

HEAD INJURIES (1)

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Introduction

- Head injuries are a major cause of morbidity and mortality in the community/
- Trauma is the 4th most common cause of death in the Jordan, preceded only by cardiac diseases, cancer and vascular diseases, with between 500 and 800 lives lost every year due to trauma
- Head injuries contribute to over half of trauma related death.

EPIDIMIOLOGY

- DEATHS: 9:100.000 in UK. 25:100.000 in
- USA and JORDAN 8:100.000
- OF ALL DEATHS = 1%

MEN > WOMEN

- YOUNG > OLD

EPIDEMIOLOGY

CAUSES IN CIVIL LIFE

- ROAD TRAFFIC 60%
- DOMESTIC 30%
- INDUSTRIAL
- ASSAULTS
- SPORTS

PATHOLOGY

- PRIMARY
 - CLOSED OR OPEN = SIMPLE OR COMPOUND
 - SCALP
 - SKULL
 - BRAIN
- SECONDARY
- COMPLICATIONS
 - EARLY
 - LATE

CLINICAL PICTURE

HISTORY

- TIME OF TRAUMA
- TYPE OF TRAUMA
- HISTORY OF CONVULSIONS
- HISTORY OF L.O.C. (LUCID INTERVAL)
- POST TRAUMATIC AMNESIA (PTA)
- RETROGRADE AMNESIA

CLINICAL PICTURE (cont.)

EXAMINATION

- BLOOD PRESSURE AND RESPIRATION (SHOCK IS RARE EXCEPT IN ENFANTS OR SEVERE SCALP INJURIES).
- PATENCY OF AIRWAYS
- LEVEL OF CONSCIOUSNESS
 - ☐ GLASGOW COMA SCALE (GCS)
 - ☐ TRAUMA SCALE (SCORE)
- PUPILLARY SIZE

ASSESSMENT OF THE SEVERITY IN HEAD INJURIES

(Glasgow Coma Scale: GCS)

Points	Eye Opening	Best Verbal	Best Motor
6	...	...	Follows commands
5	...	Oriented	Localizes pain
4	Spontaneous	Confused	Withdraws to pain
3	In response to voice	Inappropriate words	Flexion (decorticate)
2	In response to pain	Incomprehensible Sounds	Extension (decerebrate)
1	None	None	None

CLINICAL PICTURE (cont.)

- SCALP EXAMINATION
 - SCALP WOUNDS
 - SCALP HEMATOMAS
 - BATTLE'S SIGN
 - RACCOON EYE
- NEUROLOGICAL EXAMINATION
- EXAMINATION OF OTHER SYSTEMS



MANAGEMENT

- EXAMINATION
- MAKE SURE AIRWAY IS PATENT
- INSERT I.V. LINE
- SKULL X-RAYS: 3 VIEWS
- CERVICAL SPINE X-RAYS: 16% ASSOCIATED
- CT AS INDICATED (See later)
 - FRACTURES
 - DISTURBED LEVEL OF CONSCIOUSNESS
 - NEUROLOGICAL DEFICITS

MANAGEMENT (cont.)

INDICATIONS FOR CT

- Patients below 5 and over 65 years of age
- In case of drug and alcohol consumption
- Concussion more than 5 minutes
- Amnesia more than 5 minutes
- Glasgow coma score (GCS) of 14 & below
- Abnormal neurological signs
- The presence of skull fractures
- The presence of CSF leak
- The presence of epilepsy
- Abnormal skull x-rays

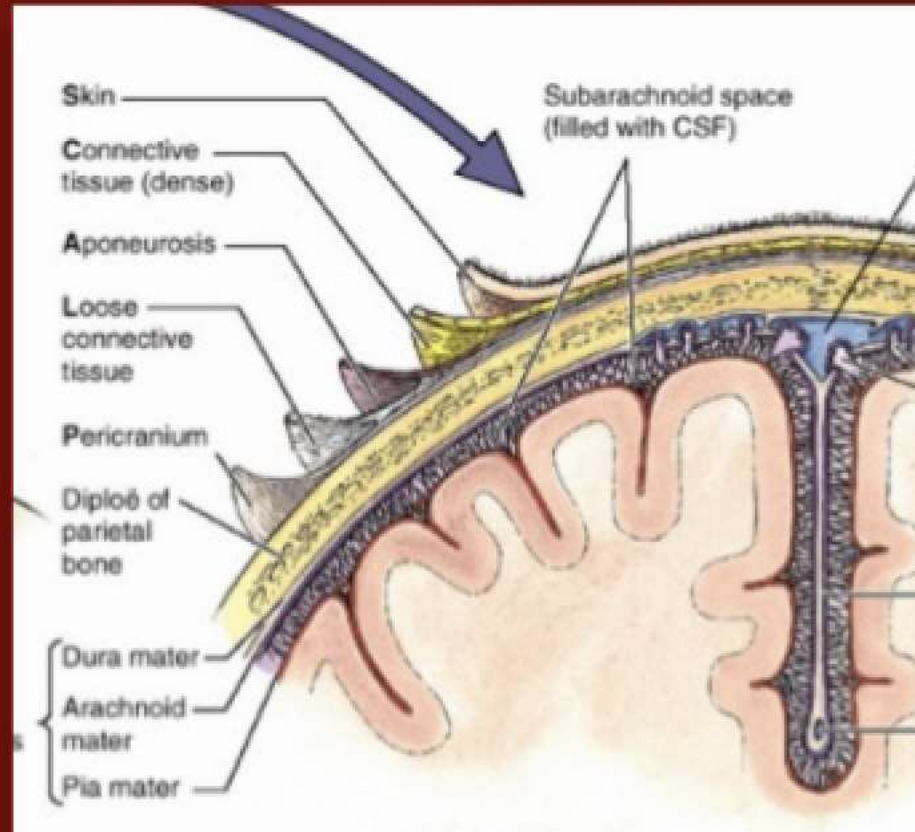
MANAGEMENT (cont.)

INDICATIONS FOR ADMISSIONS

- Patients below 5 & over 65 years of age
- In case of drug & alcohol consumption
- Concussion more than 5 minutes
- Amnesia more than 5 minutes
- Glasgow coma score (GCS) of 14 & below
- Abnormal neurological signs
- In multi trauma
- Patients with co morbidity
- The presence of skull fractures
- The presence of CSF leak
- The presence of epilepsy
- Abnormal CT scan
- If you are in doubt

SCALP INJURIES

- **S**-Skin
- **C**-Connective tissue
- **A**-Aponeurosis (galea aponeurotica)
- **L**-Loose areolar tissue
- **P**-Pericranium



SCALP INJURIES

TYPES

- ABRASIONS
- CONTUSIONS
- WOUNDS
- AVULSIONS
- HEMATOMAS
 - SUB-GALEAL HEMATOMA
 - SUB-PERIOSTEAL HEMATOMA

SCALP INJURIES

ABRASION

- Clean with antiseptic solution
- Apply antibacterial ointment
- Cover with gauze.



SCALP INJURIES

CONTUSION

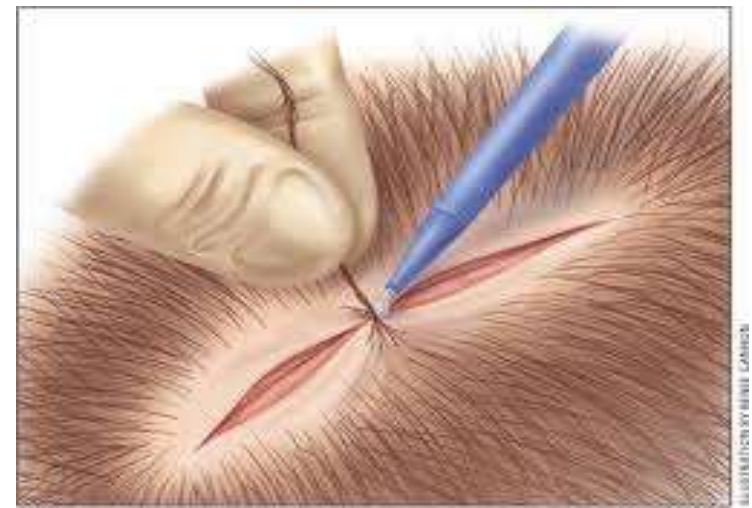
- Do not require treatment
- Cold compresses
- Analgesia



SCALP INJURIES

CUT WOUND

- Shave around wound
- Inspect wound and feel floor for fractures
- Clean wound and remove foreign material
- Stop bleeding
- Approximate edges
- Suture in two layers using a deep inverted suture.



SCALP INJURIES

LACERATED WOUND

- Shave around wound
- Inspect wound and feel floor for fractures
- Clean wound and remove foreign material
- Stop bleeding
- Do **debridement**.
- Approximate edges if you can . You may need to rotate flaps or graft.
- Suture in two layers using a deep inverted suture.



SCALP INJURIES

SCALP AVULSION

- PARTIAL
 - Stop bleeding
 - Clean with antiseptic solution
 - Do debridement.
 - Approximate edges if you can . You may need to rotate flaps or graft.
 - Suture in two layers using a deep inverted suture
- COMPLETE
 - Stop bleeding
 - Graft



SCALP INJURIES

SUBGALAEAL HEMATOMA

- A peri-natal injury
- Follows vacuum extraction of baby
- Due to torn emissary vein
- Collects underneath the galea aponeurotica
- Could be extensive
- May lead to hypovolemic shock
- Soft and boggy swelling
- Extends across midline
- TREATMENT BY COMPRESSION. TRY TO AVOID ASPIRATION FOR FEAR OF INFECTION. ATTENTION TO BLOOD VOLUME.

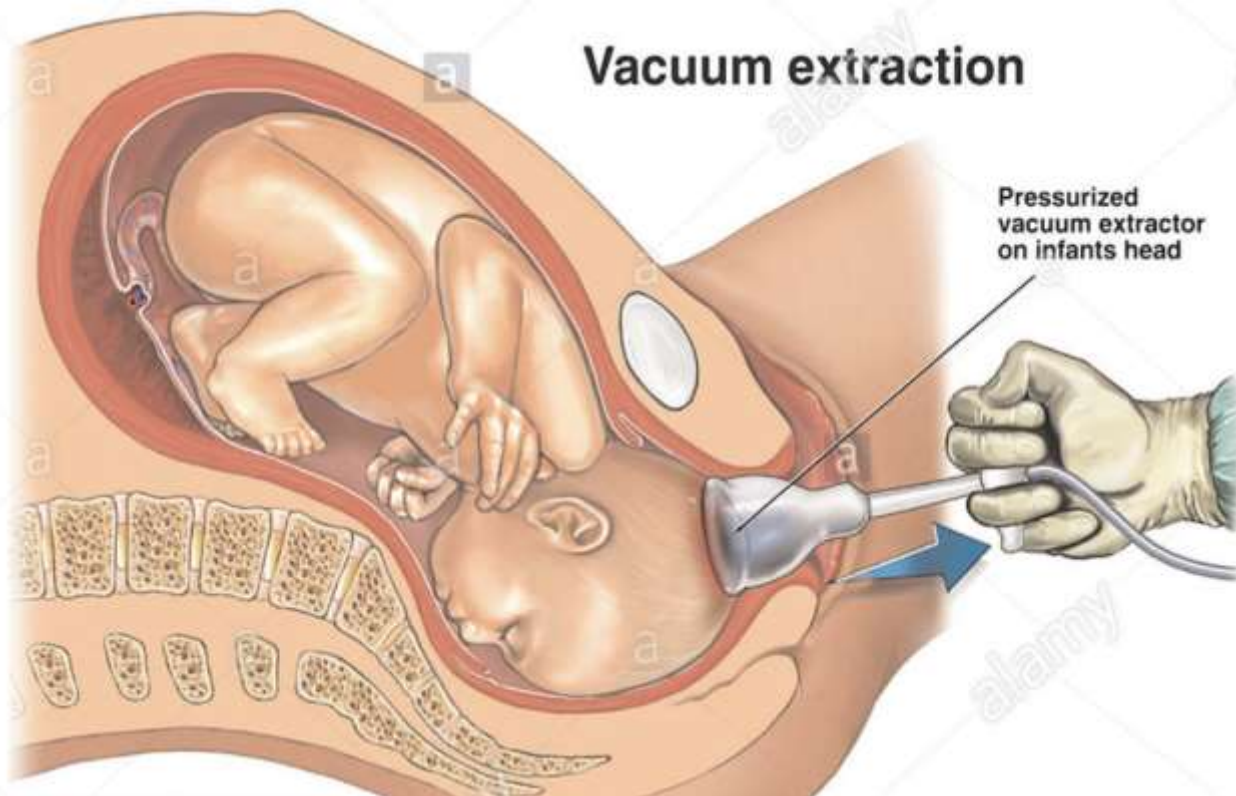
SCALP INJURIES

SUBPERICRANIAL HEMATOMA

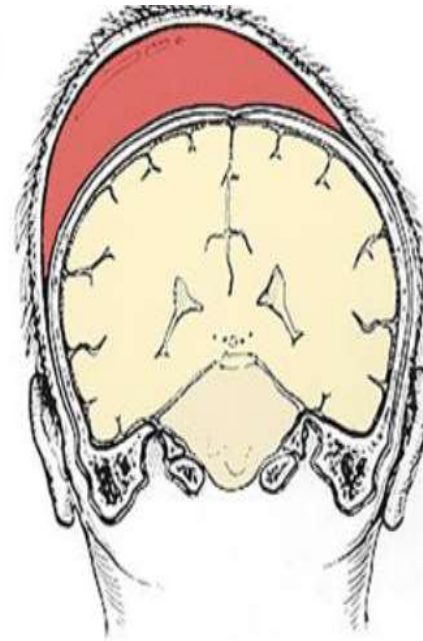
- A peri-natal injury
- Follows vacuum extraction of baby
- Due to torn emissary vein
- Collects underneath the pericranium
- Usually limited by skull sutures and do not cross midline
- Firm swelling
- TREATMENT BY COMPRESSION. TRY TO AVOID ASPIRATION FOR FEAR OF INFECTION.

SCALP INJURIES

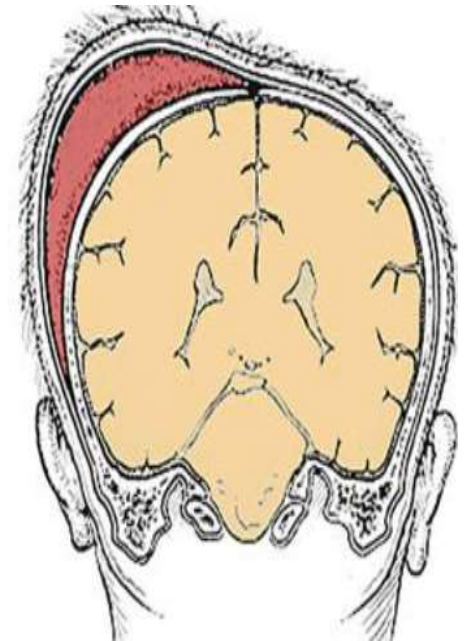
SUBGALAEAL AND SUBPERICRANIAL HEMATOMAS



B



C



SKULL FRACTURES

- A fracture is an interruption to the continuity of the skull bone.
- The trauma is significant and may provide an indication to the presence of an extradural hematoma or brain injury.
- Diffuse trauma causes linear fractures
- Localized trauma causes depressed fractures
- They could be seen on plain x-rays or on CT scans in special views called “Bone Windows”.
- THE PATIENT SHOULD BE ADMITTED .

SKULL FRACTURES

There are **ONLY** 2 types:

- **LINEAR FRACTURES**
- **DEPRESSED FRACTURES:**
 - **ONE FRAGMENT**
 - **COMMINUTED (MULTIPLE FRAGMENTS)**

SKULL FRACTURES

LINEAR SKULL FRACTURES

They are divided geographically into:

- THOSE IN THE VAULT OF THE SKULL AND ARE HAIR-LINE FRACTURES
- THOSE IN THE BASE OF THE SKULL AND ARE BASILAR FRACTURES
- THOSE WHICH RUN IN SUTURE AND ARE DIASTATIC FRACTURES

SKULL FRACTURES

LINEAR SKULL FRACTURES

HAIR-LINE FRACTURES

They occur in the vault of the skull in the area covered normally by the hair, hence their name



SKULL FRACTURES

LINEAR SKULL FRACTURES

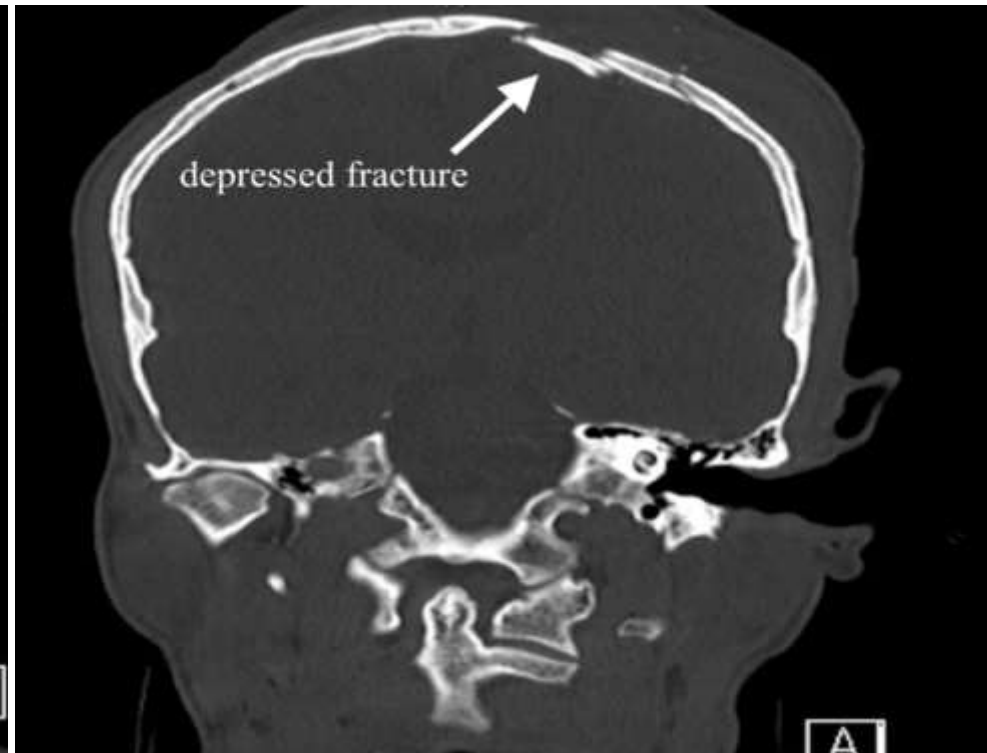
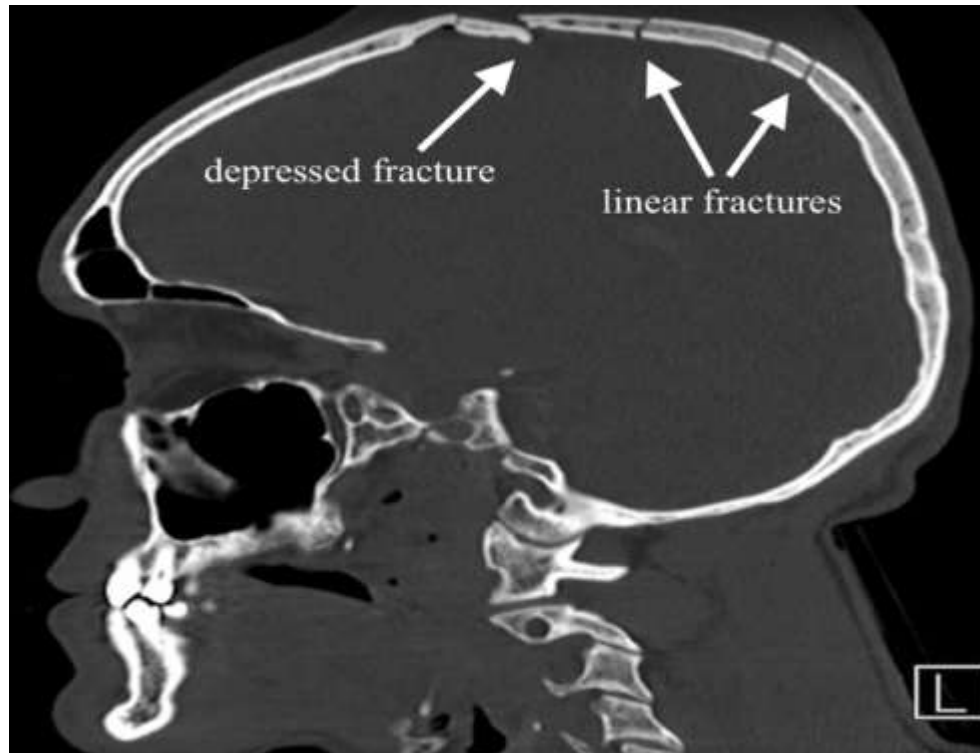
DAISTATIC FRACTURES

They occur in the vault of the skull within the sutures, or start as hair line and then reach the sutures



SKULL FRACTURES

LINEAR ASSOCIATED WITH DEPRESSED FRACTURE ON CT BONE WINDOW RECONSTRUCTION



SKULL FRACTURES

BASILAR SKULL FRACTURES

They tend to occur anywhere in the base but usually in the anterior and middle cranial fossae, and therefore, run into the paranasal sinuses.

They will also run along the many foramina in the base leading to nerve and vascular injury.

BASE OF SKULL SHOWING LEFT TEMPORAL FOSSA
BASILAR FRACTURE



SKULL FRACTURES

- **PRESENTATION IN BASILAR ANTERIOR CRANIAL FOSSA FRACTURES :**
 - Bruising around the eye called racoon or panda eye.
 - Subconjunctival hemorrhage
 - Occasionally nerve and or cranial nerve injury
 - Occasionally CSF leak
- **PRESENTATION IN BASILAR MIDDLE CRANIAL FOSSA FRACTURES:**
 - Bruising behind the ear called battle sign
 - May be hemotympanum
 - Occasionally CSF leak



RACCOON (PANDA) EYES

Bilateral racoon eyes
Left subconjunctival
hemorrhage



BATTLE'S SIGN₃₀

SKULL FRACTURES

MANAGEMENT OF LINEAR SKULL FRACTURES

- There is no specific management for linear skull fractures **unless they are complicated**. They will heal spontaneously within weeks to months
- Just admit for observation and if the patient deteriorates do CT scan to rule out hematomas.
- Open basal skull fractures should be covered with antibiotics and the nose and ear should be observed for CSF leak

SKULL FRACTURES

DEPRESSED SKULL FRACTURES:

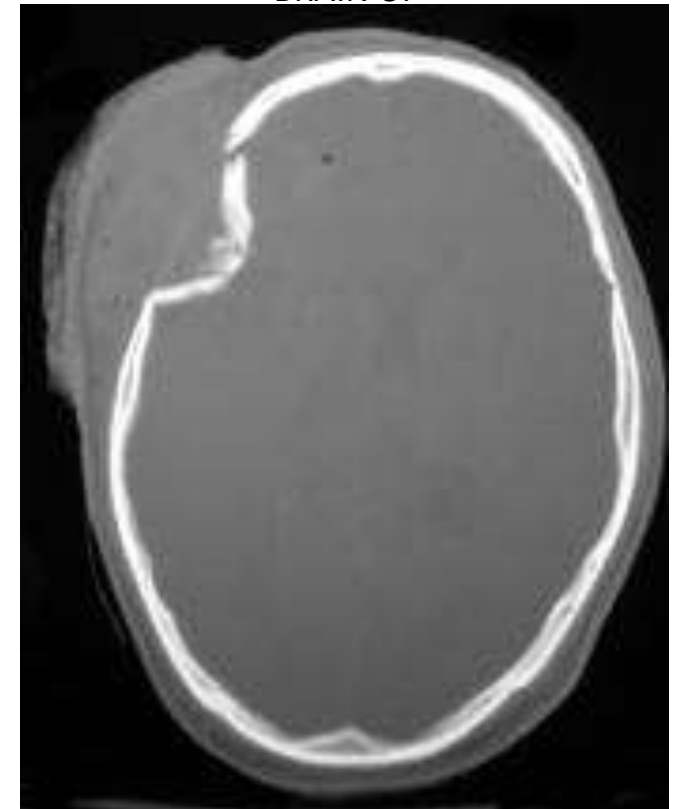
They could be:

- One depressed segment of bone
- Multiple small depressed pieces of bone (comminuted).

LATERAL XRAY VIEW WITH
DEPRESSED FRACTURE



COMMINUTED DEPRESSED
FRACTURE ON BONE WINDOW OF A
BRAIN CT



SKULL FRACTURES

MANAGEMENT OF DEPRESSED SKULL FRACTURES

THEY NEED TO BE OPERATED UPON IF:

- The depression is more than the thickness of the adjacent skull.
- If they are compound and open
- If associated with seizures
- If associated with neurological signs.
- If they overlie an important area
- Cosmetic.

SKULL FRACTURES

- **MANAGEMENT OF DEPRESSED SKULL FRACTURES**

The operation could be:

- Simple elevation
- Craniectomy, this will need to be repaired by an operation called Cranioplasty, which could be immediate or delayed if the fracture was compound.



CRANIOPLASTY WITH ACRYLIC
MATERIAL

BRAIN INJURIES

MECHANISMS OF BRAIN INJURIES

- Direct trauma
- Acceleration deceleration injury
- Shearing

BRAIN INJURIES

PRIMARY INJURIES

- ☐ Concussion
- ☐ Contusion.
- ☐ Laceration
- ☐ Diffuse axonal injury (DAI)

SECONDARY EVENTS

- ☐ Brain edema
- ☐ Hypoxia
- ☐ Ischemia

BRAIN INJURIES

CONCUSSION

Here the patient will lose his consciousness for a brief period of time. When he wakes up; he will be amnesic. Examination will show no abnormality . CT scans are usually normal.

BRAIN INJURIES

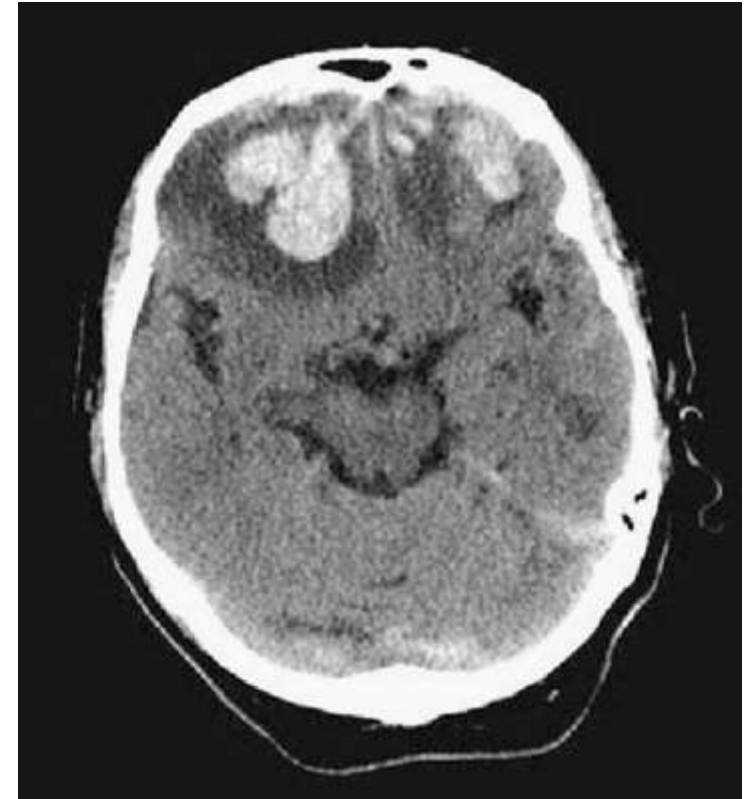
CONTUSION

Here the brain will suffer from a contused area or areas as a result of the direct trauma or the acceleration deceleration injury.

The most common sites for this latter is the under surface of the brain and the tips of the lobes in what is called coup contre-coup injuries.

Contusions are notorious for being associated with brain edema which makes their management difficult.

Bilateral frontal contusions associated with edema



*Bilateral frontal contusions associated
with edema*

BRAIN INJURIES

LACERATION

Here the brain will suffer from a lacerated area or areas as a result of the direct trauma especially if penetrating, or the acceleration deceleration injury. The neurological deficits which result are usually permanent.

BRAIN INJURIES

DIFFUSE AXONAL INJURY

Will usually result from shearing injury which acted upon the interface of grey and white matter. If extensive the patient will be in deep coma (3/15).

BRAIN INJURIES

MANAGEMENT OF BRAIN INJURIES

BRAIN INJURIES ARE DIVIDED INTO 3 CATEGORIES DEPENDING ON THE GCS:

- MILD with GCS 14 AND 15
- MODERATE With GCS BETWEEN 9 AND 13
- SEVERE With GCS 8 AND BELOW

BRAIN INJURIES

MANAGEMENT OF BRAIN INJURIES

ABC then

- ☐ **CONCUSSION:**

- ☐ Observation for 24 hours.

- ☐ **CONTUSION & LACERATION:**

- ☐ ?steroids, diuretics.
- ☐ Anticonvulsants
- ☐ May need ventilation and ICP monitoring
- ☐ Surgery?

- ☐ **DIFFUSE AXONAL INJURY:**

- ☐ As above but will definitely need ventilation, ICP monitoring and anticonvulsants