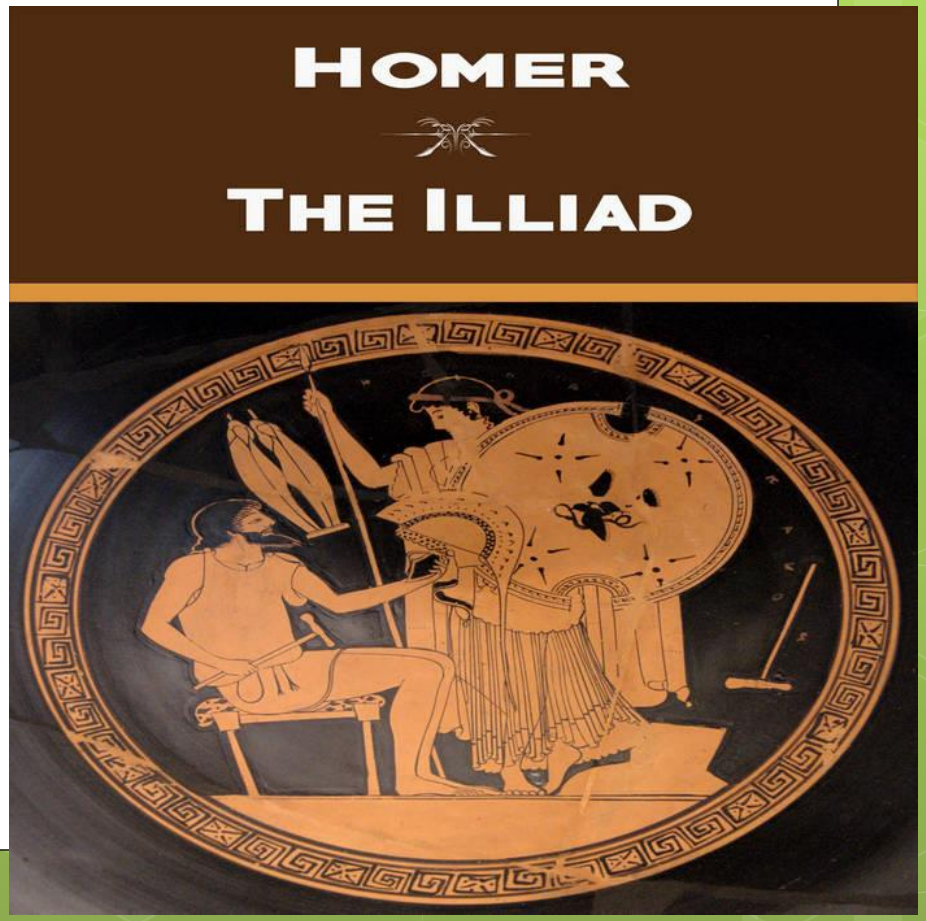
June 15, 2022

Head injuries

everything you wanted to know but were afraid to ask

Historical perspective

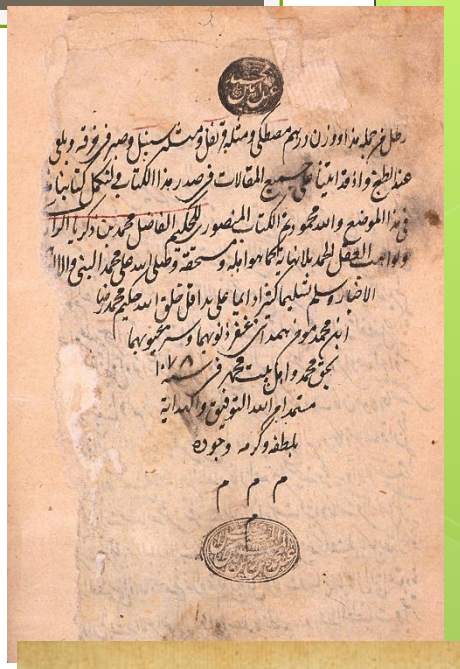
- First account of TBI – in the Iliad and Odyssey(first correspondence between head trauma and loss of conscioness)

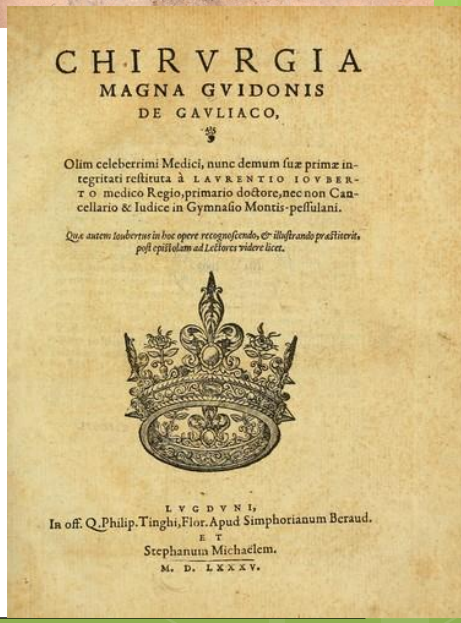


Historical perspective

- Initial use of term conscioness – Persian physician Rhazes (826-925AD)

- In western medicine – Chauliac (1300-1368AD)





Common major trauma

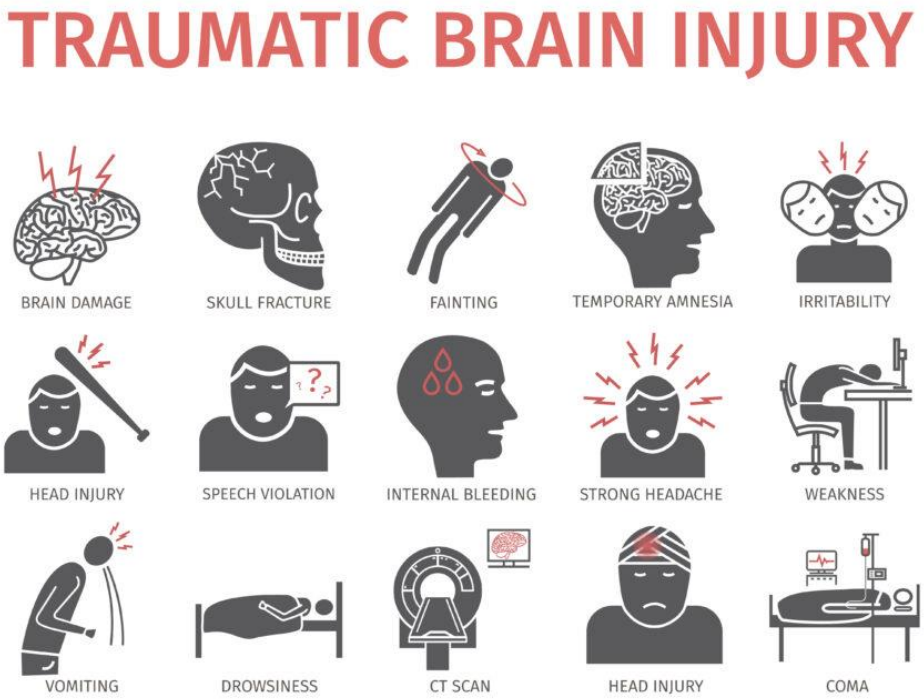
- 4 million people experience head trauma annually
- Severe head injury is most frequent cause of trauma death
- At Risk population • Males 15-24 • Infants • Young Children • Elderly

Causes/etiology

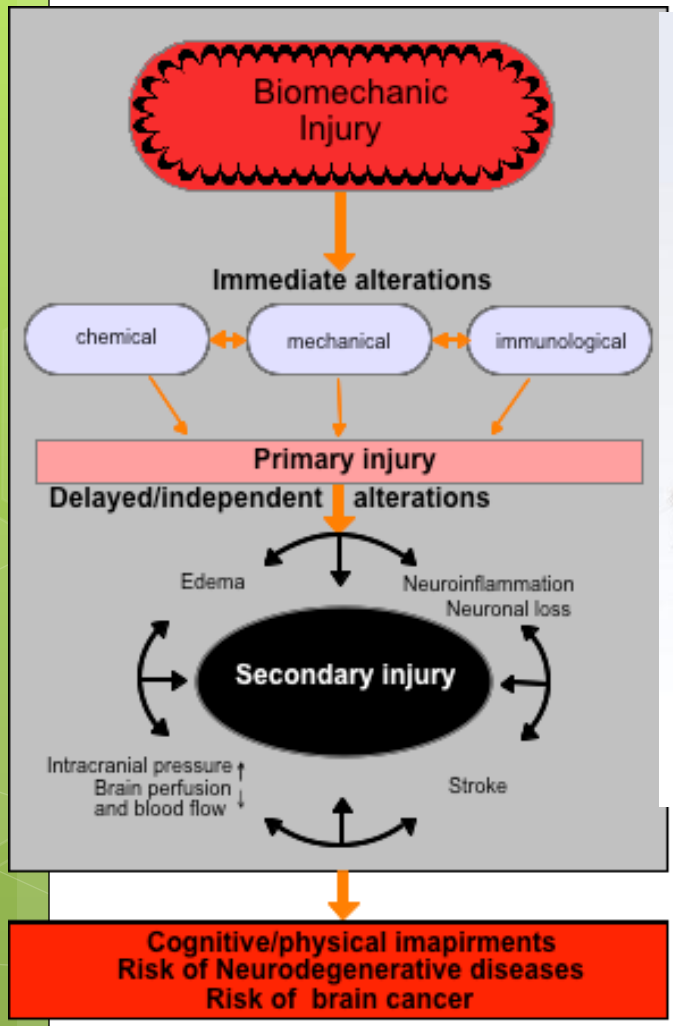
- MVA, bicycle, etc. - more than 50%
- Falls - 25%
- Violence - 20%

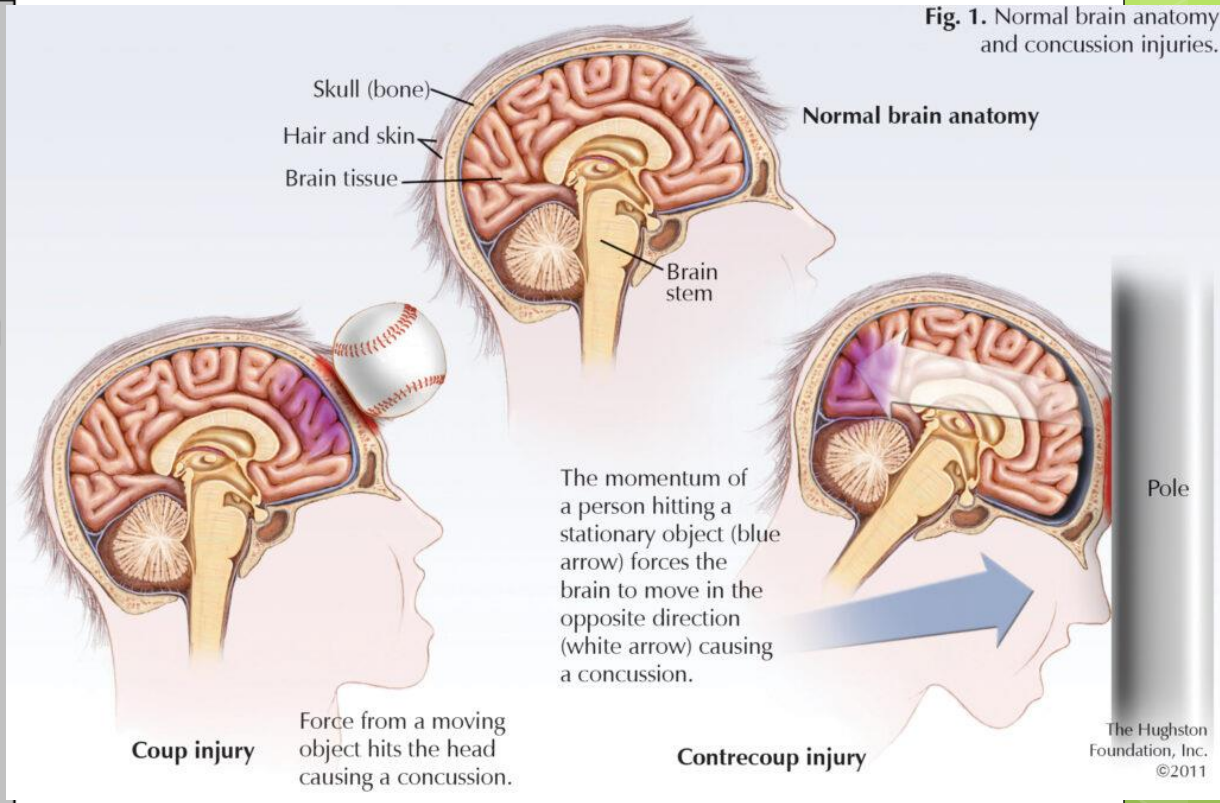
Primary or secondary?

- **Primary** - brain injury that results from mechanical forces producing tissue deformation at the moment of injury with direct damage to neural structures.
- **Secondary** – by definition – damage due to complications after initial destruction



Pathophysiology





Nosoological forms(aka – **to find anything, you must know what to look for…**)

1. Lacerations
   a) Open
   b) Closed
      - Penetrating
      - Not
2. Focal
   a) Contusions
   b) Haematomas
3. Diffuse
   a) Concussion
   b) DAI
4. Compression
   a) Foreign object
   b) Bones
   c) Blood
   d) Air
   e) CSF

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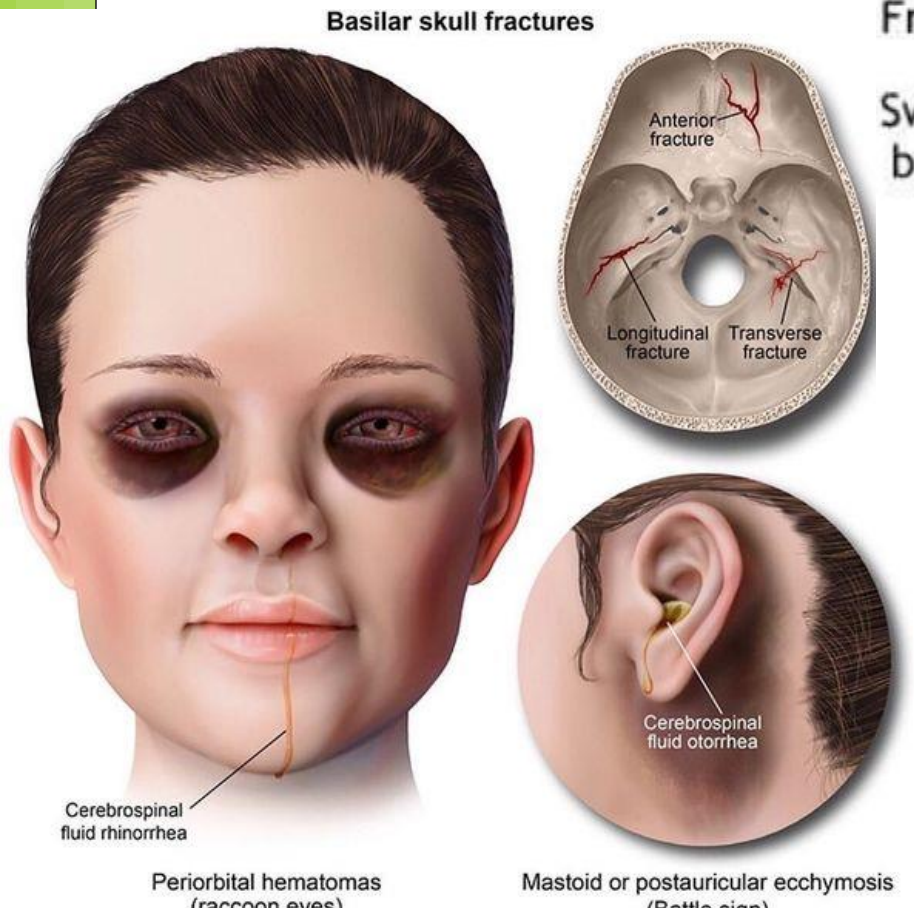
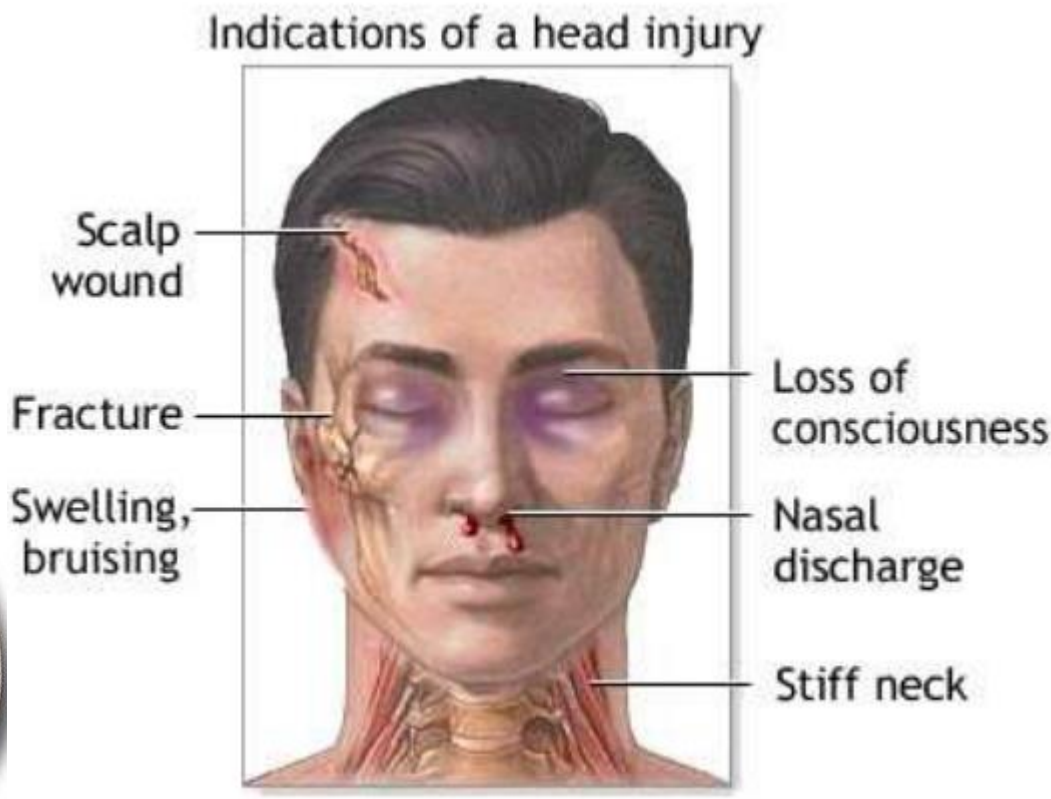
Physical examination

- Vitals(Cushing's reflex – brady, SAP/DAP dissociation, irregular respirations)
- GCS
- Lacerations(open/closed/contamination)
- Basal fractures.

Signs and Symptoms





Glasgow coma scale

- The **Glasgow Coma Scale** (**GCS**) is the most common scoring system used to describe the **level** of **consciousness** in a person following a traumatic brain injury.
- Severity:
  - Severe Head Injury----GCS score of 8 or less
  - Moderate Head Injury----GCS score of 9 to 12
  - Mild Head Injury----GCS score of 13 to 15
- Level:
  - **Conscious – 15 points**
  - **Stupor – 12-14 points**
  - **Sopor – 9-11 points**
  - **Coma – 3-8 points**

GCS: evaluation (**E V M**)

- **E**ye Opening Response
  - Spontaneous-open with blinking at baseline – 4 points
  - To verbal stimuli, command, speech – 3 points
  - To pain only (not applied to face) – 2 points
  - No response – 1 point

GCS: evaluation (**E V M**)

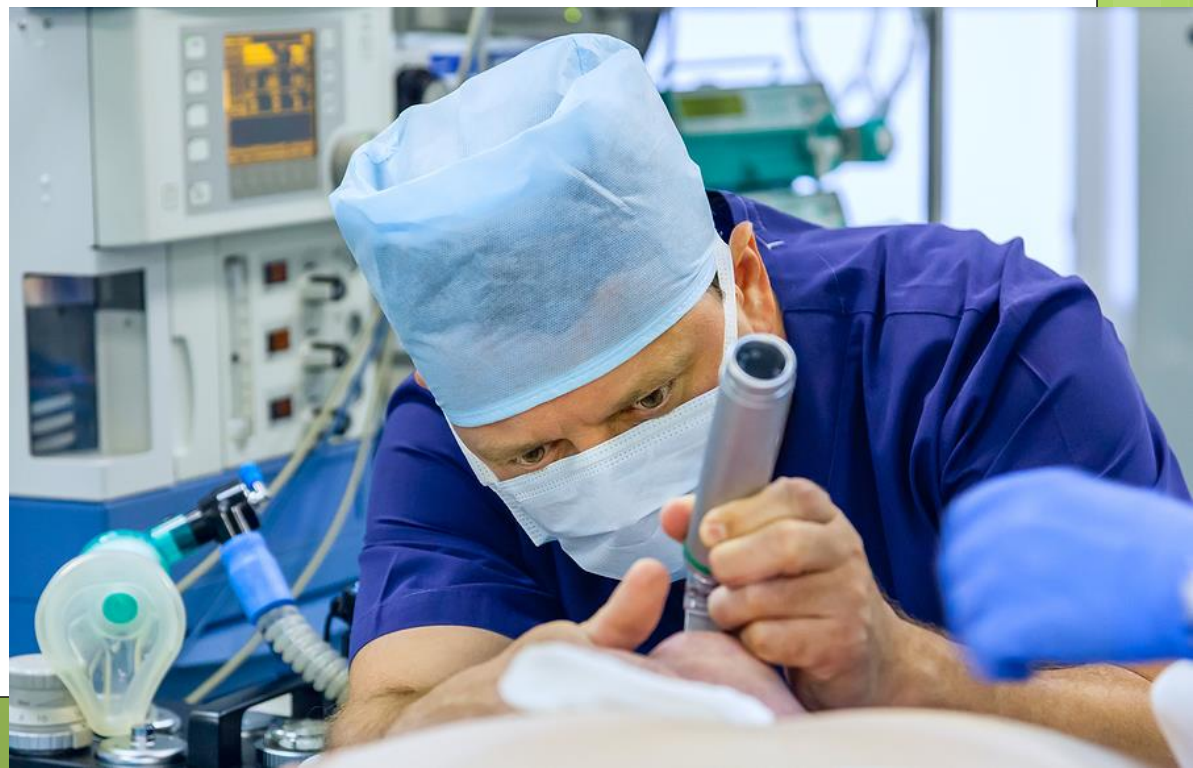
- **V**erbal Response
  - Oriented
    5 points
  - Confused conversation, but able to answer questions
    4 points
  - Inappropriate words
    3 points
  - Incomprehensible speech
    2 points
  - No response 1 point

GCS: evaluation (**E V M**)

- **Motor response**
  - Obey commands — 6 points
  - Localising — 5 points
  - Normal flexion — 4 points
  - Abnormal flexion — 3 points
  - Extension — 2 points
  - None — 1 point

GCS: evaluation (**E V M**)

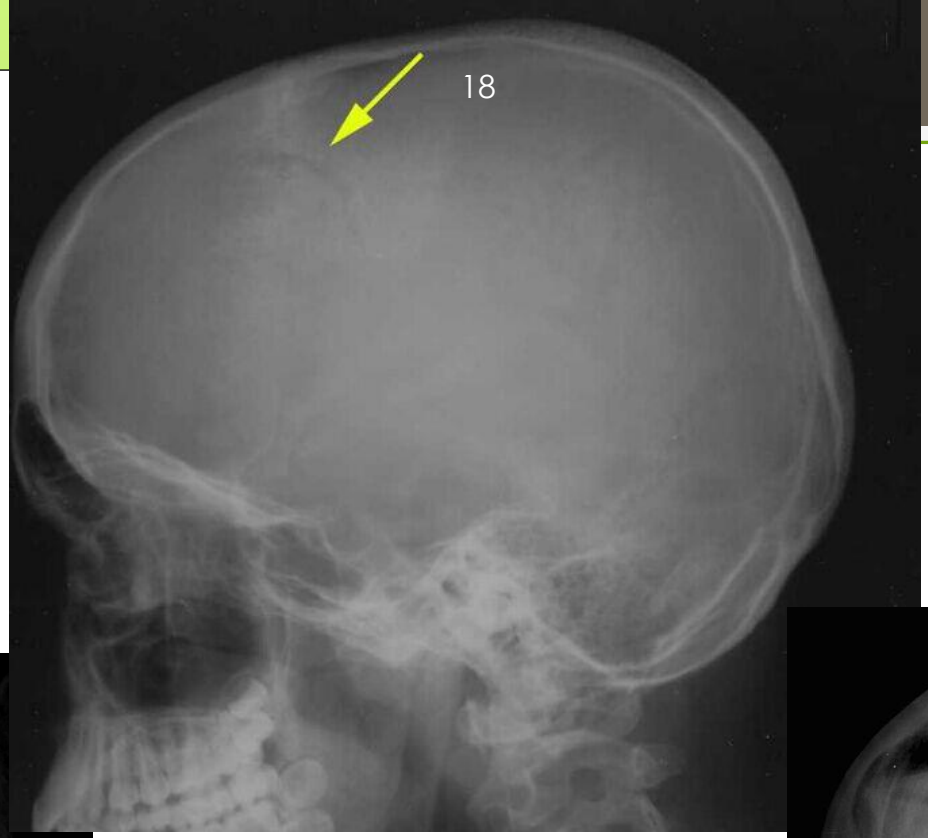
- **“Less than 8, then intubate”**



Investiagations(imaging)

- X-Ray
- CT
- MRI
- PET, SPECT

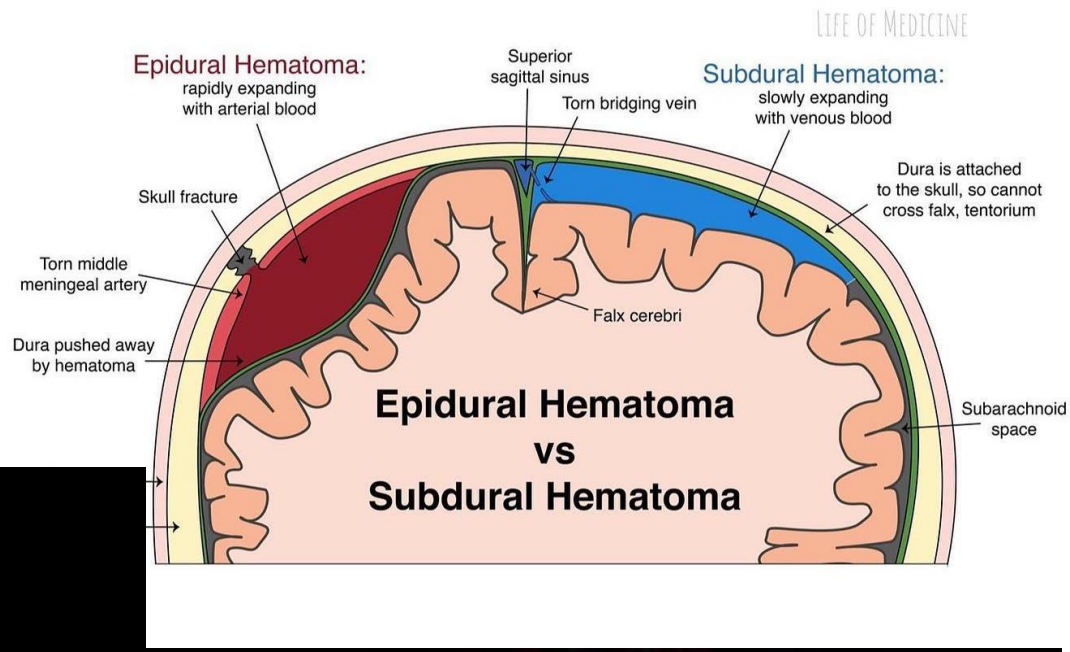
X-Ray

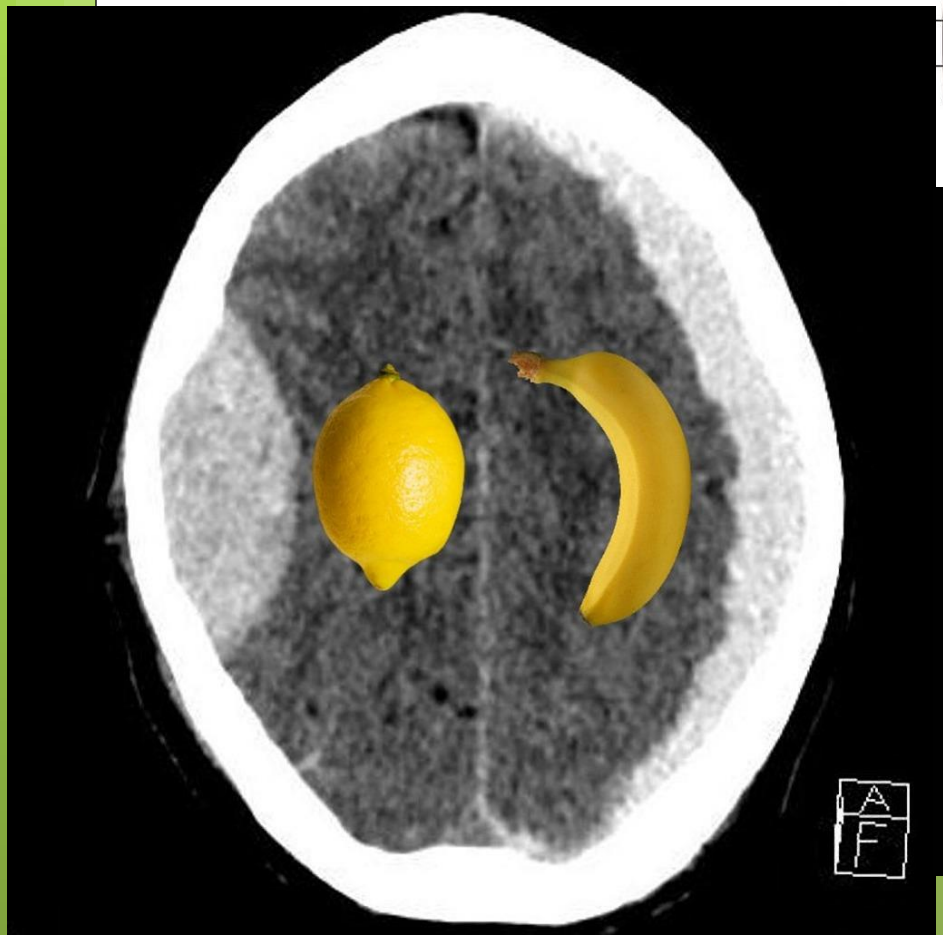


CT/ New Orleans criteria

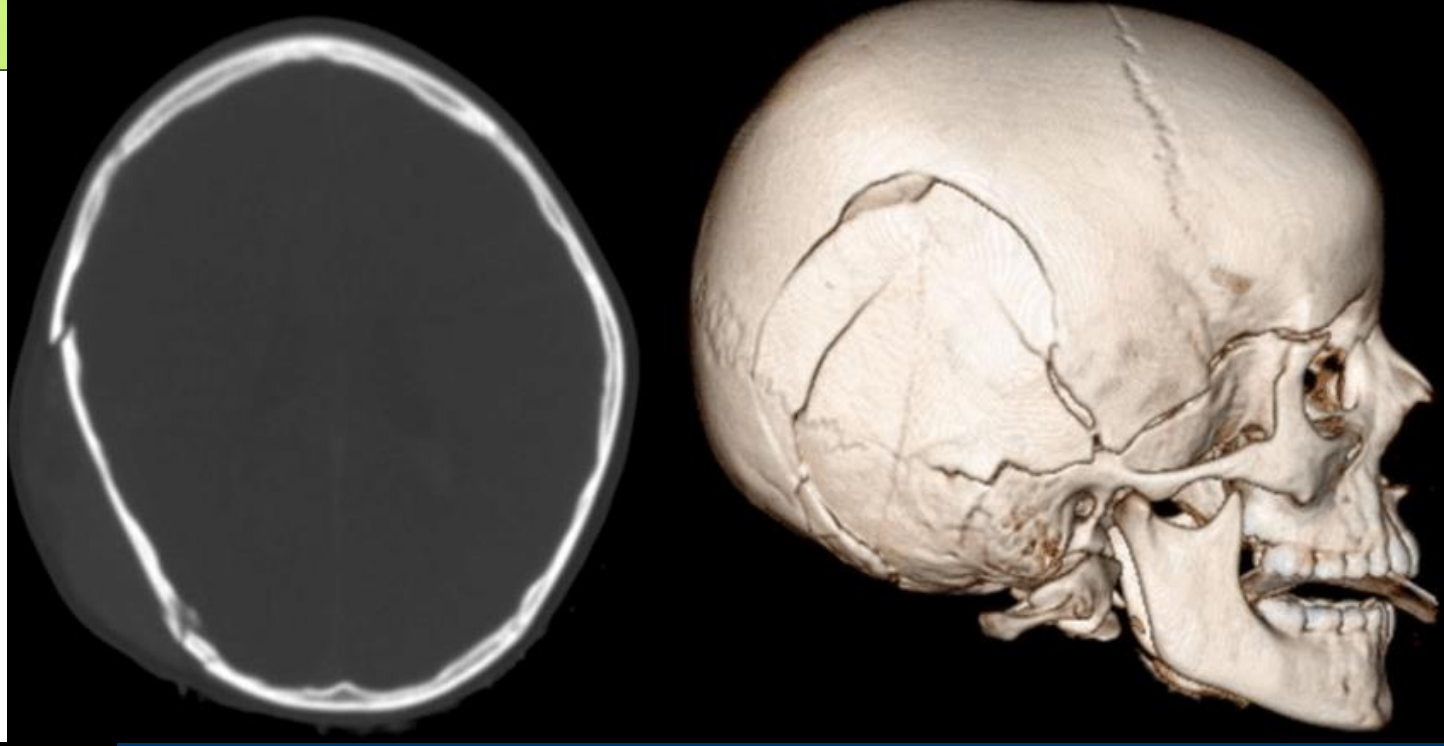
- Headache
- Vomiting
- Age>60
- Drug or alcohol intoxication
- Persistent antegrade amnesia
- Visible trauma
- Seizure

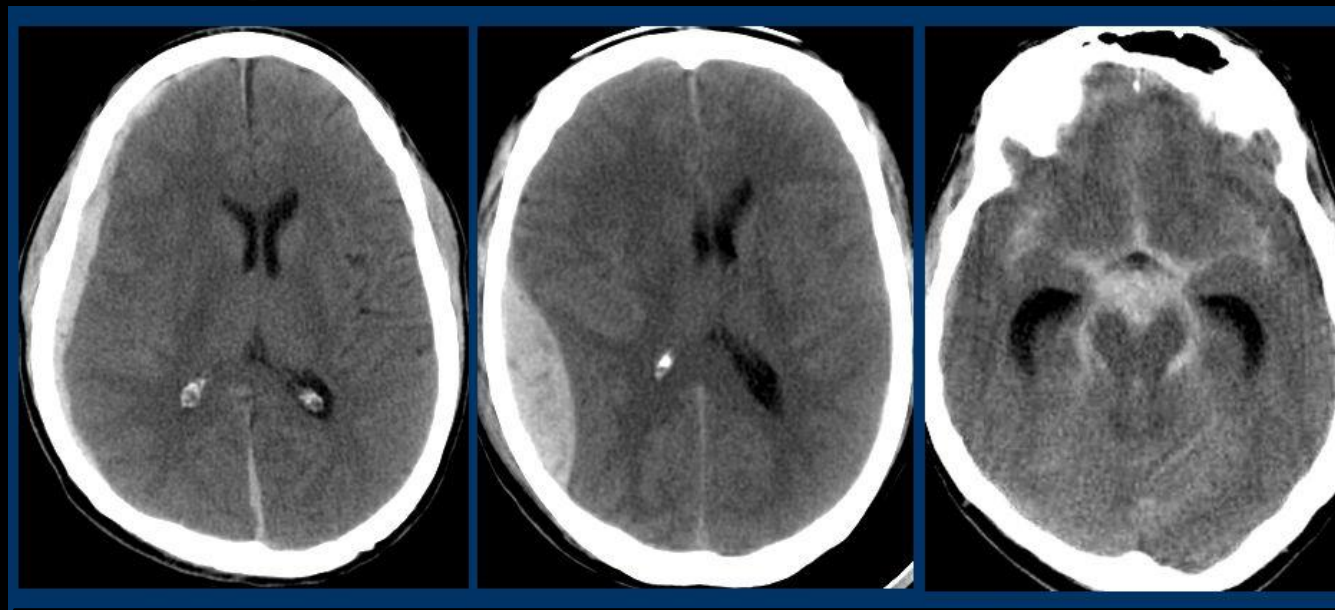
CT


Life of Medicine
Epidural Hematoma:
rapidly expanding
with arterial blood
Superior
sagittal sinus
Torn bridging vein
Subdural Hematoma:
slowly expanding
with venous blood
Dura is attached
to the skull, so cannot
cross falx, tentorium
Skull fracture
Torn middle
meningeal artery
Falx cerebri
Dura pushed away
by hematoma
Epidural Hematoma
vs
Subdural Hematoma
Subarachnoid
space

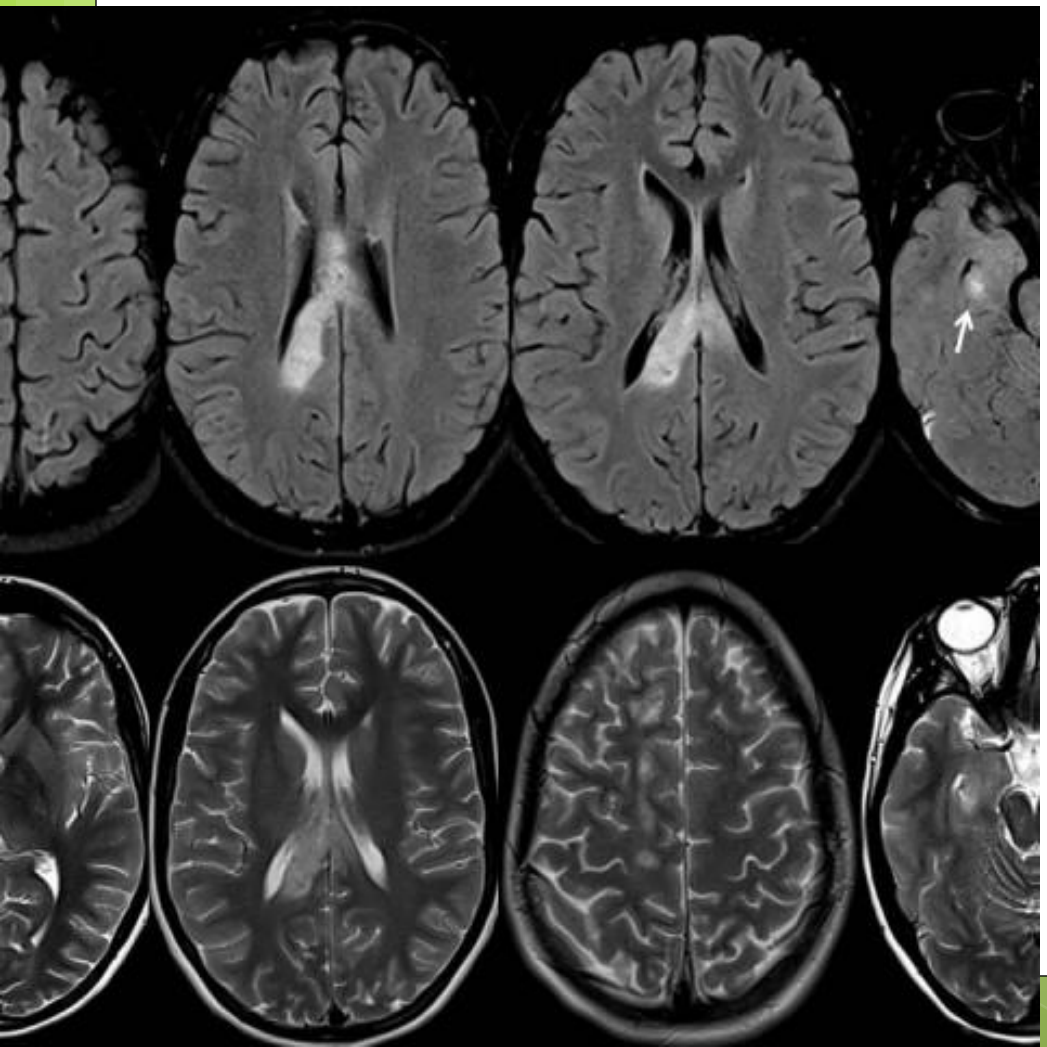

A
F

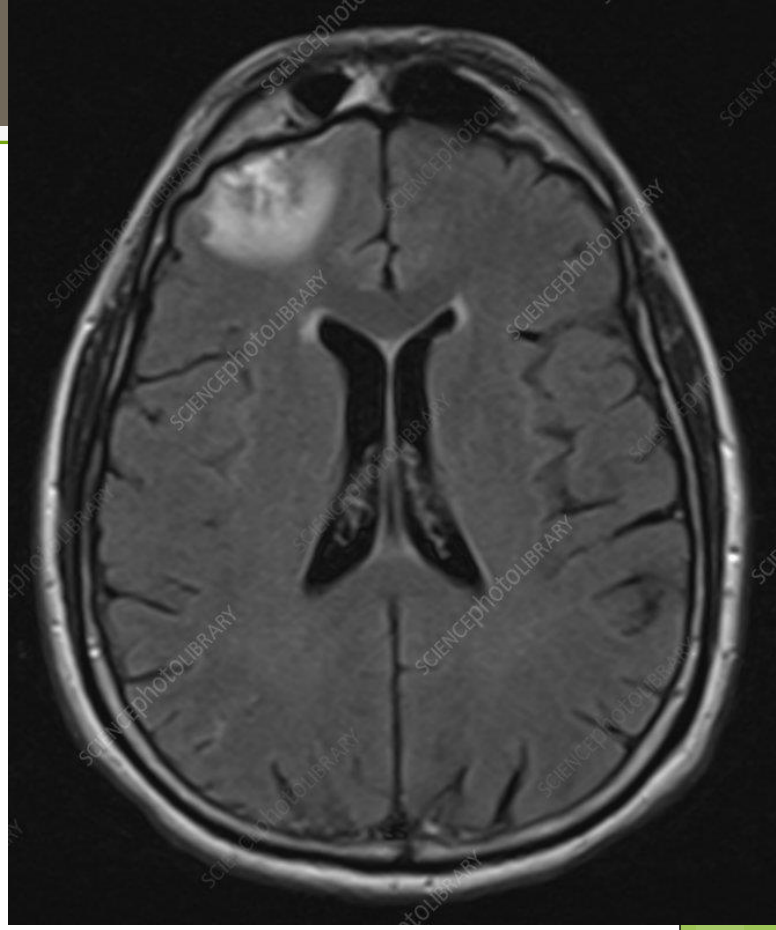
CT

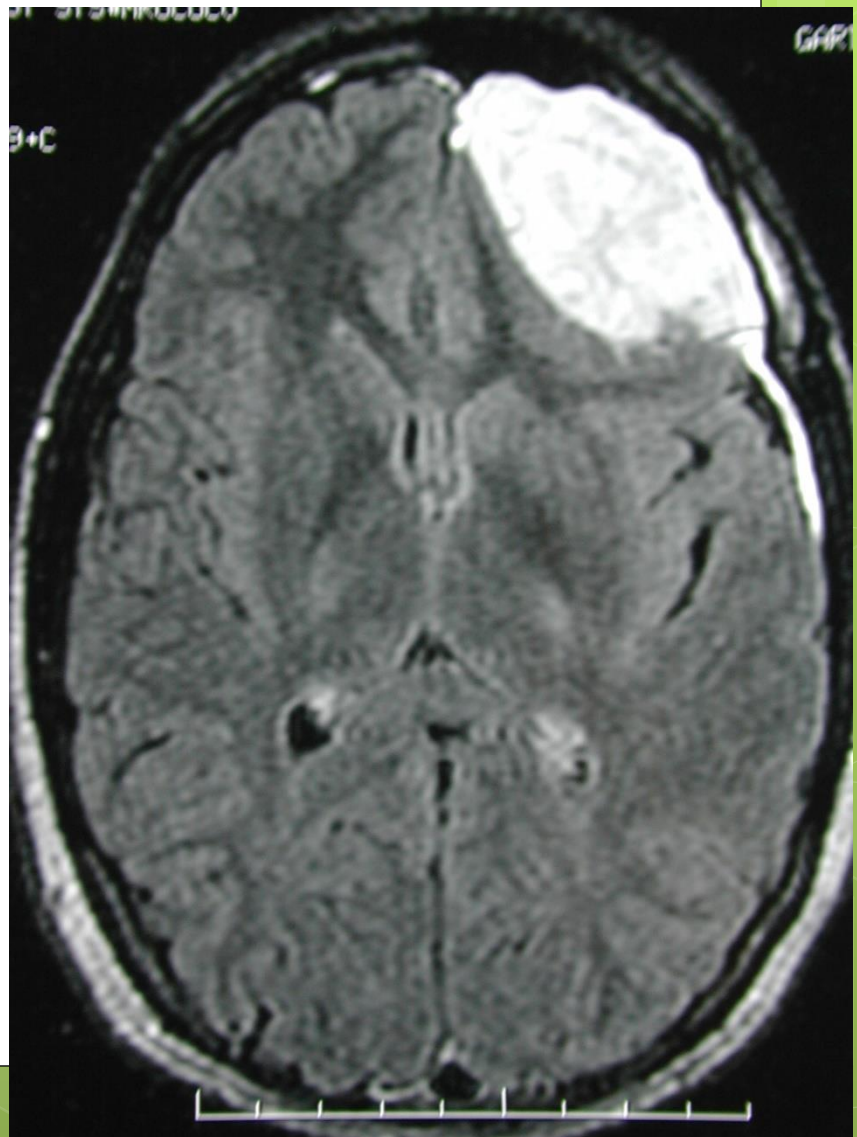




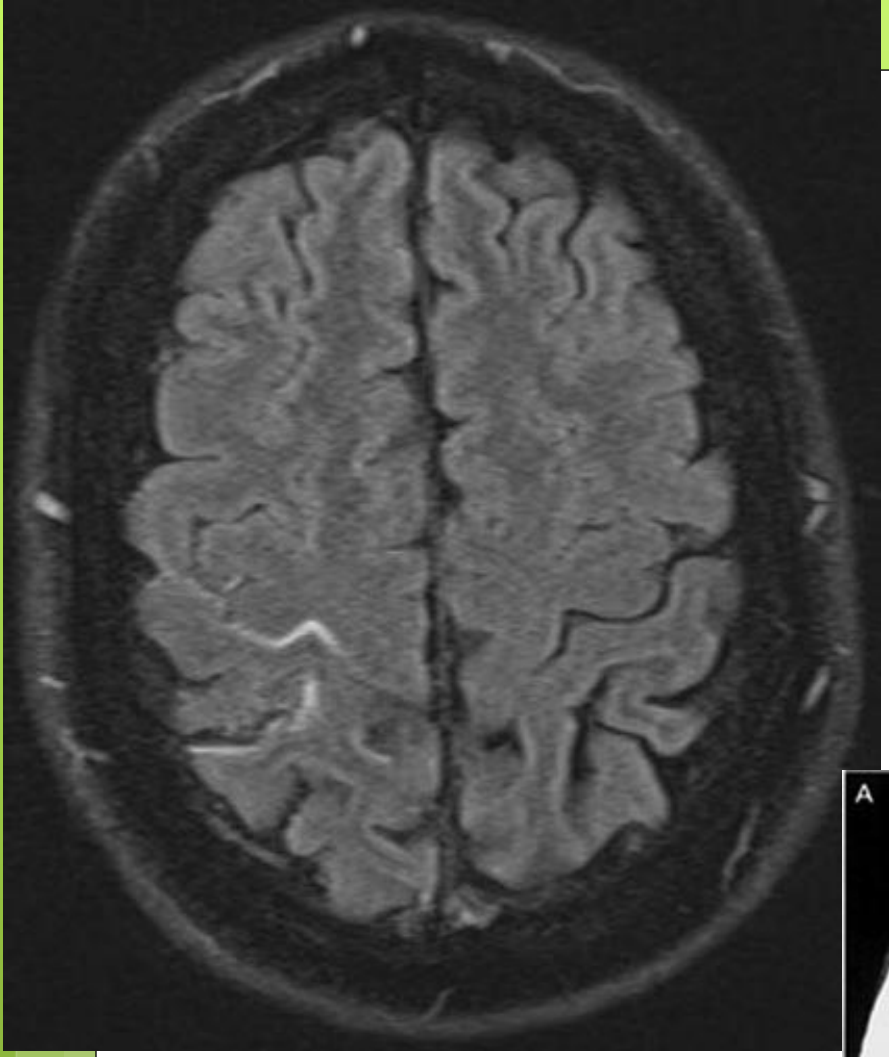
MRI



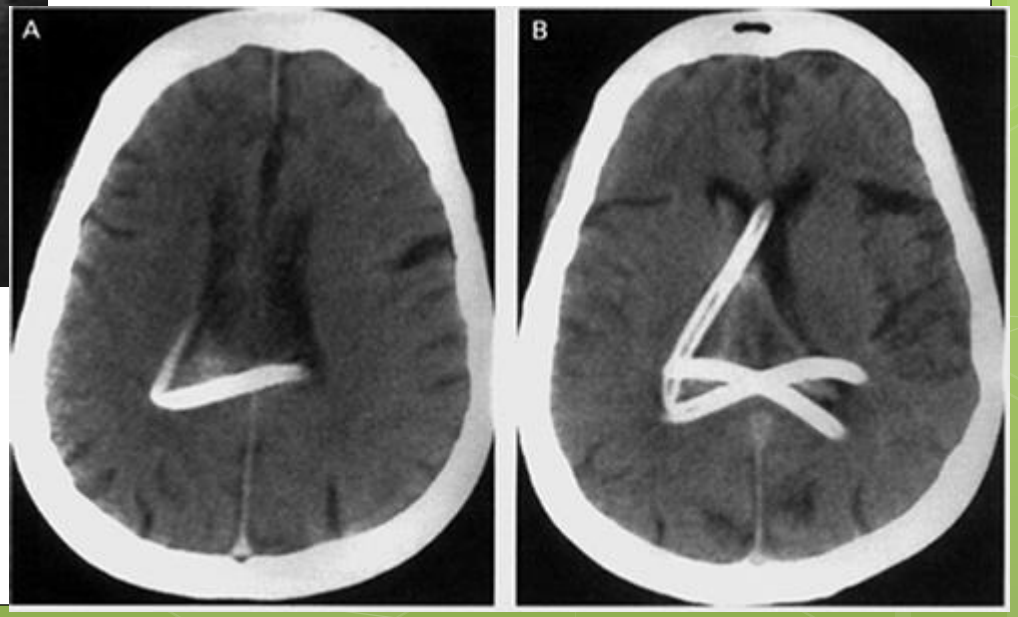




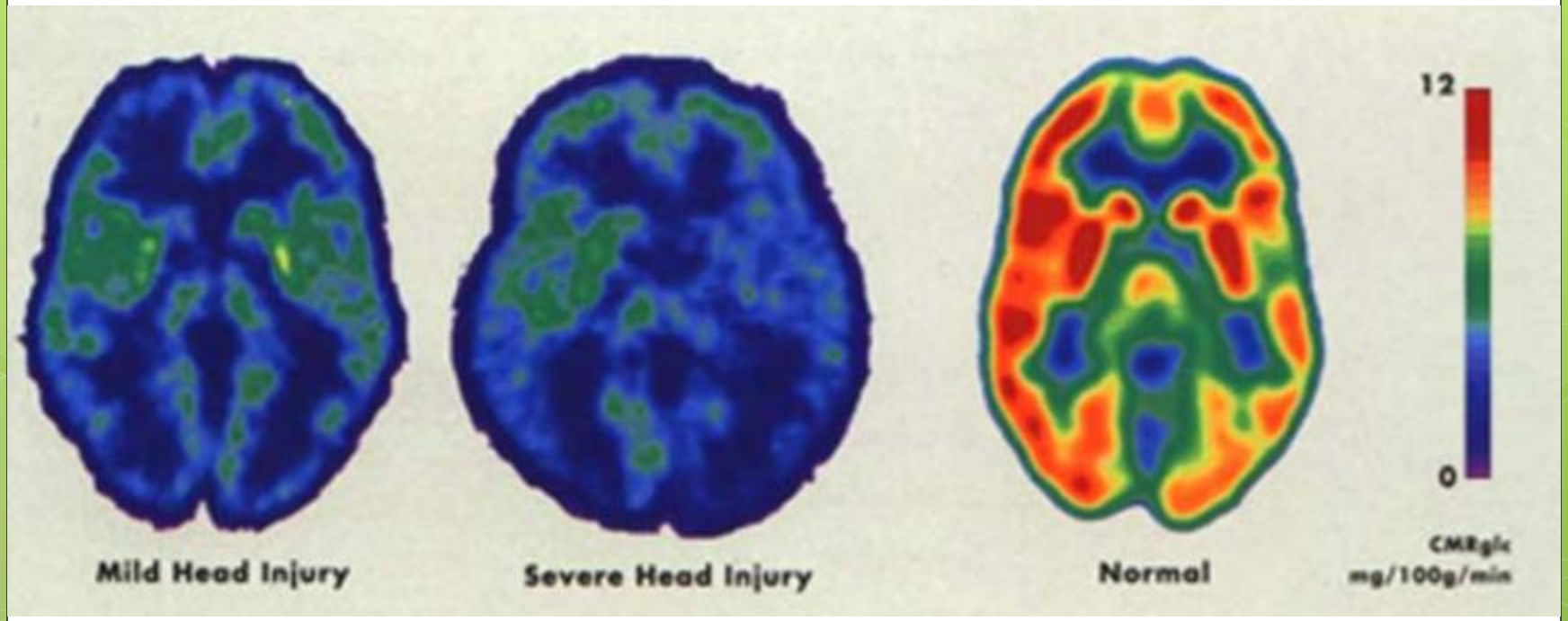
MRI



MRI



PET

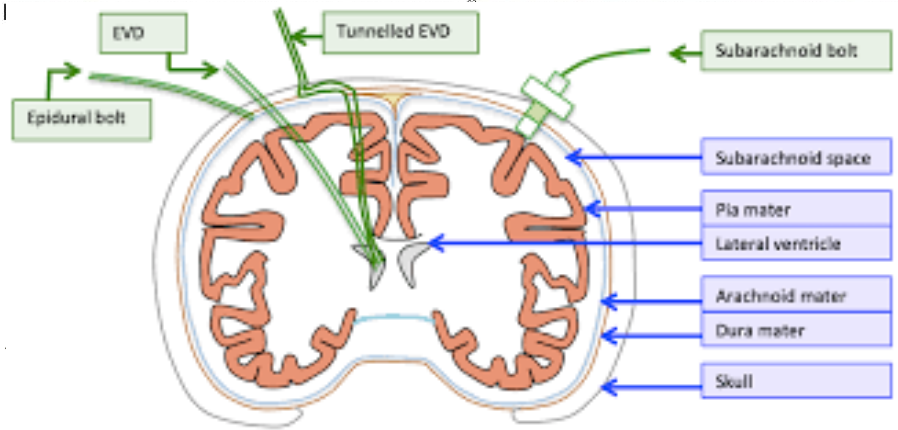

Mild Head Injury
Severe Head Injury
Normal
12
0
CMRglc
mg/100g/min

Management of TBI

- Admission in ICU
- Airvay management
- Vital signs management
- ICP management
- Surgery

Vital signs

- GCS < 8 => intubation
- Keep SAP > 90Hg
- Keep CPP>60(MAP-ICP
- ICP monitor placement if possible

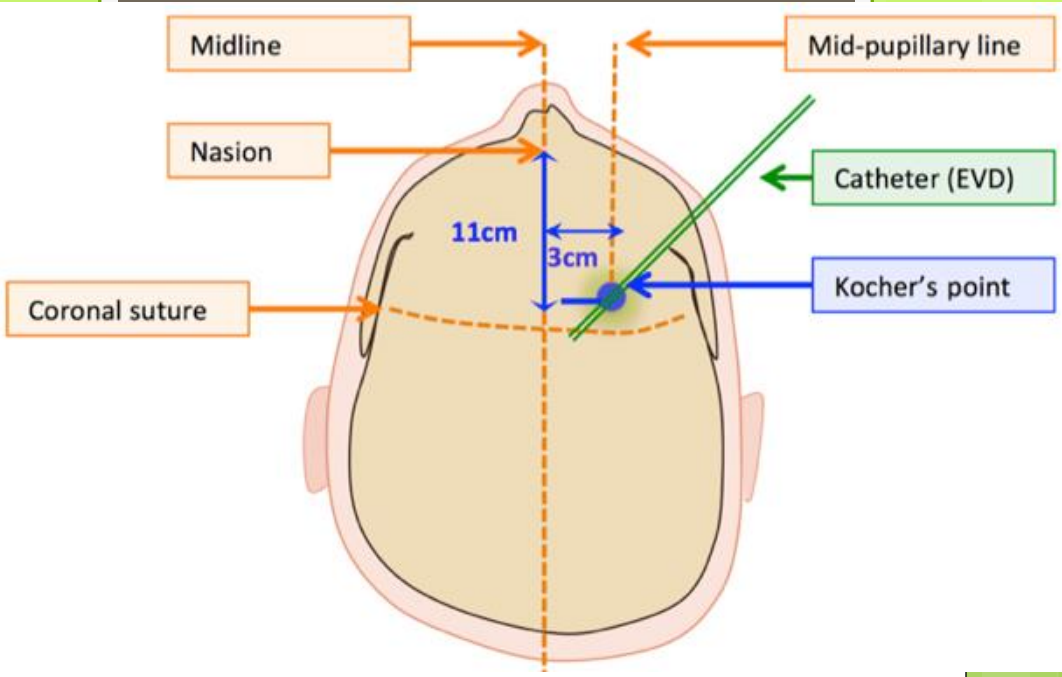


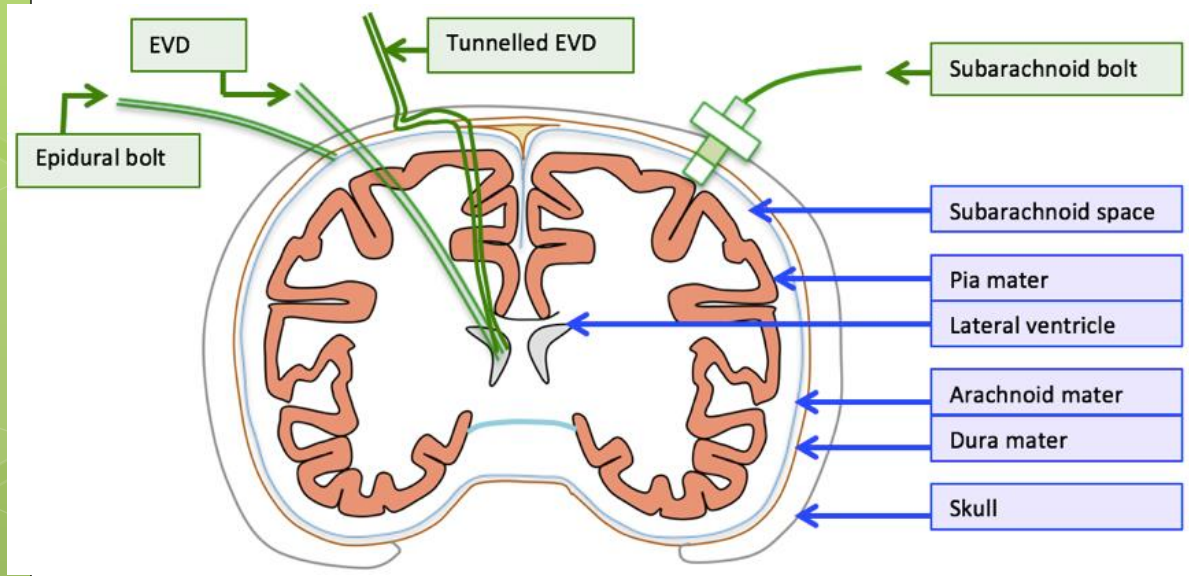
Conservative ICP management

- Mannitol (0,25-1.0/g/kg)
- Hypertonic Saline (30-60ml 23.4% bolus)
- Pharmacological coms with phenobarbital
- Induced hypotermia

Surgery

- Ventricular drain





Surgery

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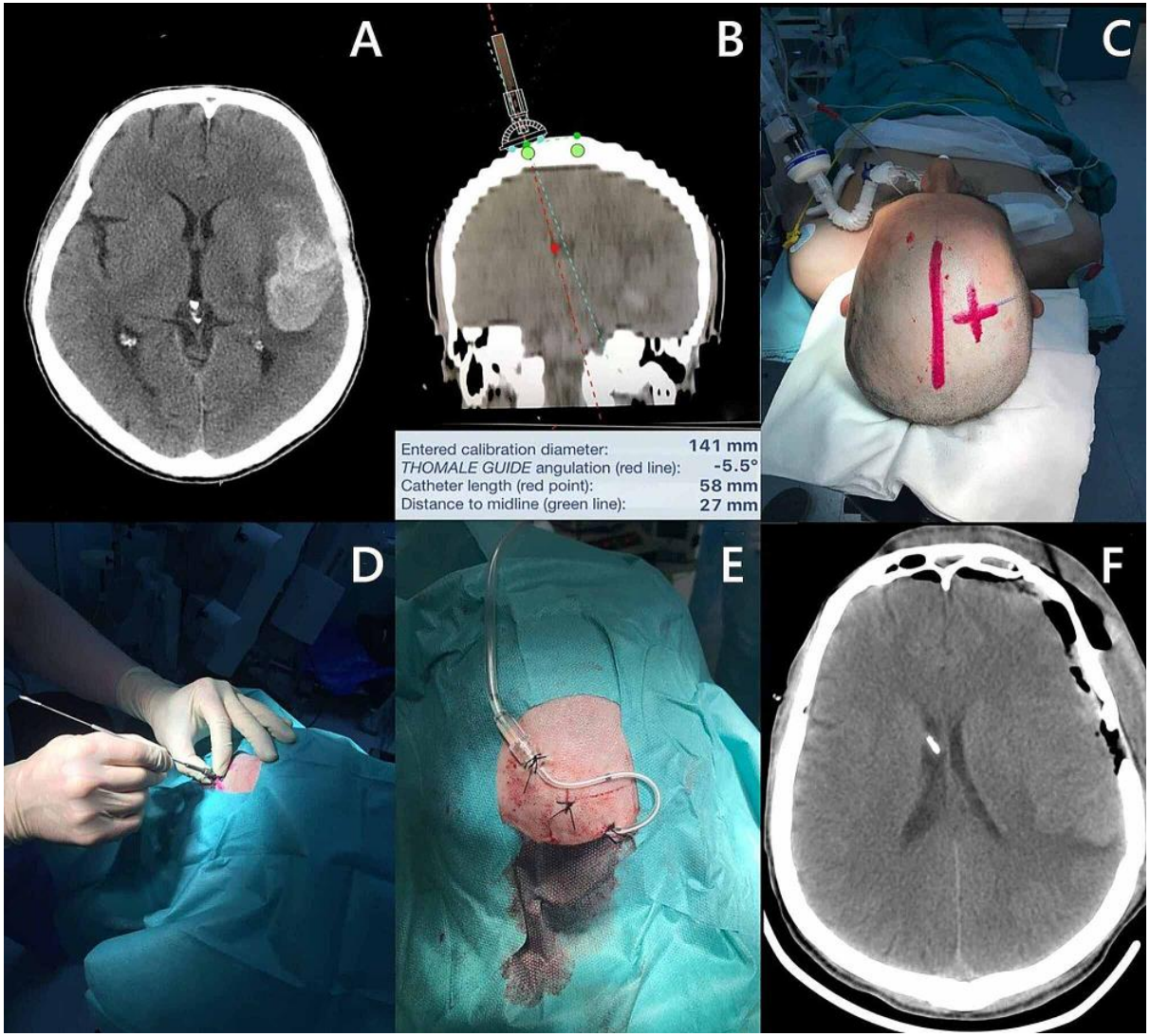
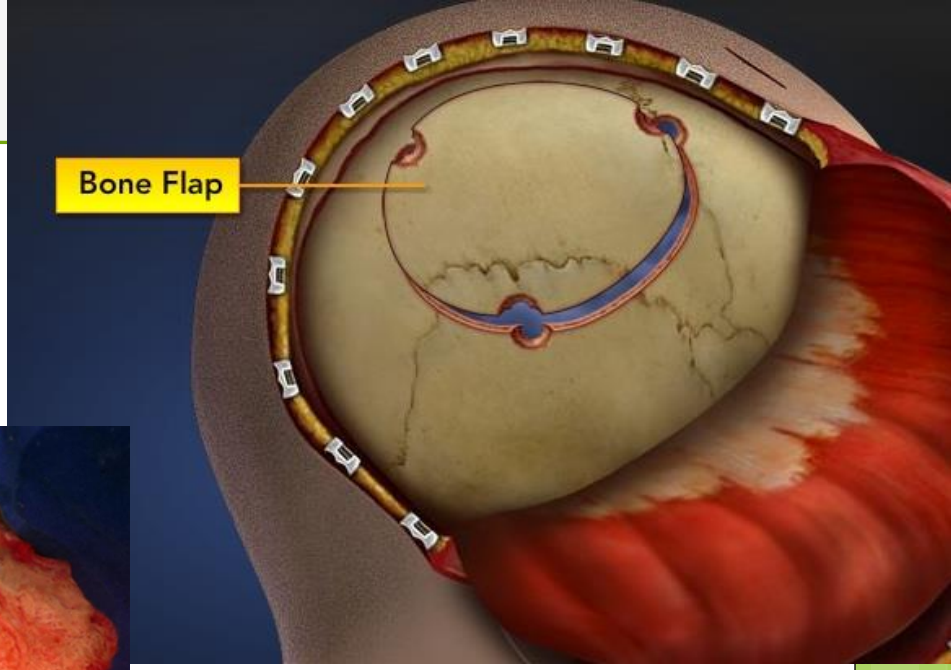
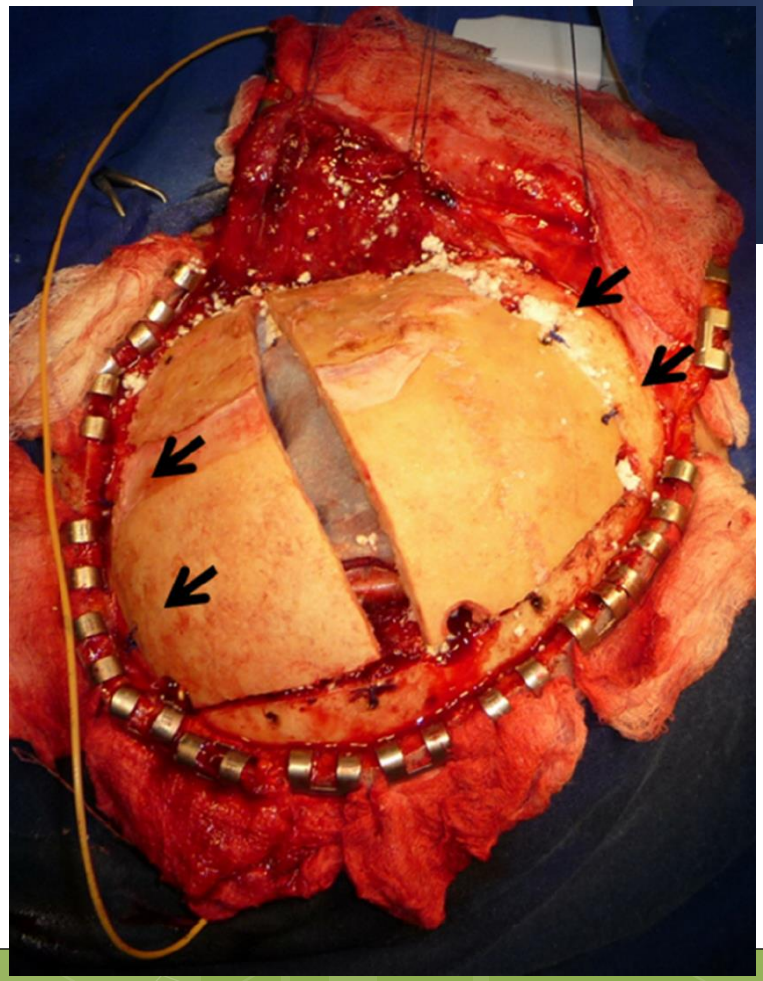


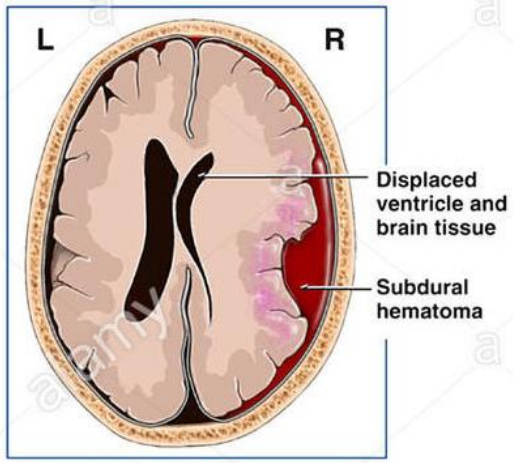
Surgery

- Craniectomy ± hematoma removal

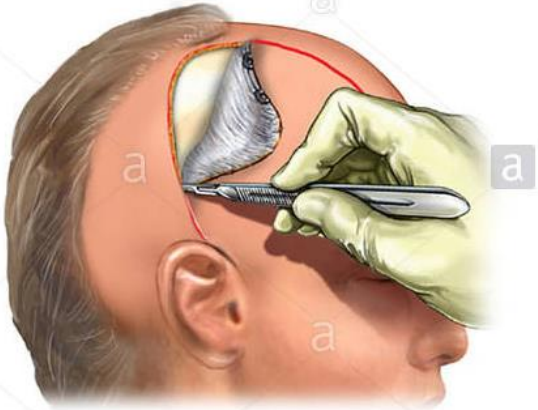




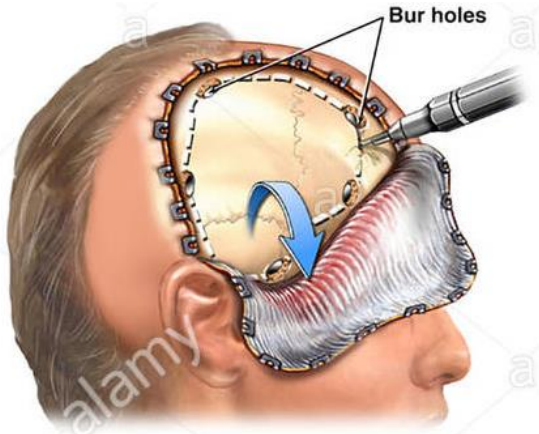
Surgery



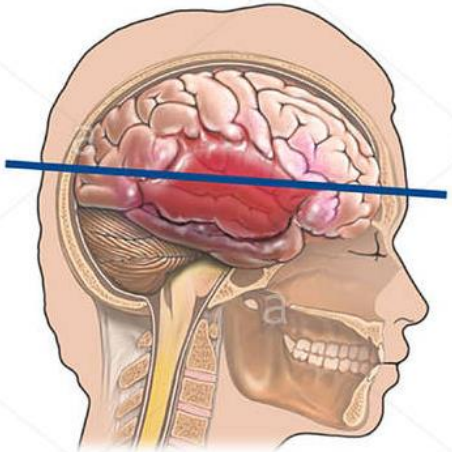
Axial section of brain and skull



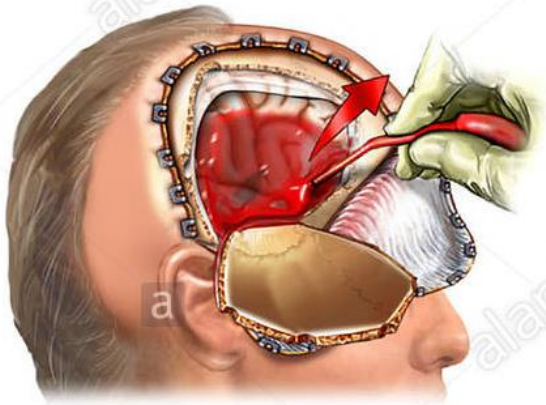
A. The scalp is incised.



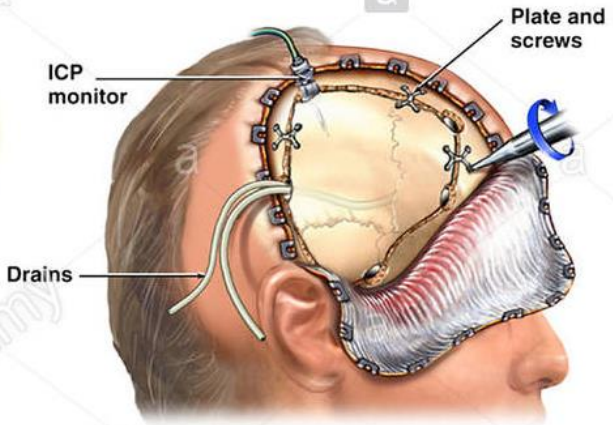
B. Multiple bur holes are drilled and a bone flap is fashioned.



Lateral cut away view



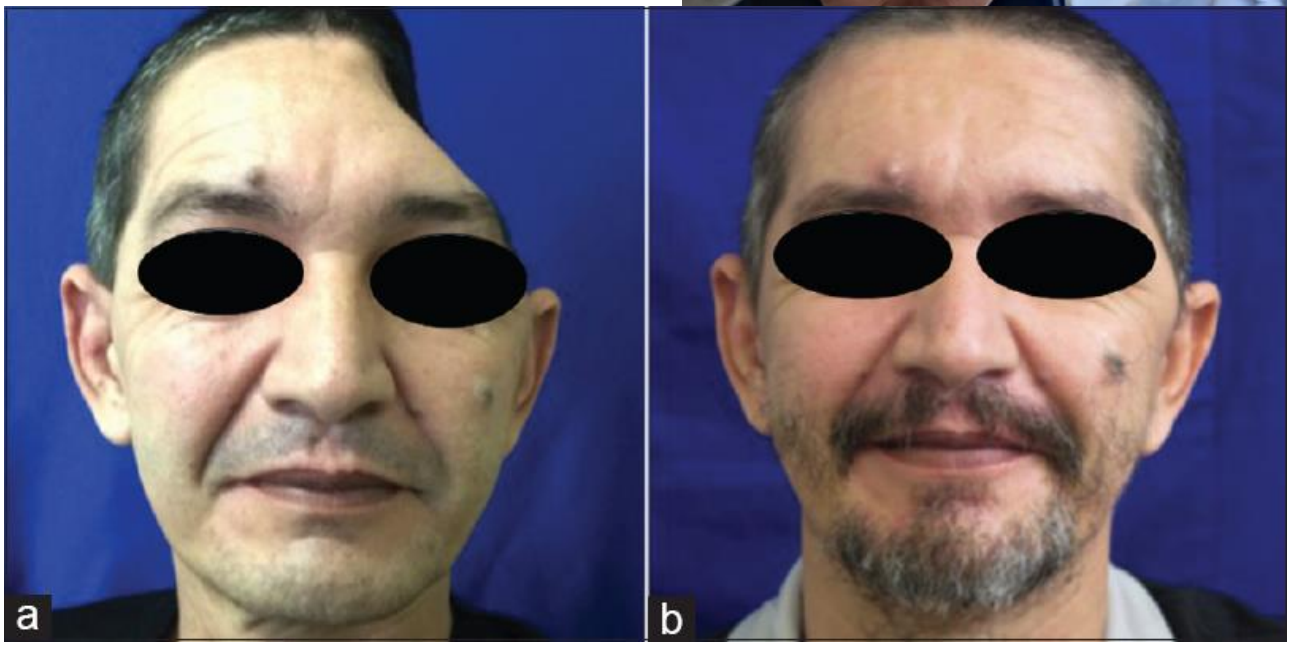
C. The subdural hematoma is evacuated.

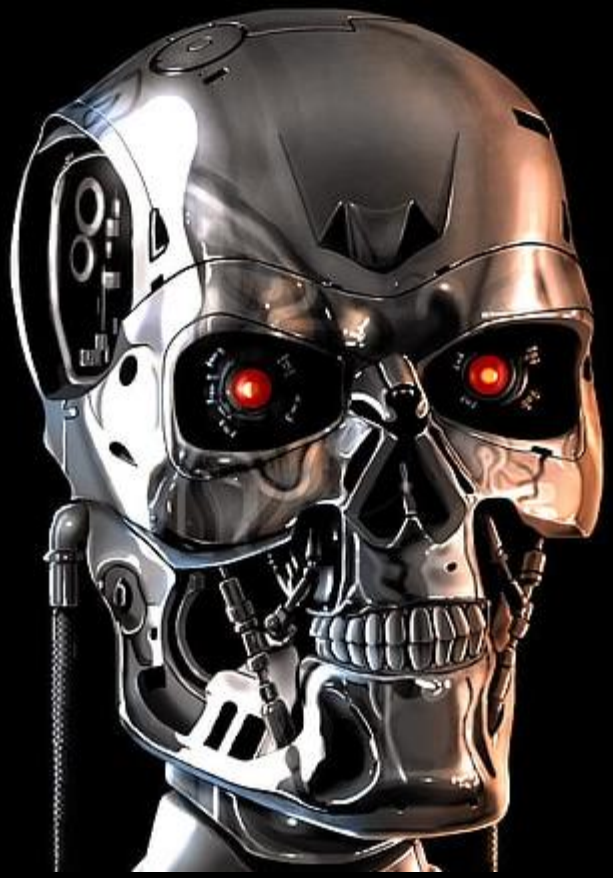


D. The skull flap is replaced and secured with plates and screws. An intracranial pressure (ICP) monitor and two drains are placed.

Cranioplasty

- If everything OK in 3-5 month => skull defect correction





Thank you for listening.
Keep safe!