

2. CRANIO-CEREBRAL INJURIES 2

B. Secondary events

- They develop after the injury + lead to augmentation of the original injury + need urgent intervention to prevent death / permanent damage:

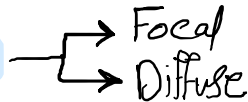
1. Continued DAD:

- Secondary axotomy: molecular basis.

Injury -> Excitotoxic NT -> Ca influx

To brain cells -> **phospholipid cascade** -> apoptosis and axon disconnection.

3. Brain edema:



- a major detrimental factor in the success of management.

2. Brain Ischemia

- diminished cerebral perfusion (CP) or hypoxia

Hypovolemia -> low cp

Low O2 -> Hypoxia

- YOU have to maintain CPP as much you can -> adequate BP /+ reduce ICP

Vasogenic.

Disruption of **BBB** around the site of injury — IV proteins leaks — withdrawing fluid — Edema.

- With brain contusion

Cytotoxic.

Failure of **Na/K** pump. — Na retention inside cells. — retain H2O — swelling

- poisoning, cardiac arrest, ischemia.

Osmotic

Low blood **osmolality** — Relatively high brain's O. — draws fluid into ECS.

- Over hydration /ADH

Interstitial

- disruption of the **CSF bb** — CSF pass Ependymal — around the Ventricles.

Management of edema —> close observation, ICP monitoring, mannitol, if progress ~ craniectomy

C. Complications

They are life threatening + require urgent attention + detected in close observation / can be missed Do CT & electrolyte examination once again, don't do them once time!!

1. Early complications

Electrolyte disturbance.

Child/Trauma — secret ADH — Volume retention, hyponatraemia. Or mannitol and diuretics induced.

>> confusion, lethargy, general weakness

or nausea with vomiting, If $Na < 120$ seizures.

If $Na < 105$ status epilepticus.

MUST be corrected as soon as possible....

Infuse saline 5 mmole /1/1hr To avoid pontine myelinolysis.

May. Both → Lumbar drainage → 2 wks + Abx → Fistula not heal yet → Do it Surgically ~ use Metrizamide & CT craniotomy/Duroplasty to detect fistula

CSF Leaks.

CSF otorrhea

- Fx in petrous temporal bone.
- with blood... otorrhagia
- halo test.
- stop alone / abx cover
- Don't examine the ear

Epilepsy

- in the cribriform plate
- runny nose? sugar content
Or B2 transferrin
- Stop alone / abx cover + sterile bad
- Don't examine the nose

Infection

- meningitis
- Abscess

May cause Recurrent Meningitis

4% of Basal Fx

Intracranial Hematomas

Epidural.

~ Acute.

- Arterial... MCA and its branches
- Needs time to strip the dura.
- Lenticular
- Mostly associated with fx/ adult > child. *rate < 60*
- Two presentations:
"Classical"
Trauma >> LOC >> wake up / lucid >> LOC
↳ concussion *↳ Transientorial Herniation*
- "Non classical"
1. LOC >> still ! >>> EDH at CT
2. Awake >> still ! >>> EDH at CT
3. Awake >> Nothing at CT >> admitted then deteriorated >> EDH at CT

• IF EDH is left untreated → brain herniation + ipsilateral p. dilation
Death!! ← Kernohan's p. ← contralateral hemiparesis + LOC
ipsilateral hemiplegia

- At CT >> hemorrhage +/- Fx (mainly adult) + Brain shifts.
- Tx :
Asymptomatic >> more than 30ml/ thicker than 1cm >> Evacuated
EDH >> with NDs >> Evacuated
EDH in children >> Evacuated
— other wise ... wait & Observe with steroids in ICU

~ Delayed

- Not present on the initial CT
- Maybe due to reduction of ICP or blood dyscrasias
- 5% of the cases

2. Late complications

Chronic SDH

- No trauma/ headache + alter. Mental function/ language/ weakness.
- in Elderly not taking anticoagulant, alcoholic.
- hypodense at CT >> CSF / osmotic activity.
- Tx :

Neurological damage/ thick > 1 cm >> surgically burr holes

Left a drain for 48 hrs ++ remove the rigid membrane of the hematoma/ craniotomy and excision.

If re-accumulation of fluid >> shunt to peritoneum

Epilepsy.

- Early/ intermediate/ late.
- more in children / trauma.
- early/ intermediate >> prophylactic anticonvulsant.
- Risk factors: GCS < 10, hypovolemic sh. Intracranial H.
- Depressed fx, amnesia > 24 hrs, neurological sign.

Subdural

~ Acute

- More challenge/ brain damage
- Venous/ bridges veins.
- highly associated with trauma
- LOC + No lucid interval >> high mortality R
- Crescentic & hyperdense at non-c CT + Brain damage / laceration
- Wide spread / sutures >>> associated with shifts & increase ICP
- Tx :
Large Craniotomy, evacuation & control the source of bleed
Or try to reduce ICP & monitor it & maintain PP & ventilation, diuresis

Intracerebral/ellar

- contusion
- No ICP change or shift
- observe/ evacuate

SAH

- codeine ph
for headache

Hydrocephalus.

- due to blockage CSF / SAS.
- specially if No recovery.
- communicated & discovered in CT
- Tx : peritoneal shunting / drain

PTS

- biochemical change/ axonal damage
- Headache, difficulty in concentration, memory disturbances, emotional d. & personality change, insomnia
- psychological assessment, analgesia should improve within 12 months.