Head Injury

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- Head injury is a general term used to describe any trauma to the head specifically to the brain itself.
- Head injury refers to, trauma to the head. This may or may not include injury to the brain.

DEFINITION

- Head injury includes any trauma to the scalp, skull or brain tissues either singly or collectively.

Causes of Head Injury

- Penetrating trauma
- Blunt Head Trauma - direct blow
- Motor vehicle accidents
- Assaults
- Falls by recreational activities such as biking, skating, or skateboarding
- Sports injuries
- Violence and abuse

Mechanisms of Trauma of Head

Deformation

- Deformation Results from the transmission of energy to the skull, which is insufficient for the skull, then becomes de formed or fractured.

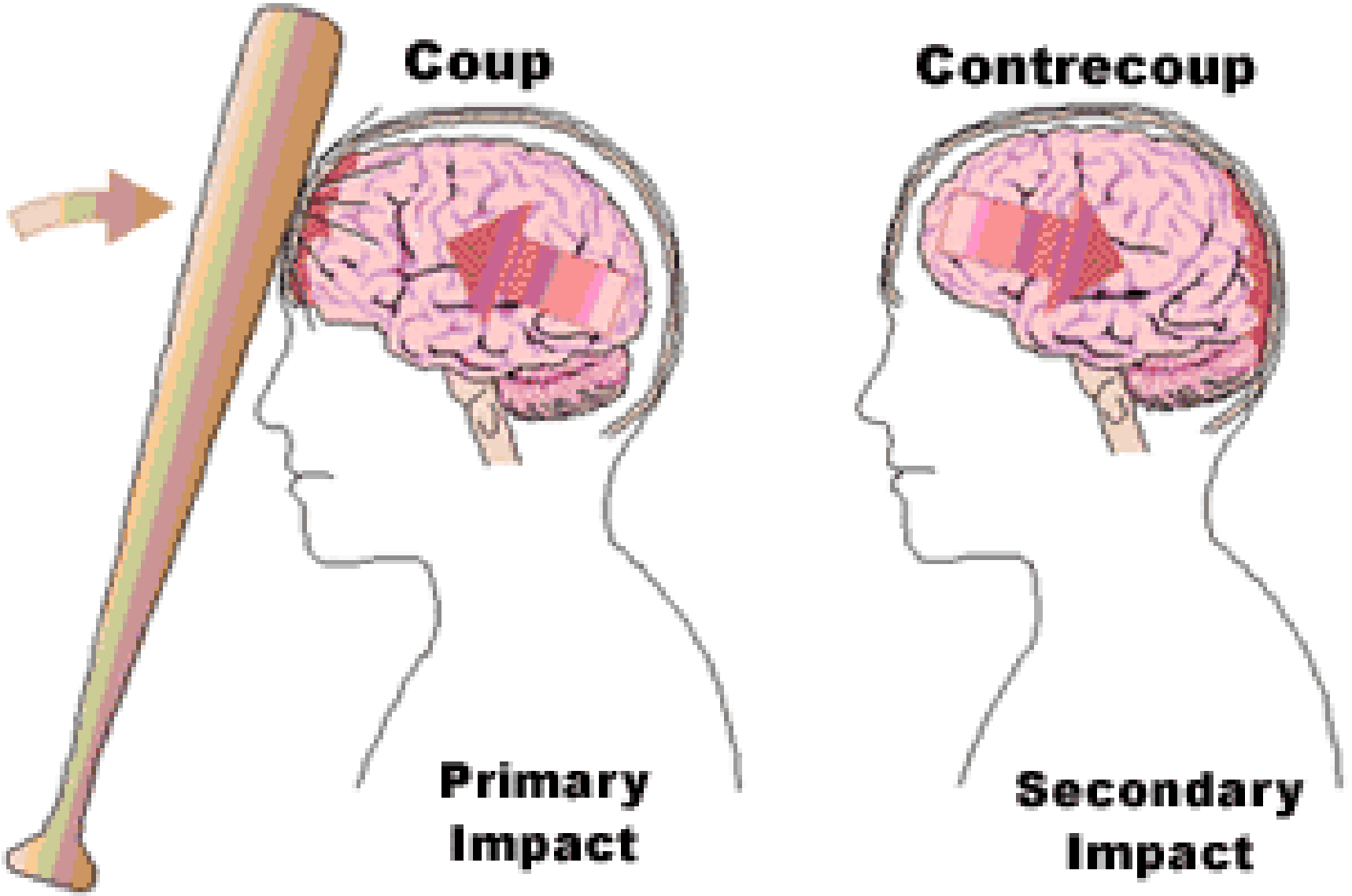
Acceleration/Deceleration

- Acceleration/Deceleration Injuries Typically occur when the acceleration of skull moving in a motor vehicle, suddenly decelerates, when it hits an im mobile object such as the steering wheel or windshield.

Rotational Forces

- Rotational forces also distort the brain and can cause tension, stretching and diffuse shearing of brain tis sues. Often the forces of acceleration, deceleration and rotation occur together, affecting both the brain and spinal cord.

Coup and Countrecoup



TYPES OF HEAD INJURY

- Anytime the skull is fractured, the patient is said to have an **open head injury.**
- If the skull is intact, the term **closed head injury** is used.

- Types of head injuries include injuries to the scalp and skull and brain.

Scalp Injury:

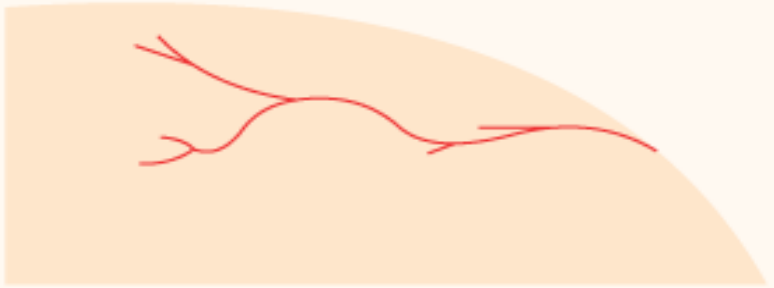
- Head injuries may be closed or open.
- A closed head injury is one in which the skull is not broken.
- A penetrating head injury occurs when an object pierces the skull and breaches the dura mater.
- Brain injuries may be diffuse, occurring over a wide area, or focal, located in a small, specific area.

Skull Injury:

- A head injury may cause a minor headache skull fracture, which may or may not be associated with injury to the brain.
- Some patients may have linear or depressed skull fractures.

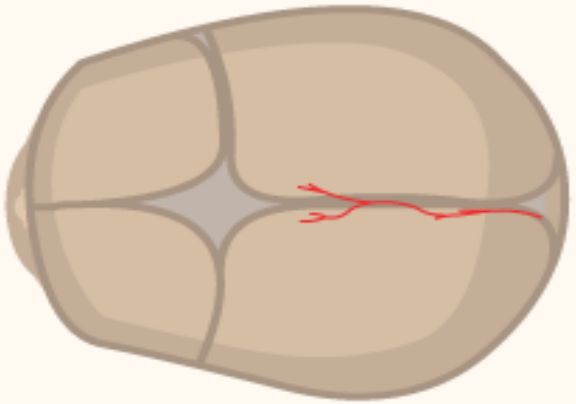
Skull Fracture:

- A skull fracture is a break in the bone surrounding the brain and other structures within the skull.
- A Linear Skull Fracture
- Depressed Skull Fractures.
- Basilar Skull Fracture
- Simple skull fracture
- Comminuted skull fracture
- Compound skull fracture



LINEAR FRACTURE

DEPRESSED FRACTURE



DIASTATIC FRACTURE

BASILAR FRACTURE

TYPES OF BRAIN INJURY

TBI

- Traumatic brain injury is the result of external mechanical force applied to the cranium and the intracranial contents, leading to temporary or permanent impairments, functional disability, or psychosocial maladjustment.

Concussions

- Concussions are associated with sequelae.
- If there is a loss of consciousness, it is for 5 minutes or less.
- Concussion is characterized by headache, dizziness, or nausea and vomiting.
- The patient may complain of amnesia of events before or after the trauma.

- On clinical examination there is no skull or dura injury and no abnormality detected on CT or MRI.

Contusion:

- Brain contusions are bruises of the brain tissue that occur as a result of brain trauma.
- In some cases, brain contusions lead to hemorrhages which are absorbed into the brain tissue.
- If blood is absorbed into the cerebrospinal fluid it can cause permanent neurological damage.

- The majority of contusions occur in the frontal and temporal lobes.
- Brain contusions are localized, a characteristic that distinguishes them from concussions, which are more diffuse (spread out).
- The patient is unconsciousness for a considerable period.

Diffuse Axonal Injury:

- Diffuse axonal injury is characterized by extensive, generalized damage to the white matter of the brain.
- Axons are stretched and damaged when parts of the brain of differing density slide over one another.
- It can be seen in mild, moderate or severe head trauma and results in axonal swelling and disconnections.

- As with other closed head injuries, diffuse axonal injury may cause brain swelling and intracranial pressure.

Intracranial Hemorrhage:

- Intracranial describes any bleeding within the skull. Bleeding in the skull may or may not be associated with a skull fracture.

Intracranial hematoma

- (collection of blood) occurs when the brain is forced against the inside of the skull, resulting in a pool of blood outside the blood vessels of the brain or in between the skull and brain (cranial vault).

- There are three types of intracranial hematoma:
- subdural,
- epidural and
- Intra parenchymal.

Clinical Manifestations

- Disturbances in consciousness
- confusion to coma
- Increased intracranial pressure
- Headache,
- vertigo and disorientation
- Agitation,
- restlessness and dizziness
- Nausea and vomiting

- Pupillary abnormalities
- Respiratory changes
- Changes in vital signs - tachycardia, tachypnea
- Altered or absent cough and gag reflex
- Sensory, visual and hearing impairment

- Hemiparesis or hemiplegia
- Personality change
- Impaired mental function
- Difficulty concentrating
- Increased mood swings
- Lethargy or aggression
- Altered sleep habits
- Ataxia

- Racoon Eyes (Periorital echymosis)

Battle sign (Bruises in mastoid region)

- CSF Otorrhea & CSF Rhinorrhea

Diagnostic Evaluations

- History and physical examination
- CT scan and MRI
- X-Ray of skull and cervical spine
- Positron Emission Tomography
- Angiography
- Neuropsychological tests

CLINICAL APPROACH OF A PATIENT WITH HEAD INJURY

- 1. Detail history of injury has to be taken and also the process of deterioration-rapid or gradual.

- 2. History of alcohol intake: Alcohol intake mimics head injury and alcoholism itself may mask the features of head injury.

3. Neurological assessment by:

- Level of consciousness Glasgow coma scale (GCS)
- Pupillary reaction to light and size
- Pulse
- Temperature
- Blood pressure
- Respiratory rate
- Reflexes Limb movements: Normal /Mild / Severe, weakness/Spastic flexion / Extension /No response.

- 4. Status and protection of airway.
- 5. General assessment and other injuries like fractures, abdominal organ injuries and thoracic injuries are looked for.
- 6. Presence of any scalp hematoma, fractures of skull bone, which may be depressed, has to be looked for.
- 7. Any blood from nose or ear, CSF rhinorrhea or CSF otorrhea has to be looked for.

MEDICAL MANAGEMENT

- Treatment varies widely depending on the type and severity of injuries.
- Minor head injuries are often treated at home as long as someone is available to watch the person.
- Medications commonly are used in the acute setting to control early seizures, reduce intracranial pressure, and correct electrolyte abnormalities.

- Brain-injured patients may be partially or completely dependent for maintenance of respiration, nutrition, elimination, movement, and skin integrity.

1. Management of Increased Intracranial Pressure

- Maintaining adequate oxygenation
- Hyperventilation
- Administering mannitol (osmotic diuretics)
- Draina of cerebrospinal fluid
- Elevation of the head of the bed
- Complete bed rest

- Administering high dose barbiturate therapy
- Dopamine to maintain cerebral perfusion pressure above 50 mmHg
- Glucocorticoid; dexamethasone (Decadron) to reduce cerebral edema.

2. Antibiotic Therapy:

- Administration of antibiotics is required to prevent infection with open skull fractures and penetrating wound.
- Antibiotics are usually not required in closed head injuries.

3. Antiepileptic Therapy:

- Medication to prevent seizures may be given to prevent or treat seizures that occur from the head injury. Seizures cause a profound elevation in intracranial pressure. Phenytoin most often used to control seizures.

4. Supportive Measures.

- Ventilator support
- Vasopressors may be required to maintain blood pressure
- Seizures prevention
- Fluid and electrolyte maintenance
- Nutritional support
- Pain and anxiety management

5. Surgical Management

- Evacuation of blood clots
- Debridement
- Elevation of depressed fractures of the skull
- Suturing of severe scalp lacerations
- Decompressive craniectomies
- Craniotomy

NURSING INTERVENTIONS

- Assist neurologic and respiratory status to monitor for sign of increased ICP and respiratory distress.
- Monitor and record vital sign and intake and output, hemodynamic variables, ICP, cerebral perfusion pressure, specific gravity, laboratory studies, and pulse oximetry to detect early sign of compromise.
- Observe for sign of increasing ICP to avoid treatment delay and prevent neurologic compromise.

- Assess for CSF leak as evidenced by otorhea or rhinorrhea.
- CSF leak could leave the patient at risk for infection.
- Assess for pain.
- Pain may cause anxiety and increase ICP.
- Check cough and gag reflex to prevent aspiration.

- Check for sign of diabetes insipidus (low urine specific gravity, high urine output) to maintain hydration.
- Administer I.V. fluids to maintain hydration.
- Administer Oxygen to maintain position and patency of endotracheal tube if patient and to lower ICP.

- Provide suctioning; if patient is able, assist with turning, coughing, and deep breathing to prevent pooling of secretions.
- Maintain position, patency and low suction of NGT to prevent vomiting.
- Maintain seizure precautions to maintain patient safety.
- To protect the patient from self injury and dislodging of body tubes use padded side rails or wrap the patient's hands in mitts.

- Avoid restraints because strainining against them can increase ICP.
- Minimize environmental stimuli by keeping the room quiet, limiting visitors, speaking calmly.

- Administer medication as prescription to decrease ICP and pain.
- Allow a rest period between nursing activities to avoid increase in ICP.
- Keep the head of the bed elevated about 30 degree to decrease intracranial venous pressure.

- Encourage the patient to express feeling about changes in body image to allay anxiety.
- Provide appropriate sensory input and stimuli with frequent reorientation to foster awareness of the environment.

- Provide means of communication, such as a communication board to prevent anxiety.
- Provide eye, skin, and mouth care to prevent tissue damage.
- Turn the patient every hours or maintain in a rotating bed if condition allows to prevent skin breakdown