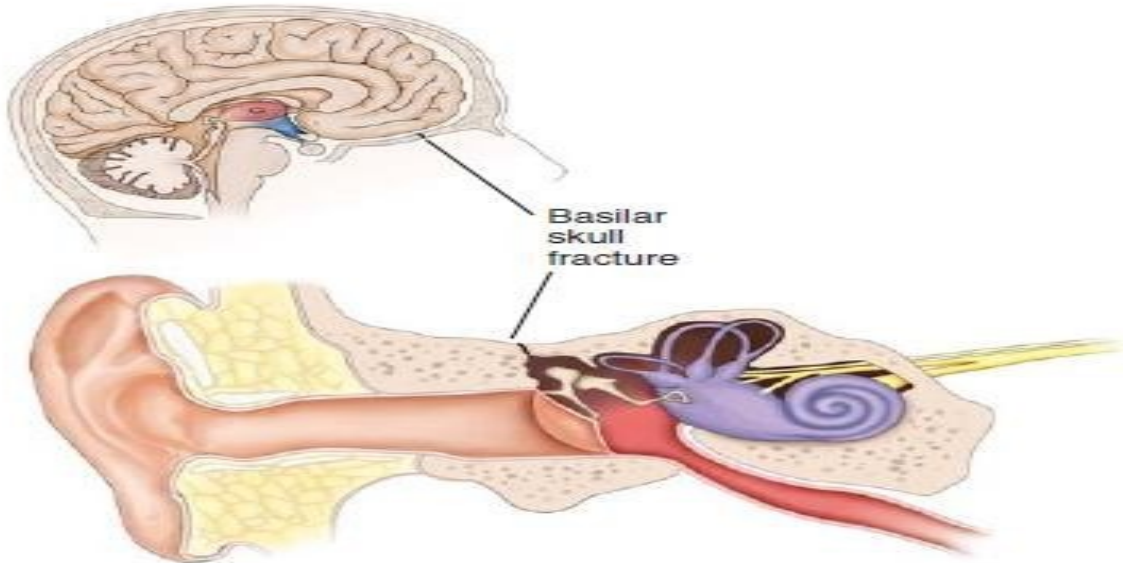
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# Skull Fracture

- is a break in the continuity of the skull caused by forceful trauma.
- It may occur with or without damage to the brain.
- **Skull fractures can be classified as:**
  - 1) **Simple (linear) fracture** is a break in the continuity of the bone.
  - 2) **Comminuted skull fracture** refers to a splintered or multiple fracture line.
  - 3) **Depressed skull fractures** occur when the bones of the skull are forcefully displaced downward and can vary from a slight depression to bones of the skull being splintered and embedded within brain tissue.
  - 4) **Basilar skull fracture** is a fracture of the base of the skull.



## Basilar fractures



## Skull Fracture

- A Skull Fracture may be
- **Open**, indicating a scalp laceration or tear in the dura (e.g., from a bullet),
- **Closed**, in which case the dura is intact.

### Head Injuries Open vs. Closed Head Injury

Open and closed refer to the cranial bones and not the skin.



**Open Head Injury:**  
A head injury that involves a fracture to the cranium is an open head injury.



**Closed Head Injury:**  
Any head injury where the cranium remains intact is a closed head injury.

## Clinical Manifestations

- depend on the severity and the anatomic location of the underlying brain injury.
- Persistent, **localized pain** usually suggests that a fracture is present.
- **hemorrhage** from the nose, pharynx, or ears, and blood may appear under the conjunctiva.
- An area of **ecchymosis** (bruising) may be seen over the mastoid (Battle's sign).
- Basilar skull fractures are suspected when **CSF escapes from the ears (CSF otorrhea)** and **the nose (CSF rhinorrhea)**.
- Rhinorrhea consisting of clear fluid is suggestive of a **tear in the dura** in a client with a basilar skull fracture.

## Assessment and Diagnostic Findings

- X-rays confirm the presence and extent of a skull fracture
- A rapid physical examination and evaluation of neurologic status detects obvious brain injuries,
- CT scan uses to detect less apparent abnormalities.
- (MRI) is used to evaluate patients with head injury when a more accurate picture of the anatomic nature of the injury is warranted.

## Medical Management

- Nondepressed skull fractures generally do not require surgical treatment; however, close observation of the patient is essential.
- Nursing personnel may observe the patient in the hospital, but if no underlying brain injury is present, the patient may be allowed to return home.
- Depressed skull fractures usually require surgery with elevation of the skull and debridement, usually within 24 hours of injury.

## Traumatic Brain Injury

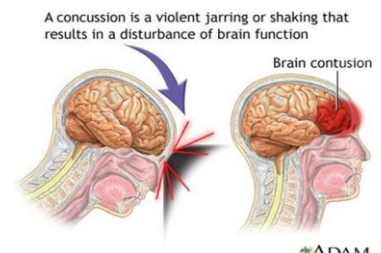
- **A traumatic brain injury, closed (blunt)** occurs when the head accelerates and then rapidly decelerates or collides with another object (e.g., a wall, the dashboard of a car) and brain tissue is damaged but there is no opening through the skull and dura.
- **A traumatic brain injury, open (penetrating)** occurs when an object penetrates the skull, enters the brain, and damages the soft brain tissue in its path or when blunt trauma to the head is so severe that it opens the scalp, skull, and dura to expose the brain.

## Types of Brain Injury

- Injuries to the brain can be **focal** or **diffuse**.
- **Focal injuries** include **contusions** and **several types of hematomas**.
- **Concussions** and **diffuse axonal injuries** are the **major diffuse injuries**.

## Contusion

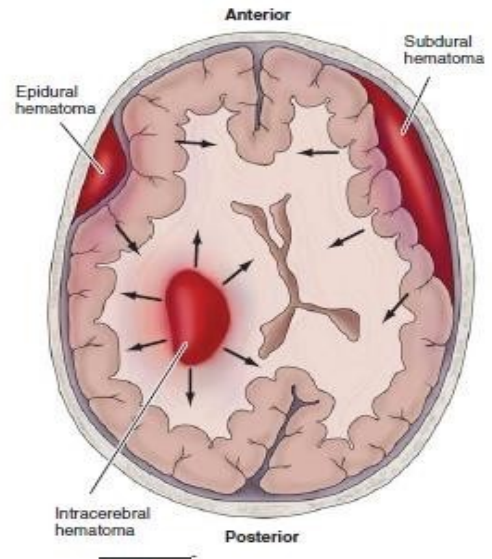
- In **cerebral contusion** the brain is bruised and damaged in a specific area because of severe acceleration–deceleration force or blunt trauma.
- The impact of the brain against the skull leads to a contusion.
- Clinical manifestations of a contusion are dependent upon size, location.
- More severe S&S than concussion. **Loss of consciousness with stupor and confusion and focal neurological deficits** including seizures reflecting area of brain that is damaged.
- The effects of injury, particularly hemorrhage and edema,
- peak after about 18 to 36 hours.
- Increased ICP





## Intracranial Hemorrhage

- Hematomas are collections of blood in the brain that may be **epidural** (above the dura), **subdural** (below the dura), or **intracerebral** (within the brain)



## Epidural Hematoma

- After a head injury, blood may collect in the **epidural** (extradural) space between the **skull** and the **dura mater**.
- This can result from a skull fracture that causes a rupture or laceration of the middle meningeal artery, the artery that runs between the dura and the skull inferior to a thin portion of temporal bone.
- Hemorrhage from this artery causes rapid pressure on the brain.
- EDH is considered an extreme emergency;
- Symptoms include a **brief loss of consciousness**, followed by a lucid interval in which the patient is awake and conversant.

## Subdural Hematoma (SDH)

- An SDH is a **collection of blood** between **the dura** and **the brain**, a space normally occupied by a thin cushion of fluid.
- venous bleeding into space between dura and arachnoid
- The most common cause is trauma, but it can also occur as a result of coagulopathies or rupture of an aneurysm.
- An SDH is more frequently venous in origin and is caused by the rupture of small vessels that bridge the subdural space
- SDHs may be acute or chronic depending on the size of the involved vessel and the amount of bleeding on CT scan.

## Acute SDH

- Approximately 50% of brain injuries and 60% of deaths in patients with brain injuries result from acute SDHs and are associated with major head injury involving contusion or laceration.
- Clinical S&S develop rapidly include changes in the level of consciousness (LOC), pupillary signs, and hemiparesis.
- Coma, increasing blood pressure, decreasing heart rate, and slowing respiratory rate are all signs of a rapidly expanding mass requiring immediate intervention.
- If the patient can be transported rapidly to the hospital, an immediate craniotomy is performed to open the dura,

## Chronic SDH

- can develop from seemingly minor head injuries and is seen most frequently in older adults who are prone to this type of head injury due to brain atrophy, which is a consequence of the aging process.
- The time between injury and onset of symptoms can be lengthy (e.g., 3 weeks to months), so the actual injury may be forgotten.
- Symptoms include severe headache, which tends to come and go; alternating focal neurologic signs; personality changes; mental deterioration; and focal seizures.
- The treatment for a chronic SDH consists of surgical evaluation for evacuation of the clot.

## Intracerebral Hemorrhage and Hematoma

- It is result from bleeding into the parenchyma of the brain.
- It is commonly seen in head injuries when force is exerted to the head over a small area (e.g., missile injuries, bullet wounds, stab injuries).
- **These hemorrhages within the brain may also result from the following:**
  - Systemic hypertension, which causes degeneration and rupture of a vessel
  - Rupture of an aneurysm
  - Vascular anomalies
  - Intracranial tumors
  - Bleeding disorders such as leukemia, hemophilia, aplastic anemia, and thrombocytopenia
  - Complications of anticoagulant therapy

## Concussion

- It is a temporary loss of neurologic function with no apparent structural damage to the brain as a result of head injury.
- The mechanism of injury is usually blunt trauma from an acceleration–deceleration force, a direct blow, or a blast injury.
- Monitoring includes observing the patient for a decrease in LOC, worsening headache, dizziness, seizures, abnormal pupil response, vomiting, irritability, slurred speech, and numbness or weakness in the arms or legs

- Repeated concussive incidents can lead to a syndrome known as **chronic traumatic encephalopathy**.
- This syndrome has been recognized in those participating in contact sports such as football and boxing.
- The presentation is similar to Alzheimer disease, characterized by personality changes, memory impairment, and speech and gait disturbances.

## Diffuse Axonal Injury (DAI)

- DAI results from widespread shearing and rotational forces that produce damage throughout the brain—to axons in the cerebral hemispheres, corpus callosum, and brainstem.
- The injured area may be diffuse with no identifiable focal lesion.
- DAI is associated with prolonged traumatic coma; it is more serious and is associated with a poorer prognosis than a focal lesion.
- The patient with DAI in severe head trauma experiences **no lucid interval**, immediate coma, decorticate and decerebrate posturing.

## Medical Management

- ❖ Assessment and diagnosis of the extent of injury are accomplished by the initial physical and neurologic examinations.
- ❖ CT and MRI scans are the main neuroimaging diagnostic tools and are useful in evaluating the brain structure
- ❖ Any patient with a head injury is presumed to have a cervical spine injury until proven otherwise.

## Assessment

- ❑ The immediate health history should include the **following questions:**
- When did the injury occur?
- What caused the injury? A high-velocity missile? An object striking the head? A fall?
- What was the direction and force of the blow?
- includes determining the patient's LOC using the Glasgow Coma Scale (GCS) and assessing the
- patient's response to tactile stimuli (if unconscious), pupillary response to light, corneal and gag reflexes, and motor function.

## NURSING DIAGNOSES

- ❑ Ineffective airway clearance and impaired gas exchange related to brain injury.
- ❑ Risk for ineffective cerebral tissue perfusion related to increased ICP, decreased Cerebral Perfusion Pressure, and possible seizures.
- ❑ Deficient fluid volume related to decreased LOC and hormonal dysfunction.
- ❑ Imbalanced nutrition: less than body requirements related to increased metabolic demands, fluid restriction, and inadequate intake.
- ❑ Risk for imbalanced body temperature related to damaged temperature-regulating mechanisms in the brain.

## Planning and Goals

- ❑ maintenance of a patent airway,
- ❑ adequate Cerebral Perfusion Pressure, fluid and electrolyte balance, adequate nutritional status,
- ❑ prevention of secondary injury,
- ❑ maintenance of body temperature within normal limits,
- ❑ maintenance of skin integrity, improvement of coping,
- ❑ prevention of sleep deprivation,
- ❑ effective family coping,
- ❑ Increased knowledge about the rehabilitation process,
- ❑ and absence of complications.

## Nursing Interventions:

- ❑ Maintaining the Airway
- ❑ monitoring neurologic function
- ❑ monitoring fluid and electrolyte balance
- ❑ promoting adequate nutrition
- ❑ preventing injury
- ❑ maintaining body temperature
- ❑ maintaining skin integrity
- ❑ improving coping
- ❑ preventing sleep pattern disturbance