HEAD INJURIES (1)

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.

EPIDIMIIOLOGY

- Deaths: 9:100.000 in UK. 25:100.000 in
- USA and JORDAN 8:100.000
- Of all deaths = 1%

Men > women

- Young > old

EPIDIMIIOLOGY

CAUSES IN CIVIL LIFE

- Road traffic 60%
- Domestic 30%
- Industrial
- Asssaults
- Sports

PATHOLOGY

1. Primary

   Closed or open = simple or compound

   1. Scalp
   2. Skull
   3. Brain

2. 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

ABC…..DE

- 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

Level of consciousness 15—3/15

(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.)

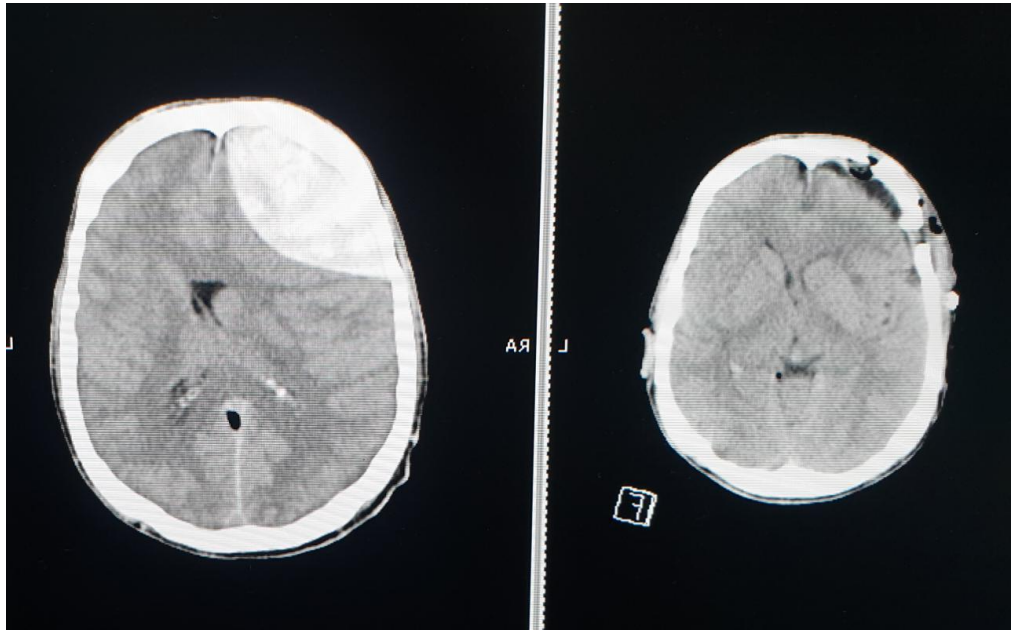
- Scalp examination
  - Scalp wounds
  - Scalp hematomas
  - Battle's sign
  - Racoon eye
- Neurological examination
- Examination of other systems

MANAGEMENT

1. Examination…..ABC
2. Make sure airway is patent
3. Insert i.V. Line
4. Skull x-rays: 3 views????
5. Cervical spine x-rays: 16% associated
6. CT-scan AS INDICATED (see later)

INDICATIONS FOR CT

1. Patients below 5 and over 65 years of age
2. In case of drug and alcohol consumption
3. LOC witnessed-more than 5 minutes
4. Amnesia ?
5. Glasgow coma score (GCS) of 14 & below
6. Abnormal neurological signs
7. The presence of skull fractures
8. Signs of skull base fractures
9. The presence of posttraumatic seziures
10. Abnormal skull x-rays

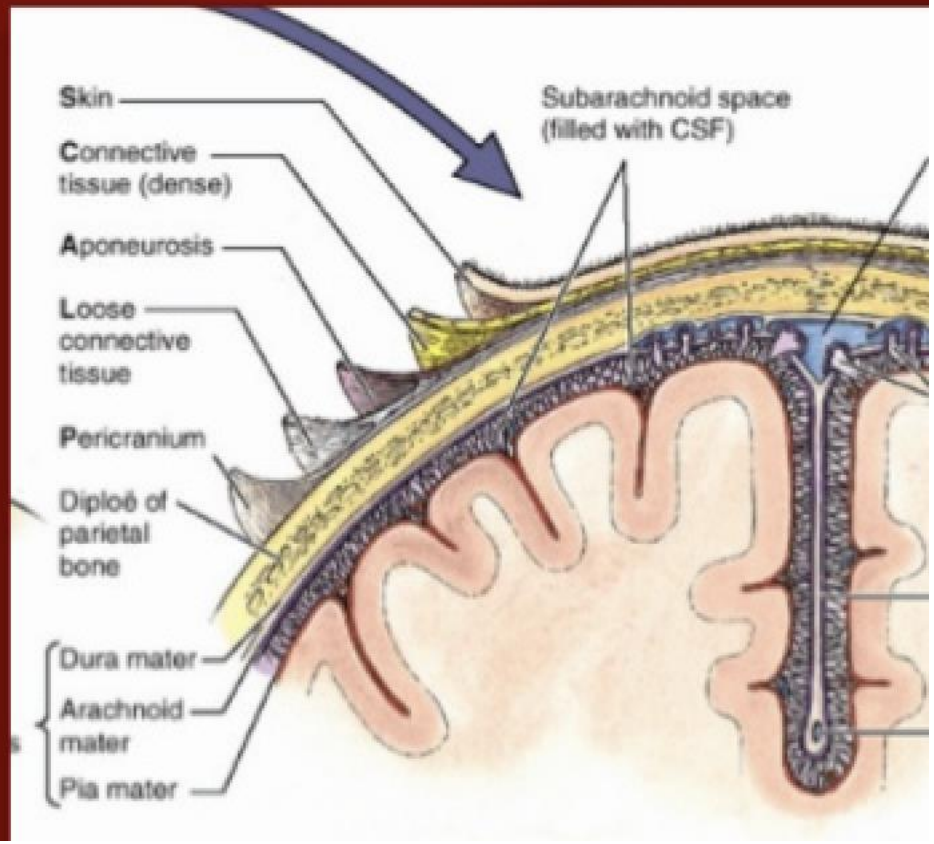


INDICATIONS FOR ADMISSION:

1. Patients below 5 & over 65 years of age
2. In case of drug & alcohol consumption
3. LOC more than 5 minutes
4. Amnesia more than 5 minutes
5. Glasgow coma score (GCS) of 14 & below
6. Abnormal neurological signs
7. In multi trauma
8. Patients with co morbidity
9. The presence of skull fractures
10. The presence of sings of skull base fractures
11. The presence of seziure
12. Abnormal brain-CT scan
13. If you are in doubt

Classificaion of head injury –Pathology
1-SCALP INJURIES

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



SCALP INJURIES

TYPES

1. Abrasions
2. Contusions
3. Wounds
4. Avulsions
5. Hematomas
    1. Sub-galeal hematoma
    2. 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

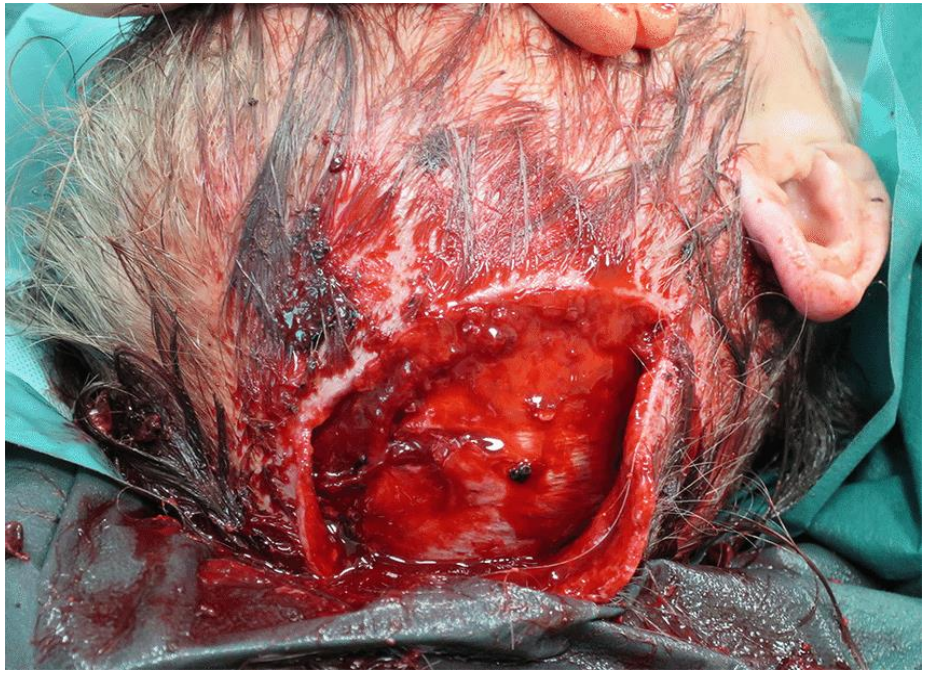
CUT WOUND

- 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

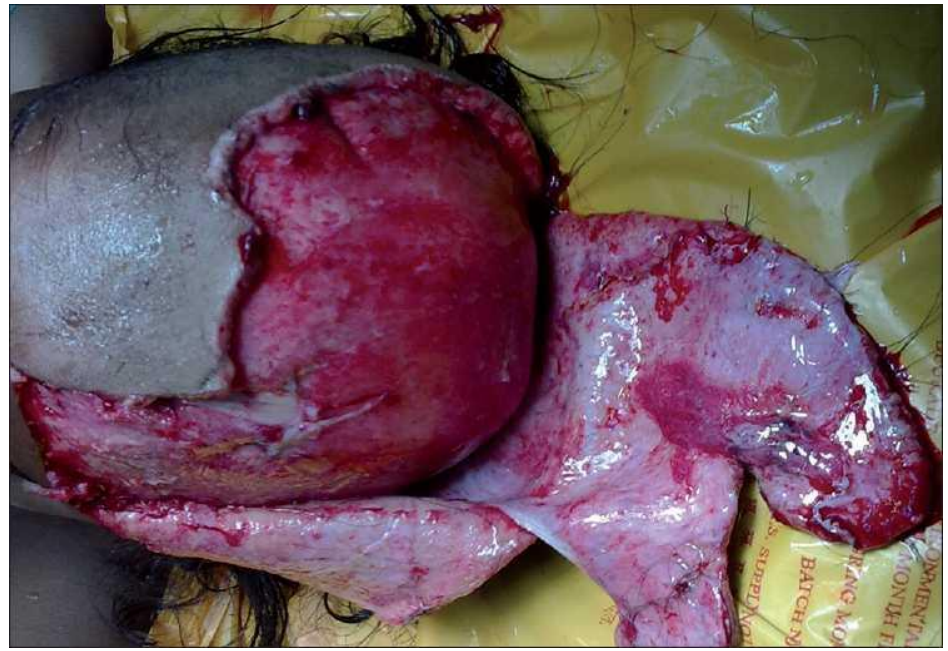
- Shave around wound
- Inspect wound and feel flooe for fractures
- Clean wound and remove foreign material
- Stop bleeding
- Do **debridement.**
- Approximate edges if you can . You may need to rotate flaps or graft.
- Suture in two layers using a deep inverted suture.



SCALP INJURIES

SCALP AVULSION-Degloving scalp

- 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



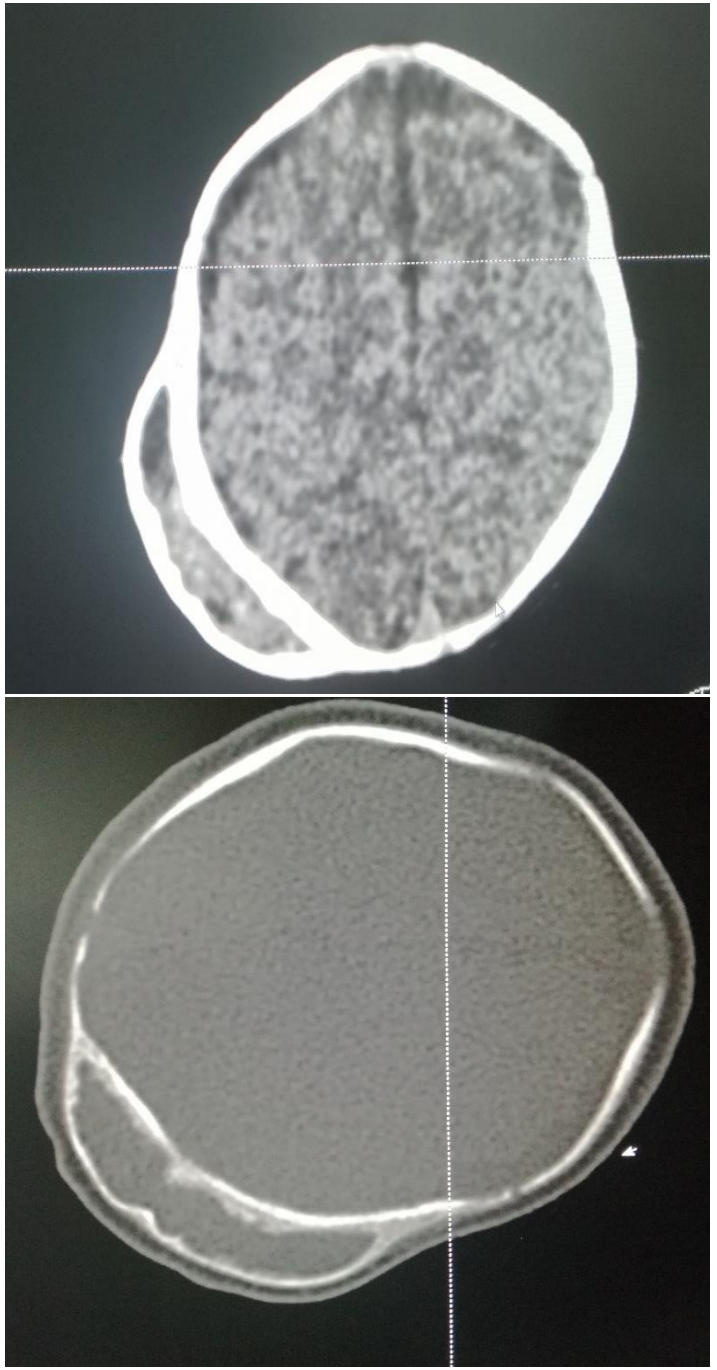
SUBGALAEAL HEMATOMA

May be a birth related trauma

- Due to torn emissary vein
- blood underneath the galea aponeurotica
- Could be extensive
- May lead to hypovolemic shock in infants
- Soft and boggy swelling
- Extends across midline
- TREATMENT BY COMPRESSION. TRY TO AVOID ASPIRATION FOR FEAR OF INFECTION. ATTENTION TO BLOOD VOLUME.

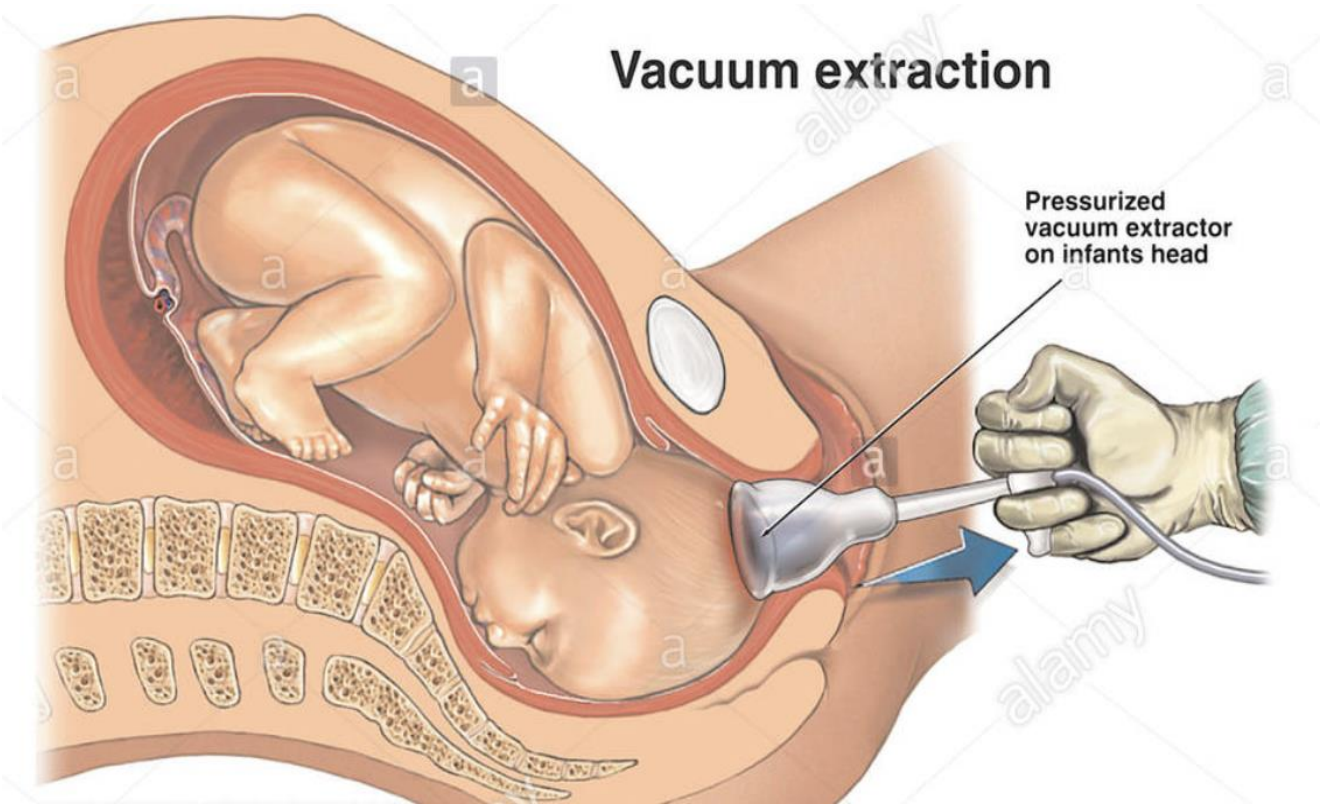
SUBPERICRANIAL(periosteal) HEMATOMA

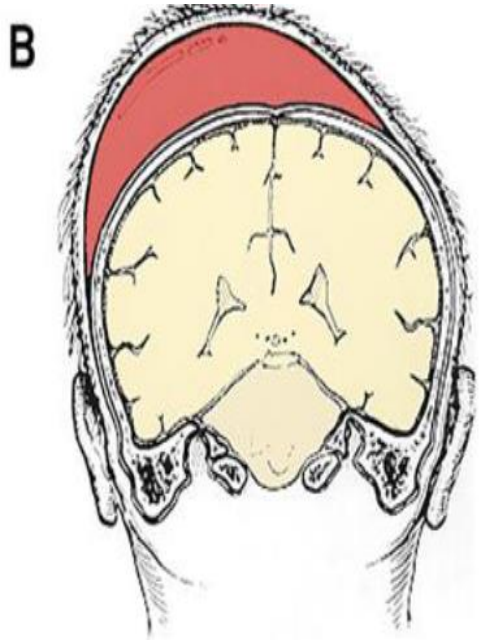
- A peri-natal injury
- Collects underneath the pericranium
- Usually limited by skull sutures and do not cross midline
- Firm swelling
- TREATMENT BY COMPRESSION. TRY TO AVOID ASPIRATION FOR FEAR OF INFECTION.
- May calssify

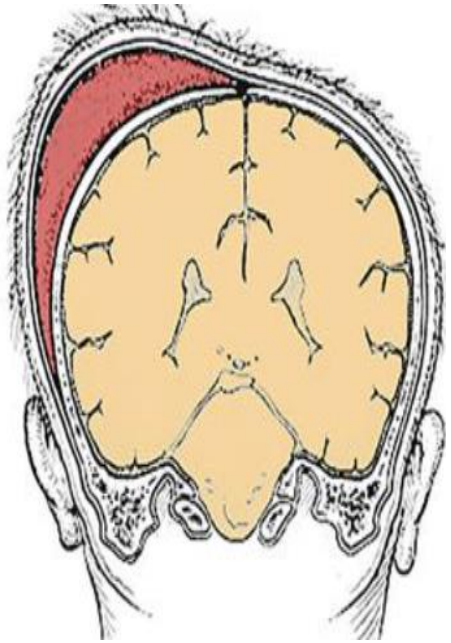


SCALP INJURIES

SUBGALAEAL AND SUBPERICRANIAL HEMATOMAS







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(5%) 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

- **Linear fractures**
- **Depressed fractures:**
  - **One fragment**
  - **Comminuted (multiple fragments)**

SKULL FRACTURES

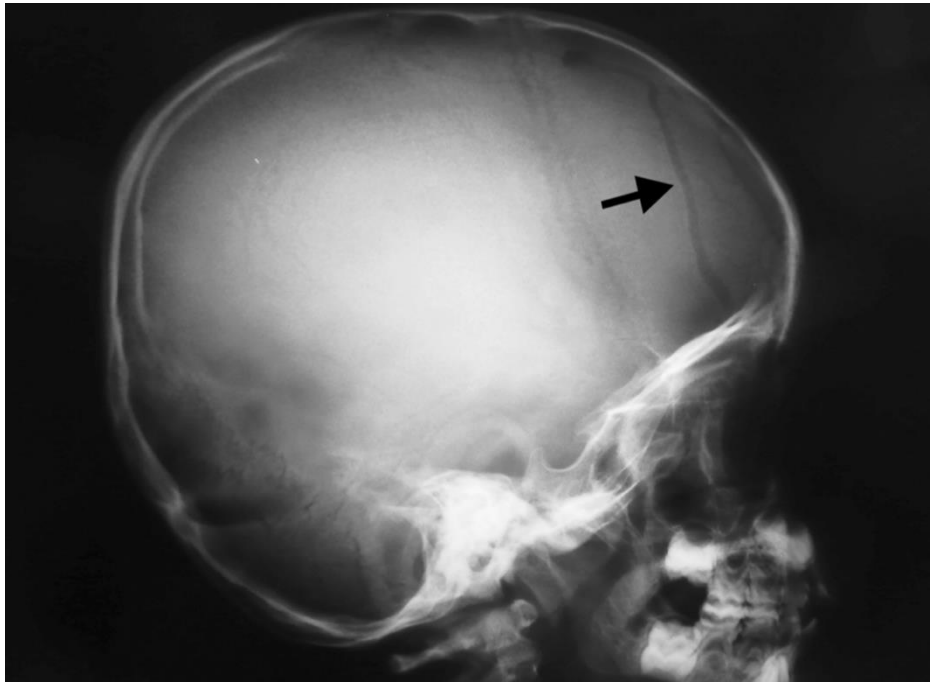
LINEAR SKULL FRACTURES

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

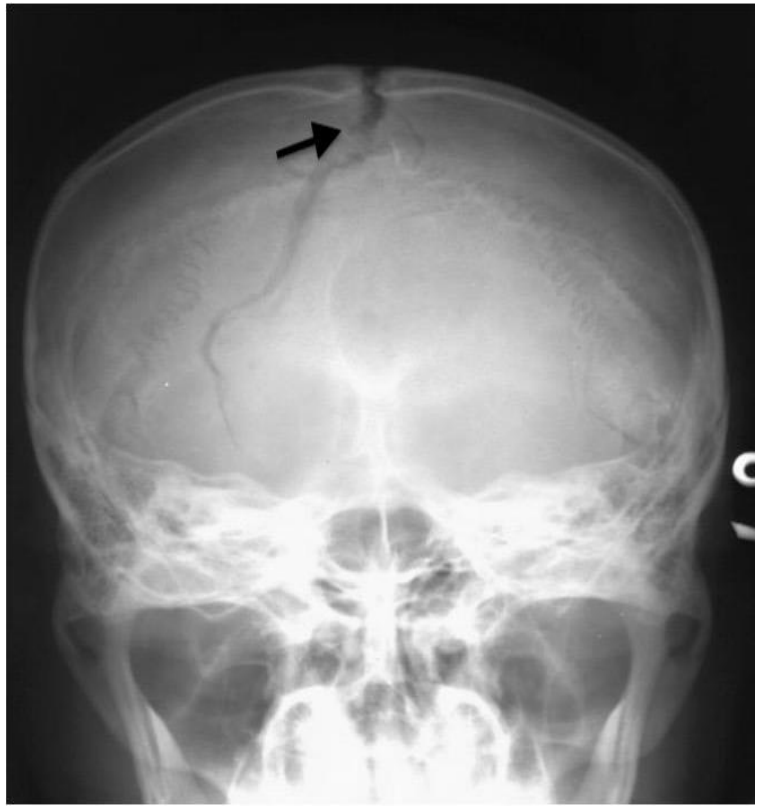
They occur in the vault of the skull in the area covered normally b y the hair, hence their name

SKULL FRACTURES

LINEAR SKULL FRACTURES

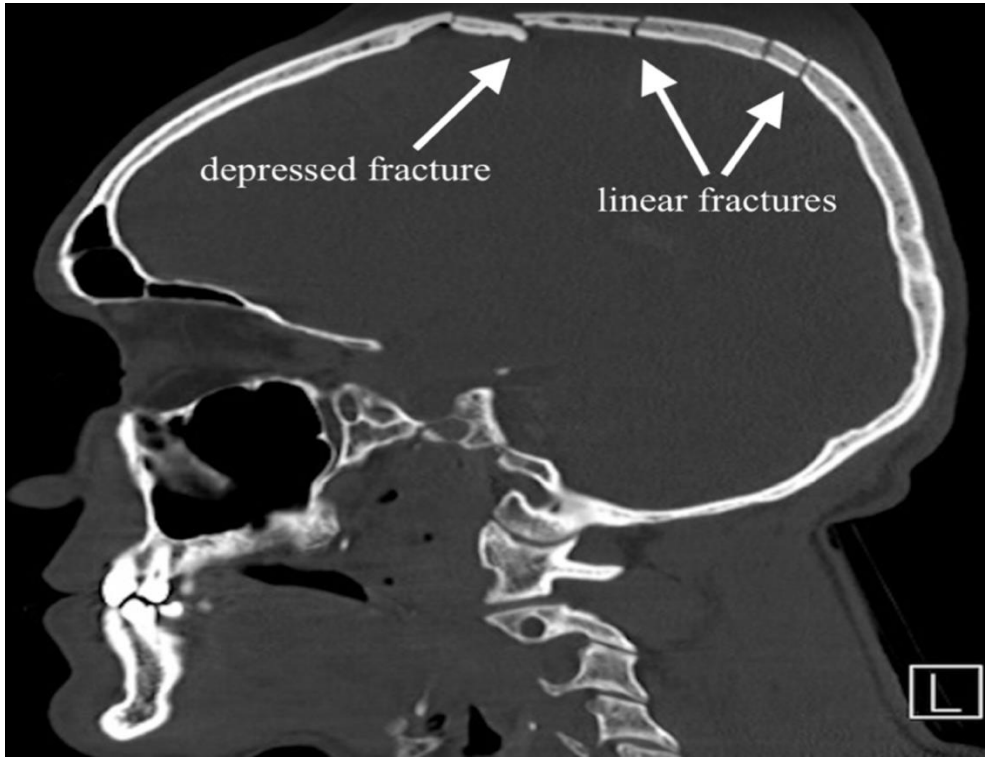
DAISTATIC FRACTURES

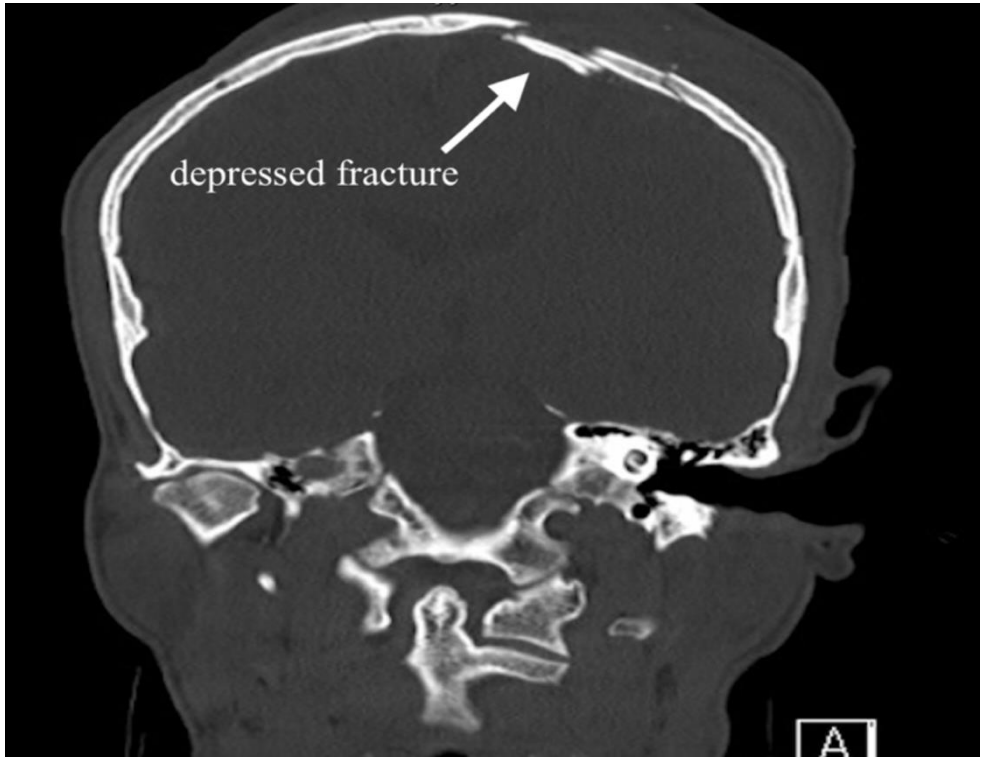
They occur in the vault of the skull within the sutures, or start as hair line and then reach the sutures



SKULL FRACTURES

LINEAR ASSOCIATED WITH DEPRESSED FRACTURE ON CT BONE WINDOW RECONSTRUCTION





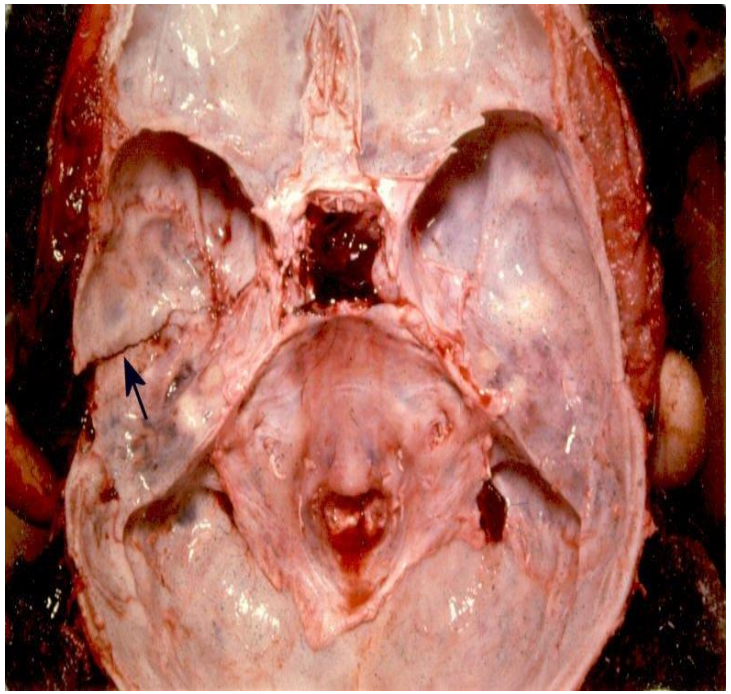
SKULL FRACTURES

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 FOSSAFRACTURES**:
  - Bruising behind the ear called battle sign
  - May be hemotympanum
  - Occasionally CSF leak

RACOON (PANDA) EYES

Bilateral racoon eyes
Left subconjunctival hemorrhage

BATTLE'S SIGN[30]

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

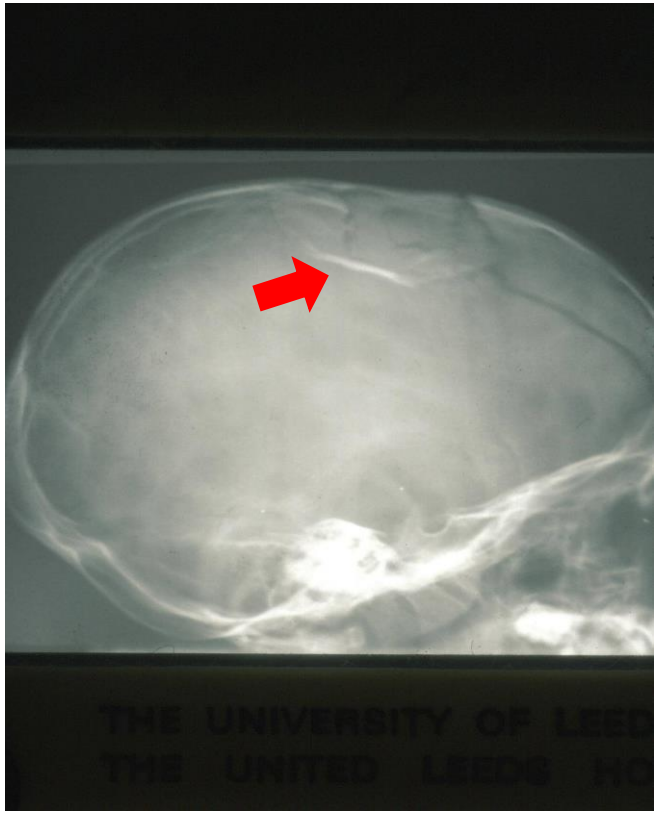
SKULL FRACTURES

DEPRESSED SKULL FRACTURES:

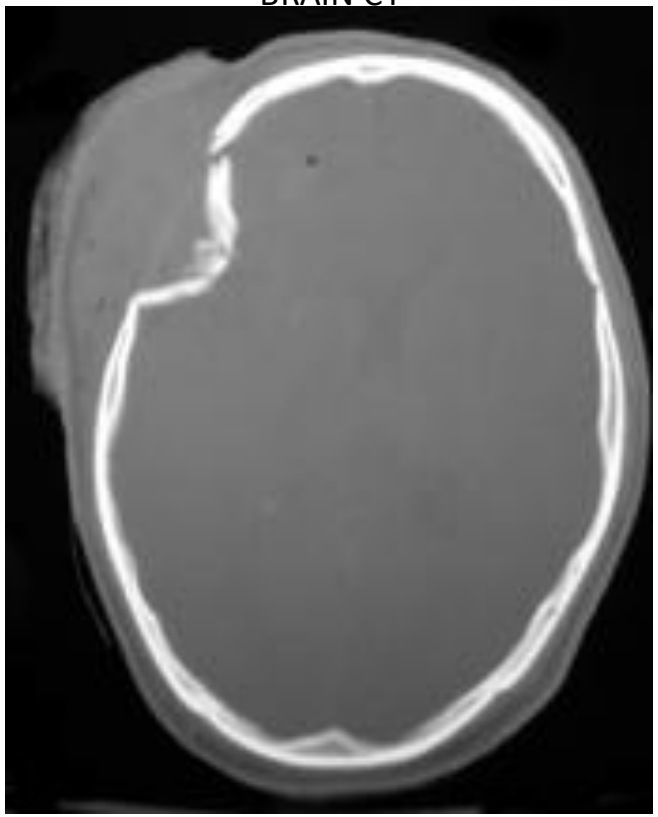
They could be:

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

LATERAL XRAY VIEW WITH DEPRESSED FRACTURE



COMMINUTED DEPRESSED FRACTURE ON BONE WINDOW OF A BRAIN CT

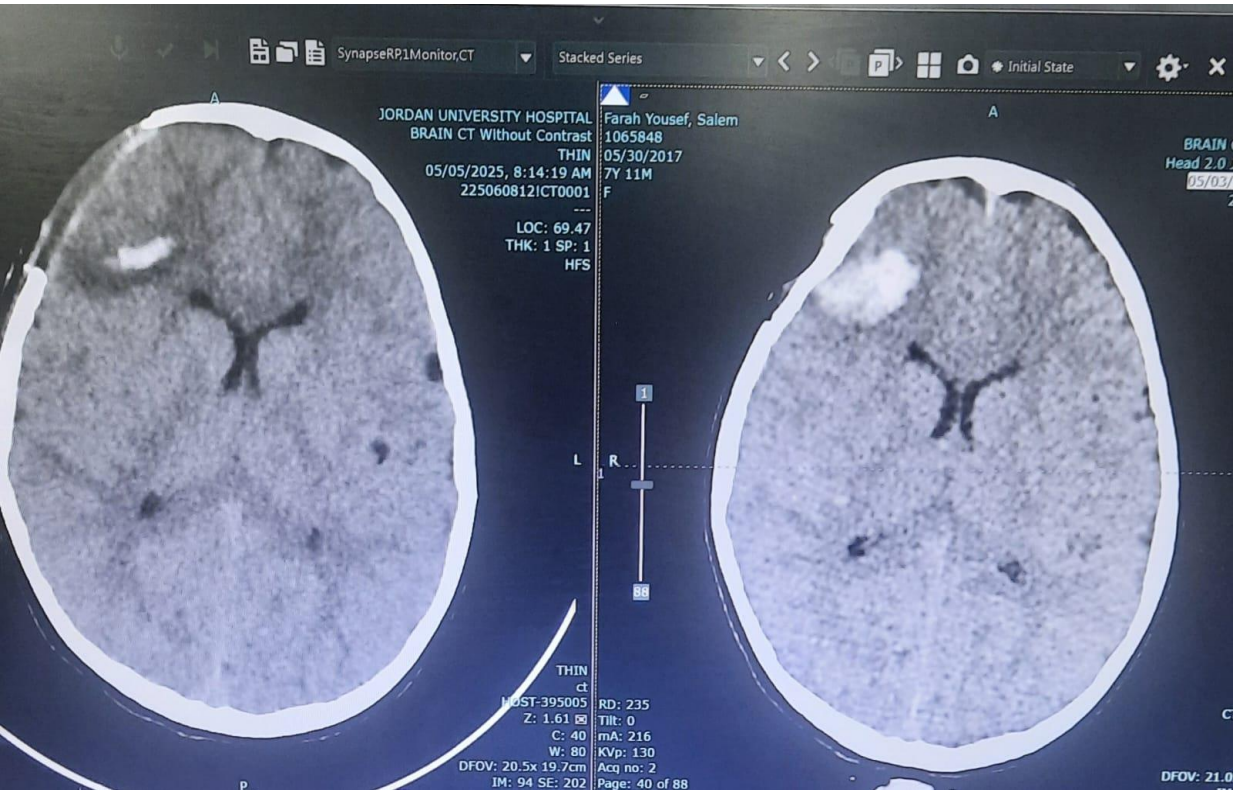


SKULL FRACTURES

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
- Cosmotic.


SynapseRP,1Monitor,CT
Stacked Series
Initial State
JORDAN UNIVERSITY HOSPITAL
BRAIN CT Without Contrast
THIN
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225060812!CT0001
LOC: 69.47
THK: 1 SP: 1
HFS
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1065848
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7Y 11M
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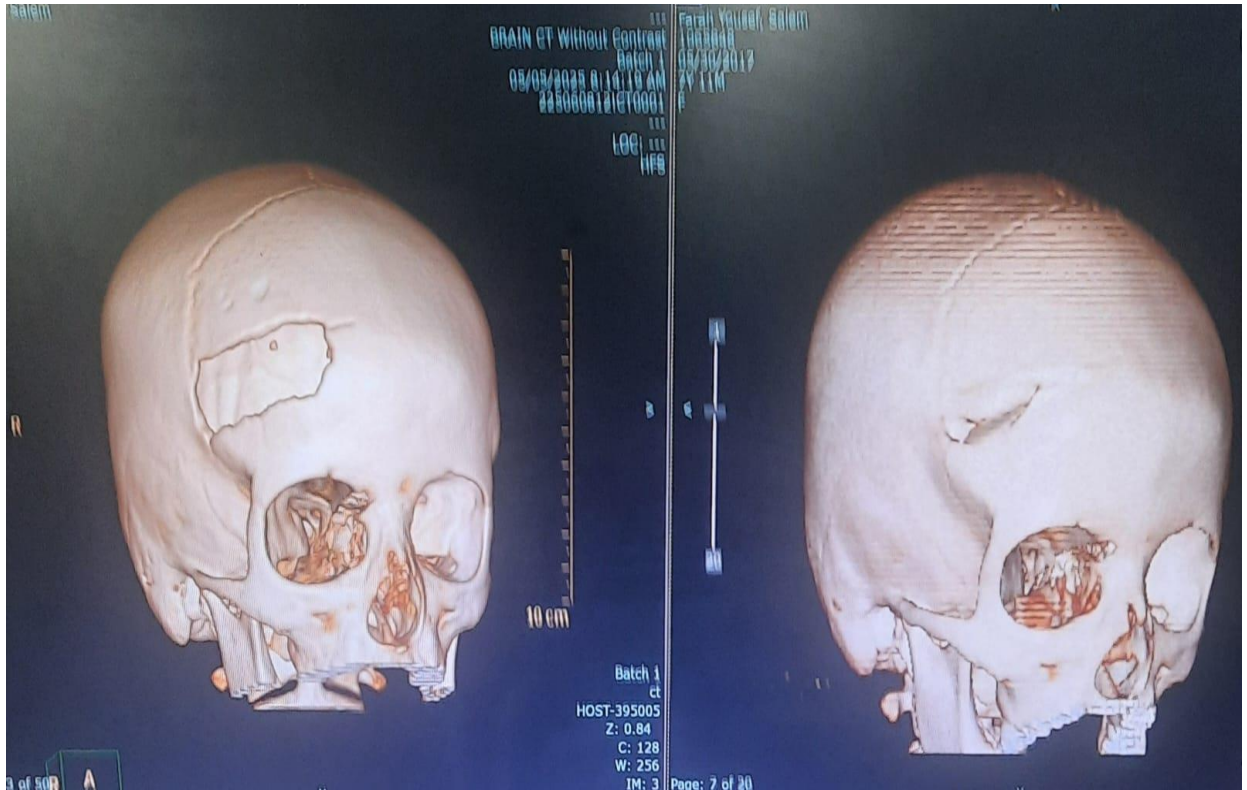
THIN
ct
HOST-395005
Z: 1.61
C: 40
W: 80
DFOV: 20.5x 19.7cm
IM: 94 SE: 202
RD: 235
Tilt: 0
mA: 216
kVp: 130
Acq no: 2
Page: 40 of 88
DFOV: 21.0


BRAIN CT Without Contrast
10 cm
Batch 1
ct
HOST-395005
Z: 0.84
C: 128
W: 256
IM: 3

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 الارتجاج الدماغي

#traumatically induced transient disturbance of brain function#

-diffuse

-physiological

Here the patient will lose his consciousness for a brief period of time. When he wakes up; he will be amnesic.

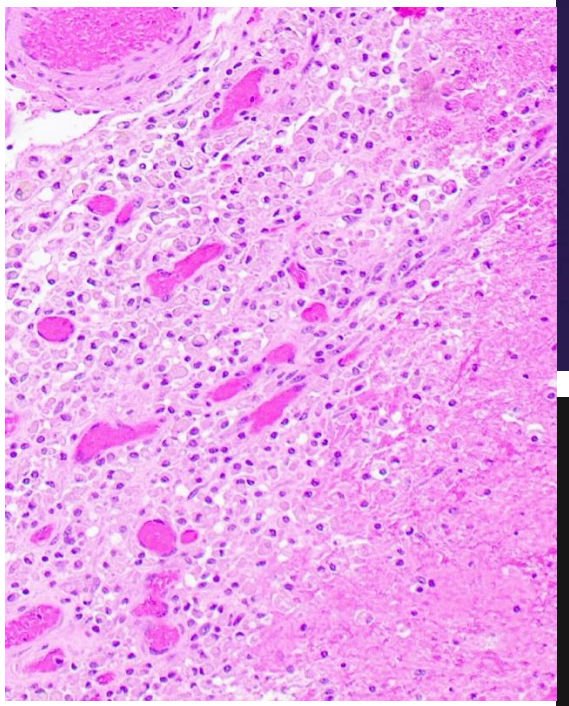
Examination will show no abnormality .

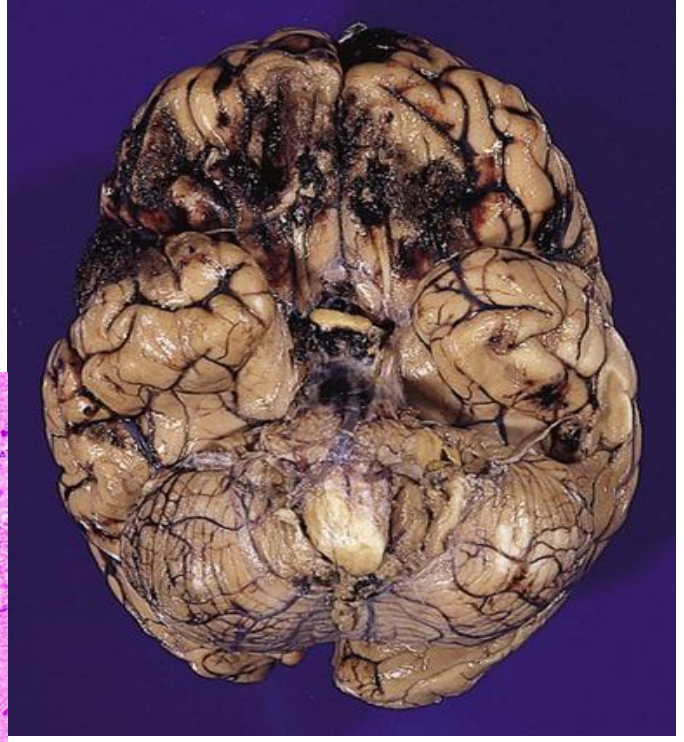
CT scans are usually normal.

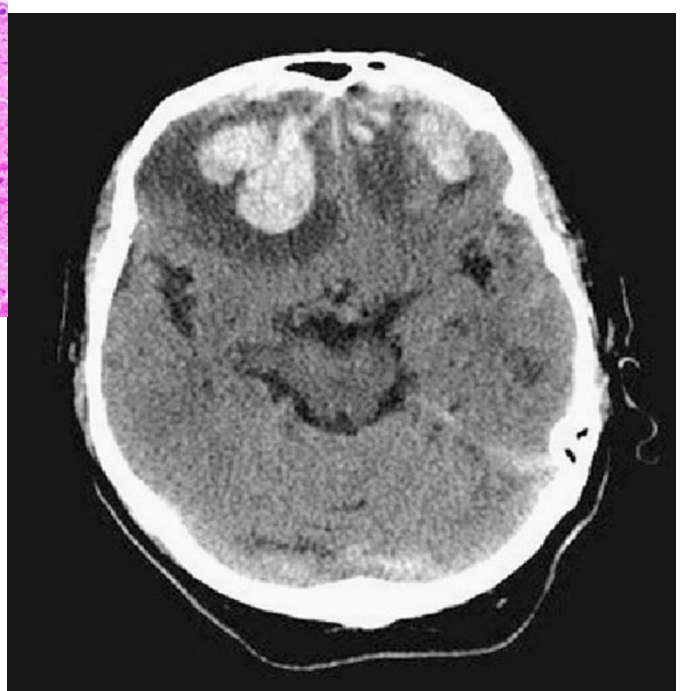
BRAIN INJURIES

CONTUSION رضه

- Focal &structural injuries to the brain occurring at locations where brain tissue directly impacts against the inner skull / bony protuberance
- are typically observed in the temporal and frontal lobes
- coup contre-coup injuries.
- Contusions are notorious for being associated with brain edema which makes their management difficult.





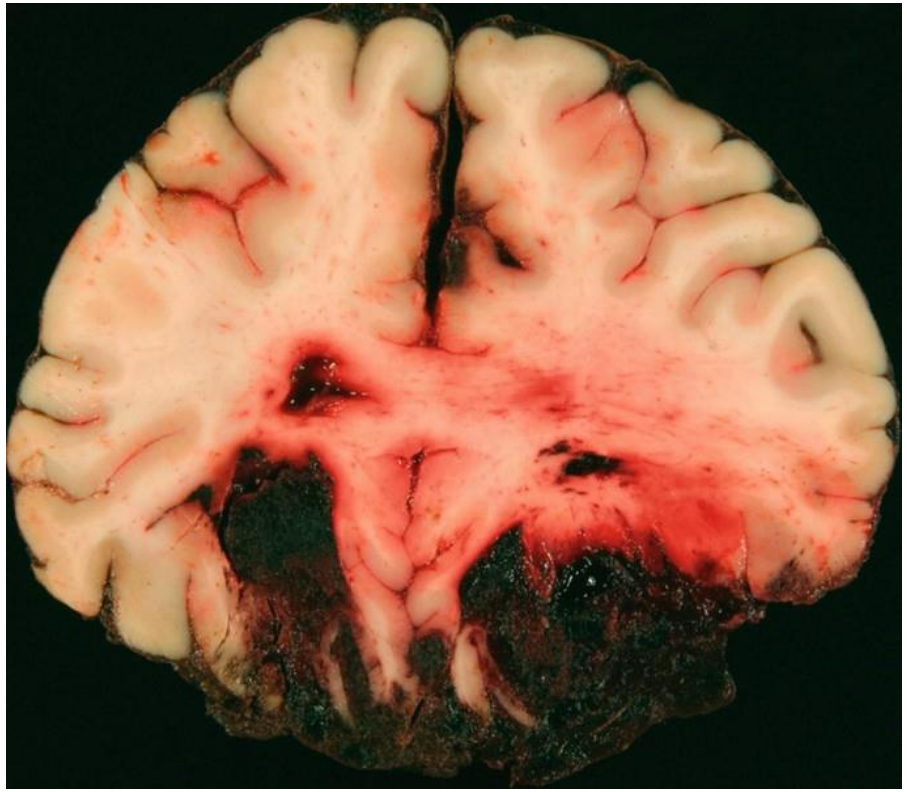


BRAIN INJURIES

Brain Laceration

&burst lobe

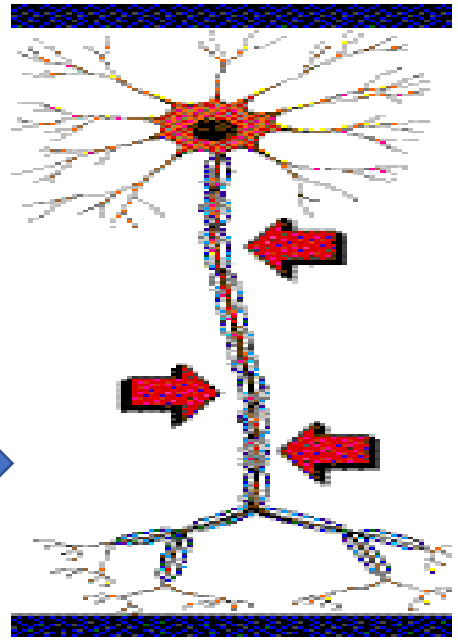
Here the brain will suffer from a lacerated area or areas as a result of the direct trauma especially if penetrating, or the acceleration deceleration injury. The neurological deficits which result are usually permanent.

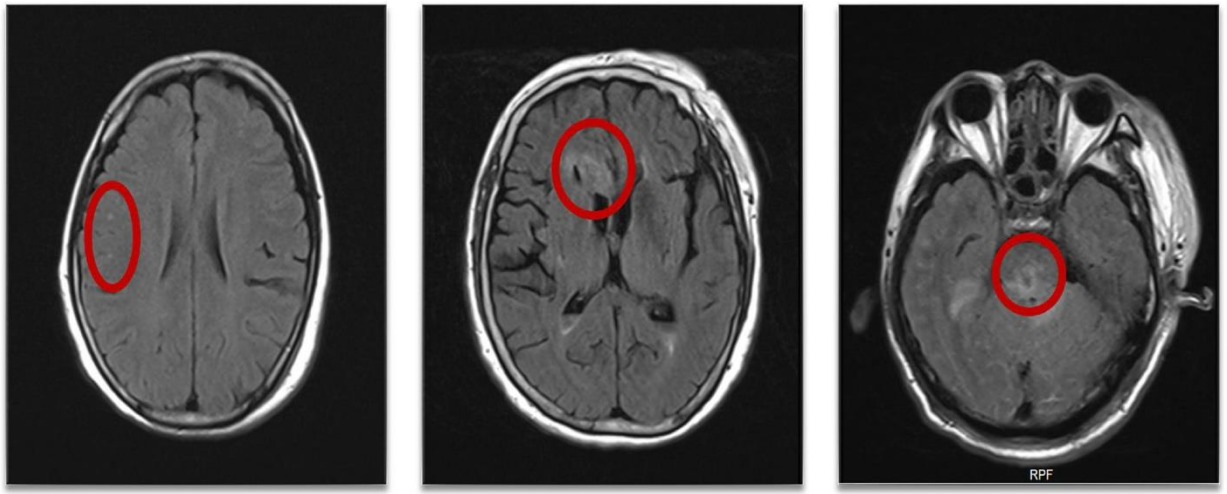


BRAIN INJURIES

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).
- Graded by MRI





DAI grade 1 DAI grade 2 DAI grade 3

BRAIN INJURIES

MANAGEMENT OF BRAIN IJNURIES

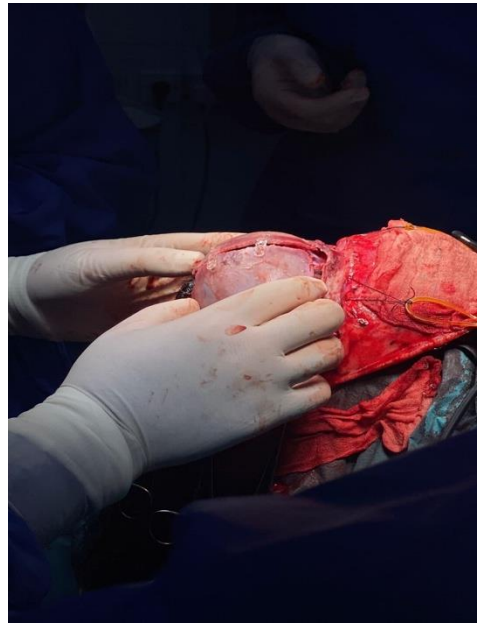
BRAIN INJURIES ARE DIVIDED INTO 3 CATEGORIES DEPENDING ON THE GCS:

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

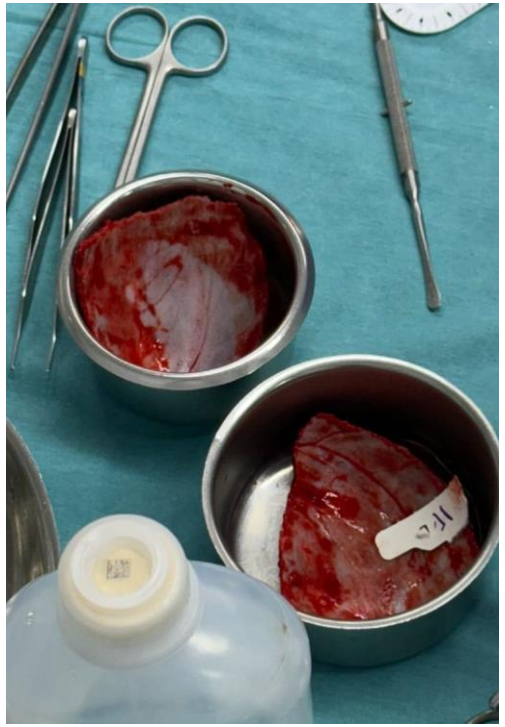
MANAGEMENT OF BRAIN INJURIES

ABC then-depends on clinical picture and Ct-scan findings and pathology:

Aim is to treat the pathology and prevent secondary injuries:



- Ventilation –indications
- Intracranial pressure management
- Medications? Steroids,
    - Anticonvulsants
    - antibiotics



- Surgery-burr hole

    Craniotomy

    Craniectomy