ICP Notes

- Always do a CT prior to an LP:
  - **a-** LP is contraindicated when the pressure is not equally distributed (e.g. tumor, hematoma), it causes herniation → brainstem compression.
  - **b-** In diffuse causes of increased ICP (e.g. idiopathic) → LP is a Tx
- Signs indicating increased ICP compensation → Subarachnoid space absence / Sulci effacement; CSF moves to lumbar theca.
- There's no altered consciousness in idiopathic increased ICP.
- X-ray findings in children: sutures widening, calcified pineal gland, thumb impressions.
- Burr hole, a hole drilled into the right frontal skull to relieve pressure.
- ICP Monitoring when:
  - **a-** Severe closed head injury (common)
  - **b-** Intracranial surgery
  - **c-** Idiopathic IC hypertension (using a lumbar-subarachnoid catheter)
  - ⇨ Complication: Infection
- Cushing Triad: HTN + Bradycardia (to maintain CPP), wide pulse pressure, respiratory depression
- ICP abnormalities can be:
  - **a-** Elevation
  - **b-** Pathological waves, e.g. 'a' wave (plateau waves)
    Note: Lundberg A waves or plateaus are characterized by increase in ICP to 20–100 mmHg with a duration of min-hrs and may indicate risk of low CBF.
- Papilledema: Bilateral = increased ICP / Unilateral = optic neuritis
- Headache: +Projectile vomit = increased ICP / +Non-projectile vomit = migraine
- Hyperventilation > ↓ PaCO2 > vasoconstriction > ↑ ICP
- Hypoventilation > ↑ PaCO2 > vasodilation > ↑ CBF > ↑ ICP
- Patients with idiopathic increased ICA may also present with PCKD, Behcet's, OSA, hypothyroidism.
- Kernohan notch phenomenon is known as an indentation in the contralateral cerebral crus by the tentorium cerebe.
- Transcalvarial herniation needs craniotomy
- **Froin syndrome:** yellowish CSF caused by increased protein content (more than 40 mg) and it usually indicates obstruction.

ICP Summary

- Autoregulatory mechanisms:
  - **a-** ↑ ICP > CCA release > ↑ systemic BP = To maintain CPP and CBF
    This occurs also in cases of hypovolemia
  - **b-** ↓ CPP > hyperventilate > ↑ PaCO2 > vasodilation > ↑ CBF
- Normal Ranges:
  - **a-** CPP =70-120 mmHg
  - **b-** ICP <20 mmHg
- Compensatory mechanisms:
  - **1-** CSF moves to lumbar theca
  - **2-** Venous blood moves out of sinuses
  - **3-** Lateral brain shifting
  - **4-** Supratentorial herniation through tentorial hiatus (central, uncal)
  - **5-** Infratentorial herniation through foramena Magnum (tonsillar)
- Sx of increased ICP = Headache, projectile vomit, visual disturbances + bulging fontanelle and diplopia (6^{th}).
  Note: papilledema needs several days to show and several days to disappear.
- Sx due to shifts and herniation:
  - **a- Subfalcine (frontal mass):** contralateral leg weakness, Abulia
  - **b- Transtentorial:** decreased consciousness (RAS), ipsi pupil dilation (3^{rd}), contralateral hemianopia with macular sparing (PCA), contralateral hemiparesis (ipsi crus cerebri), Cushing and Cheyne-Stocks breathing (midbrain)
  - **c- Transforaminal:** Cushing
  - **d-** Neck stiffness, head tilt (children), coning (duret hrrg), DI (damage to pituitary stalk).
- Idiopathic increased ICP management:

  1- LP **2-** Wt loss **3-** Stop OCP, Vit A, tetracyclines, nalidixic acid

  4- Give CAI (Acetazolamide; Diamox)

  5- Surgery: optic nerve sheath fenestration, Lumbo-peritoneal shunting, stenting (used for TSS, refractory Sx, or as a last choice)
- MRI findings in idiopathic increased ICP:
  - **a-** Post. flattening of the globes: eye shortening, hyperopic sheath
  - **b-** Empty Sella or TSS