

Hydrocephalus

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Outline

- Define hydrocephalus
- Background anatomy & physiology
- Pathogenesis
- Clinical features
- Types of hydrocephalus
- Aetiology
- Investigations
- Management
- Complications
- Differential diagnosis of large head

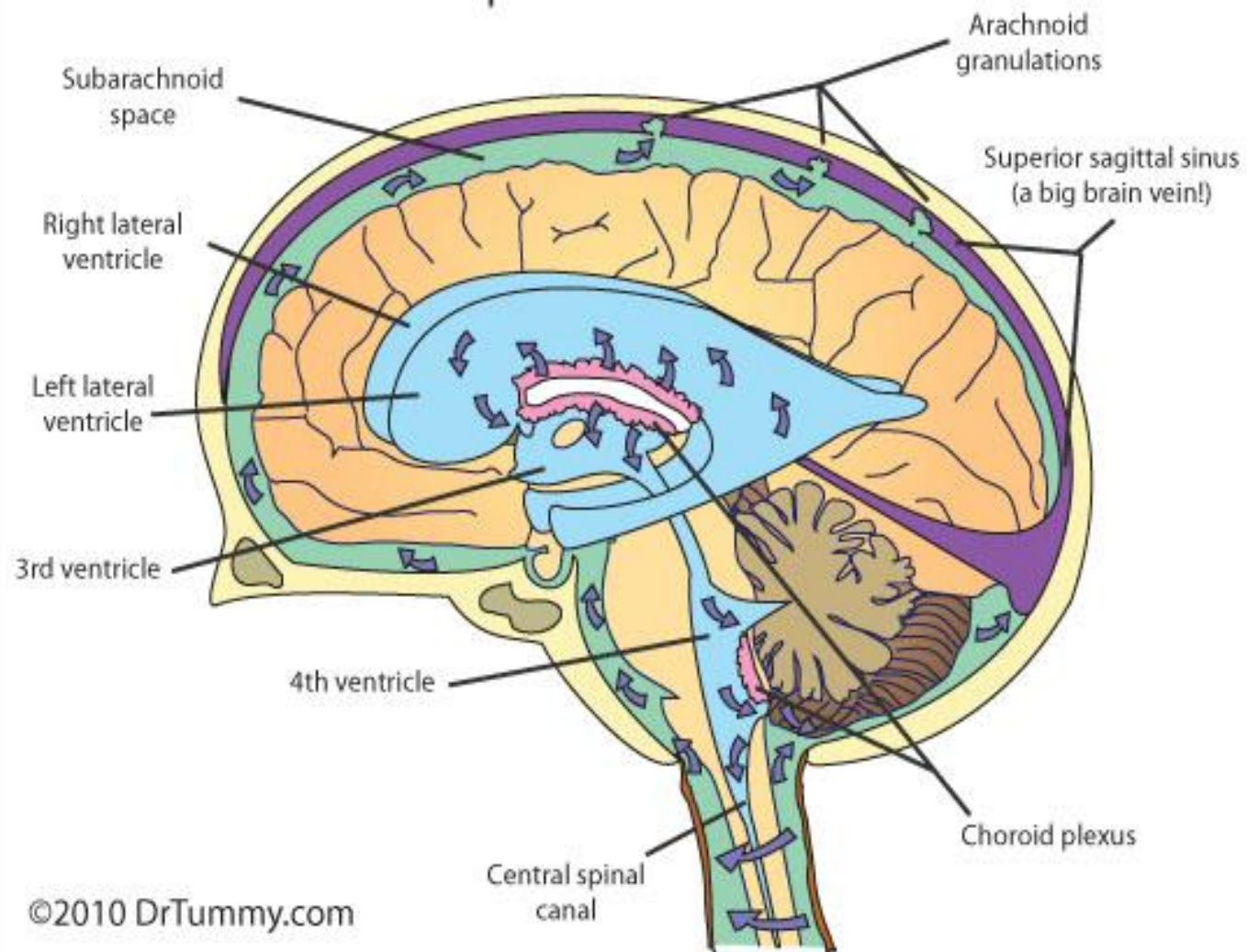
What is hydrocephalus?

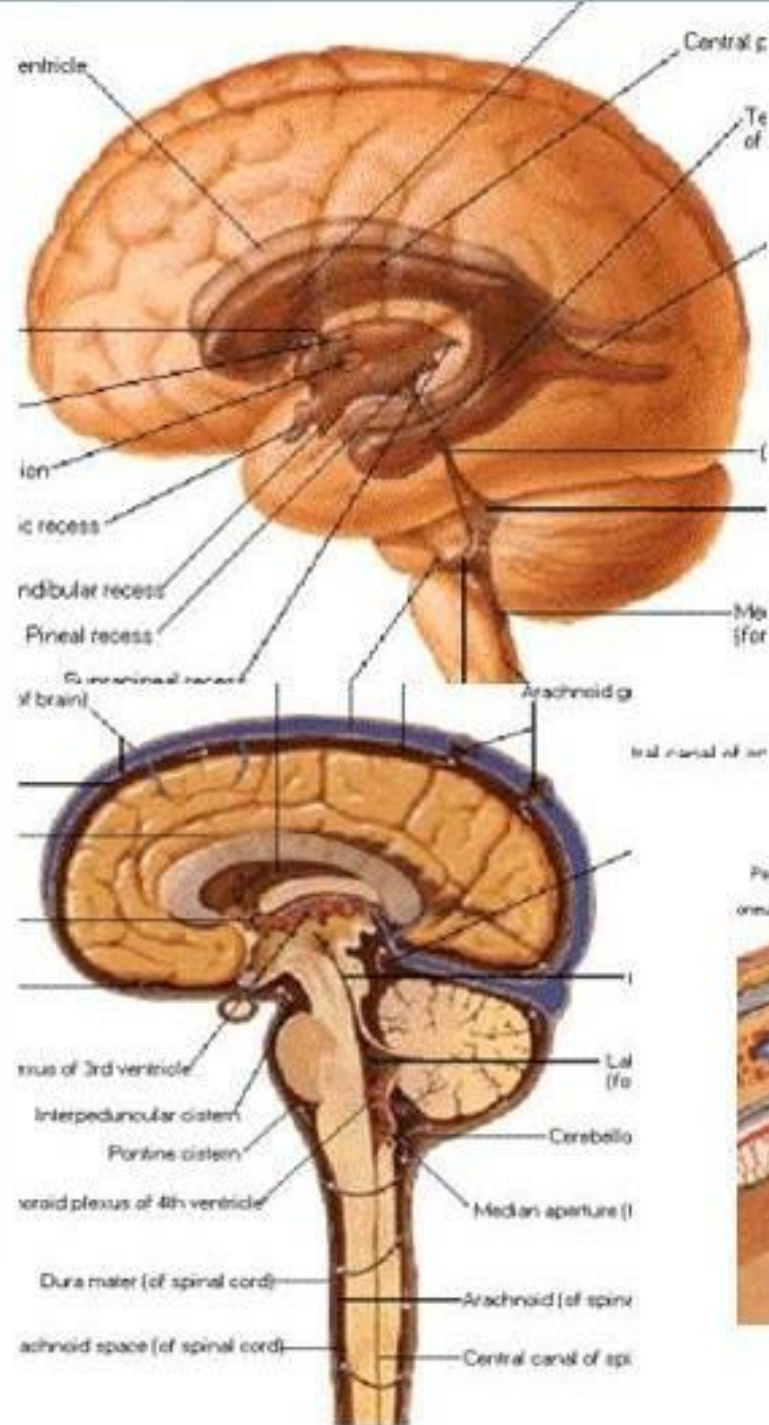
- Large head due to excessive accumulation of CSF within the ventricular system
- Not a specific disease
- It is a manifestation of an underlying disease



The Brain

Cerebral Spinal Fluid Circulation





CSF formed active process

1. **choroidal plexus 70%**

• Lat ventricle: ant horn (frontal), temporal horn, occipital horn

2. **blood vessels lining ventri wall: 30%**



Interventricular
foramen of **Monro** (a
pair) into 3rd ventricle



Cerebral aqueduct of
Sylvius (single) to 4th
ventricle



CSF fr ventricular
system into
subarachnoid space,
via

1. Median foramen of **Magendie**
2. Lat (pair) foramen of **Luschka**
3. Central canal (not patent in adult)

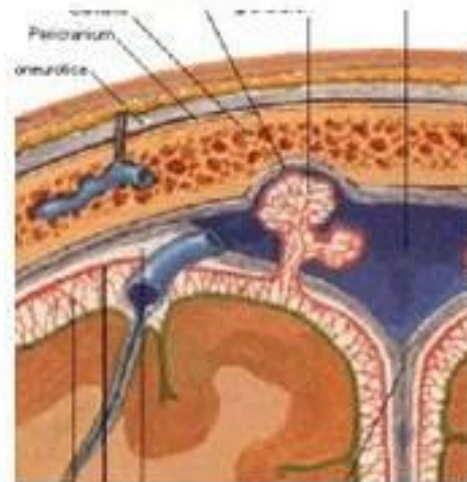


Into dural sinus
(gradient)



CSF absorbed by

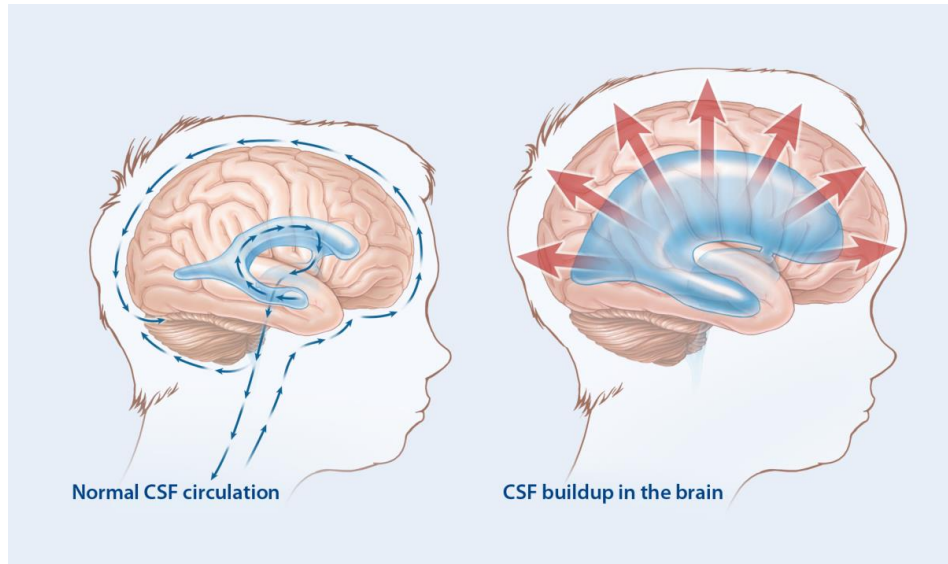
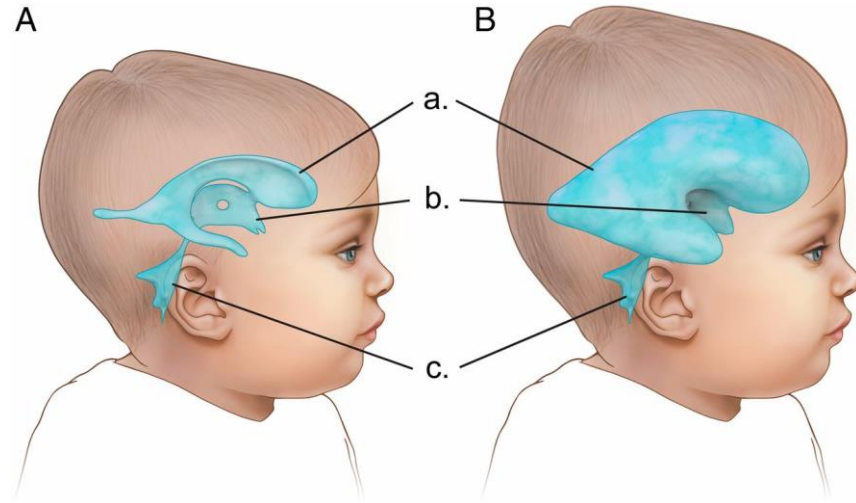
1. **arachnoid villi: 80%**
2. **spinal nerve root: 20%**



Pathogenesis of hydrocephalus

- Increased production of CSF
Eg: choroid plexus papilloma
- Impaired absorption of CSF
Eg:
 - Sub arachnoid h'ge
 - Meningitis
- Impaired circulation of CSF
Eg:
 - Aqueductal stenosis
 - Chari malformation – type II
 - Dandy- Walker malformation
 - Space occupying lesion
tumours, haematomas, abscesses

Hydrocephalus



Clinical features



Clinical features

Depend on the age of onset and underlying cause , rate of rise in intra cranial pressure

Signs in the head and face

- Large head / Unduly rising OFC
- Frontal bossing
- Broad forehead
- Dilated veins over the scalp
- Setting-sun sign mechanism??
- Deeply set eyes
- Wide anterior fontanelle and bulging
- Suture separation
- Macewen sign – cracked pot sign

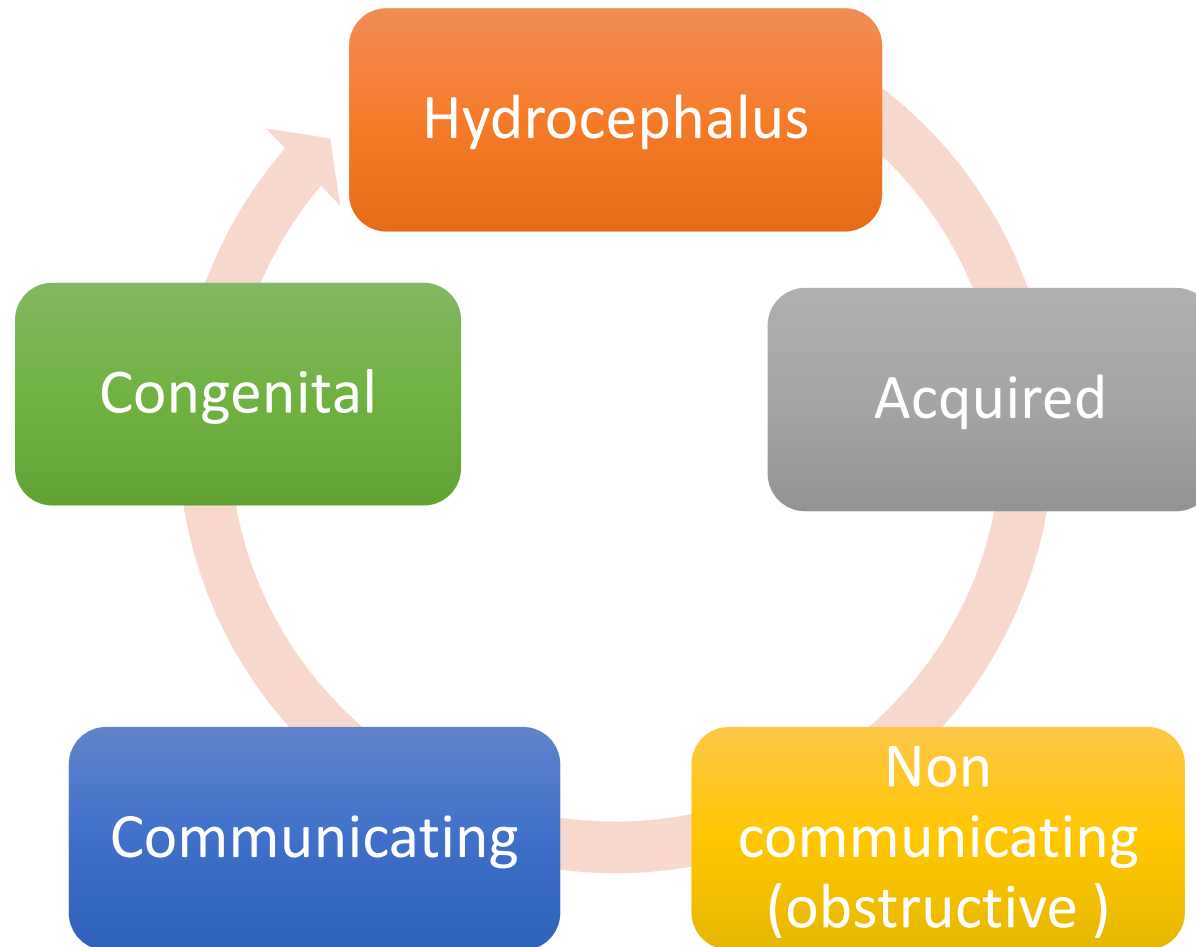
Other signs

- Long tract signs
- Brisk tendon reflexes
- Spasticity
- Clonus
- Babinski sign
- Papilledema
- 6th nerve palsy
- Signs suggestive of occult spinal dysraphism

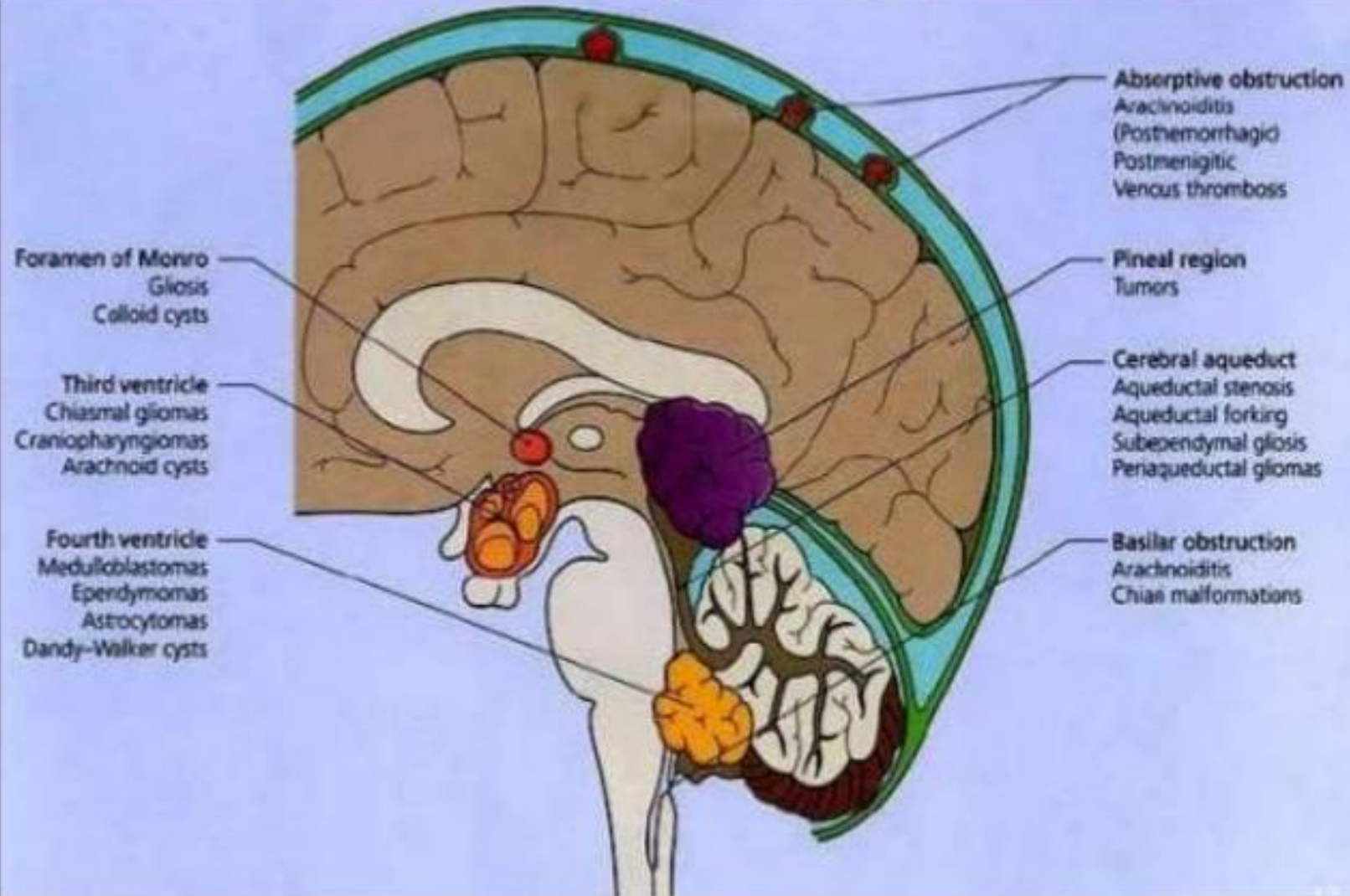
General

- Nausea
- Vomiting
- Drowsiness
- Headache
- Irritability
- Lethargy
- Poor appetite
- Change in personality
- Deterioration of academic performance

Types of hydrocephalus



Causes of Hydrocephalus



Causes of hydrocephalus

Communicating

- Meningeal malignancy , **leukemic infiltrates**
- **Meningitis**
- **Post-haemorrhagic**
- Achondroplasia
- Basilar impression
- Benign enlargement of subarachnoid space
- Choroid plexus papilloma

Non communicating

- **Aqueductal stenosis**
- **Neural tube defects**
- **Infectious – congenital infections**
- **Mass lesions – brain tumours specially posterior fossa**
- **Abscess**
- **Haematoma – SAH, Intraventricular haemorrhage in preterm infants**
- X linked/Mitochondrial/Autosomal recessive/Autosomal dominant
- Arnold Chiari malformations & Dandy-Walker malformations
- Klippel-Feil syndrome

Investigations – USS brain

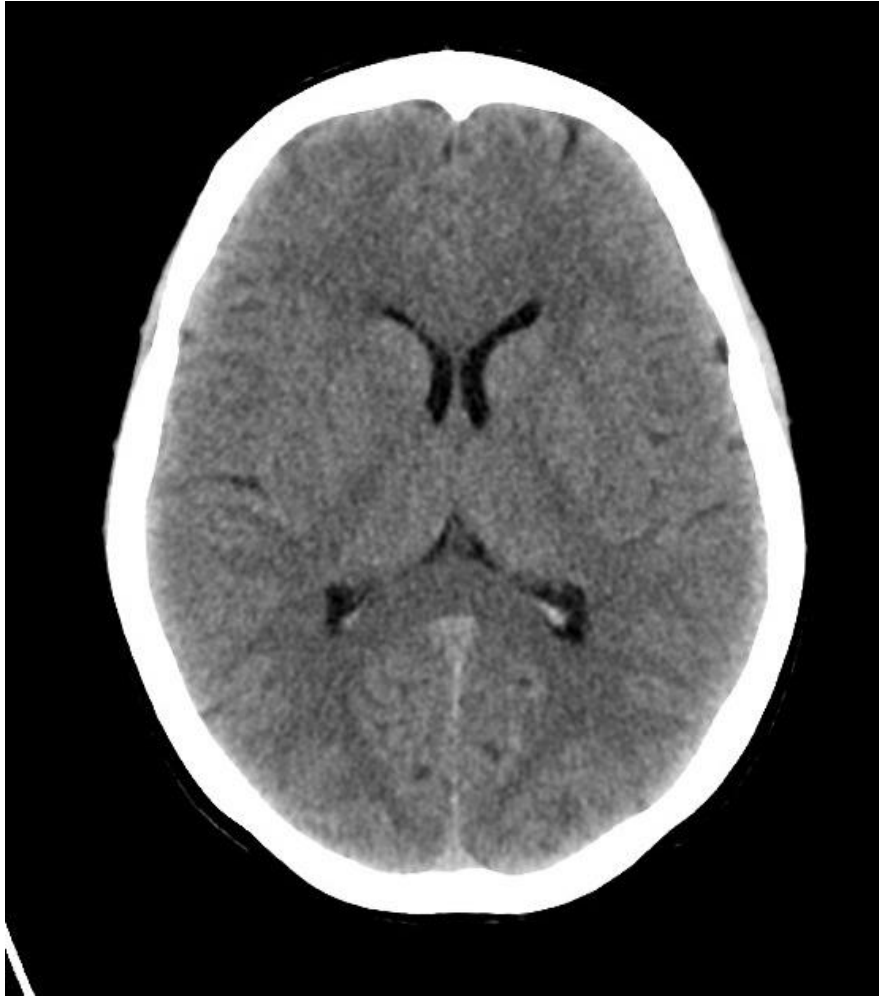


Investigations - X ray skull

- Separation of the sutures
- Erosion of the posterior clinoids
- Silver-beaten appearance – indicate long standing raised ICP



Investigations – CT brain



Management of hydrocephalus

- Depend on the underlying aetiology
- However, raised ICP is a medical emergency which should be managed according to a common protocol

Conservative management

(arrested hydrocephalus or under control with shunts)

- Monitor OFC
- Monitor development
- Monitor for neurological symptoms

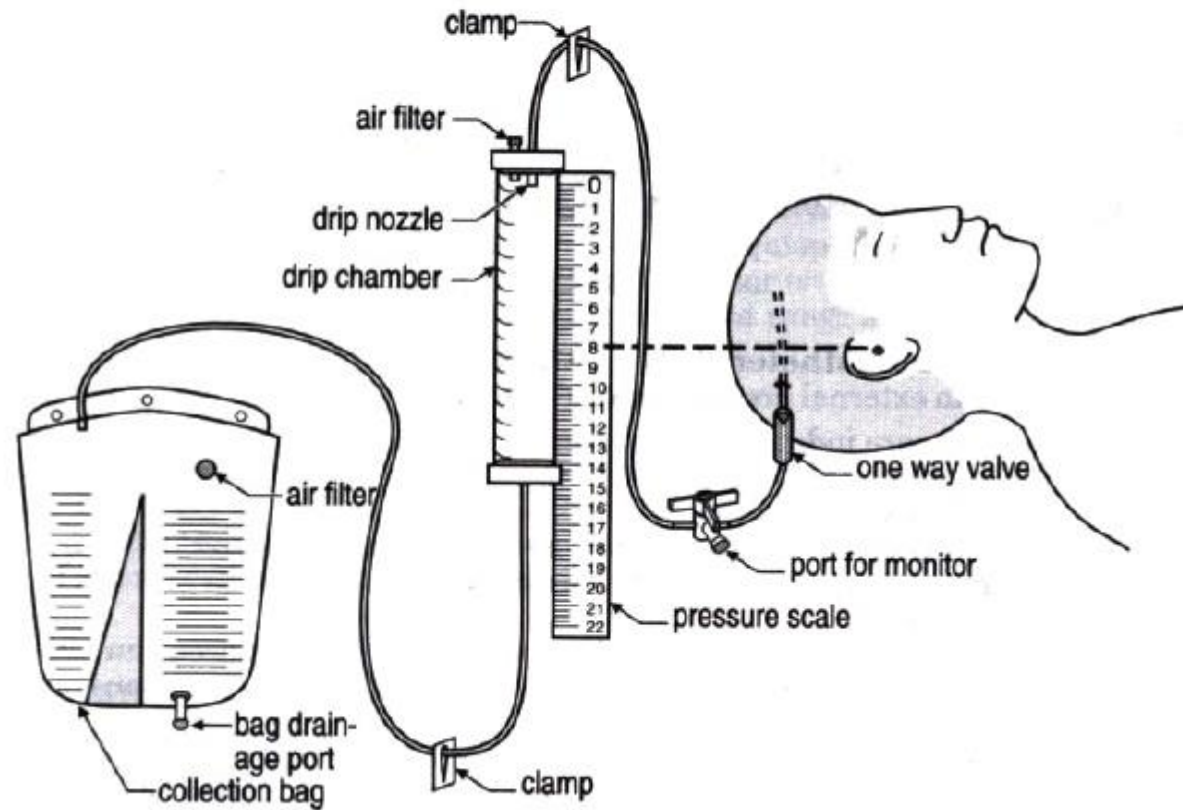
Medical management

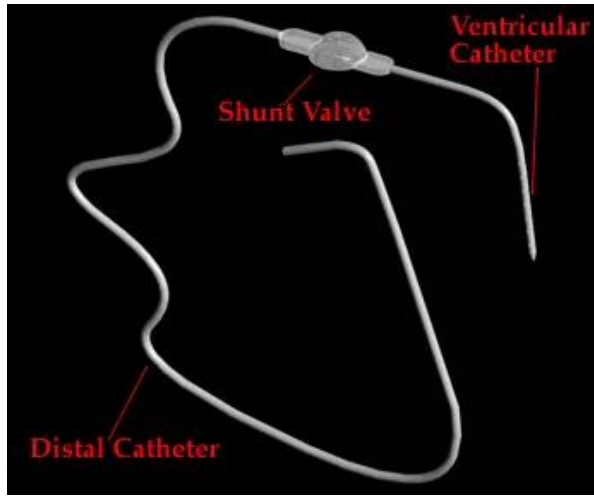
- Acetazolamide
- Furosemide

Surgical management

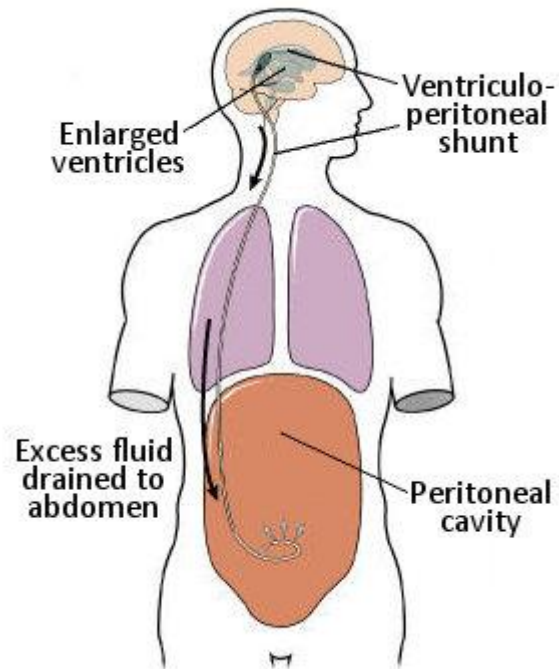
- Internal CSF drainage eg: VP shunt
- External CSF drainage

EVD, External Ventricular Drain

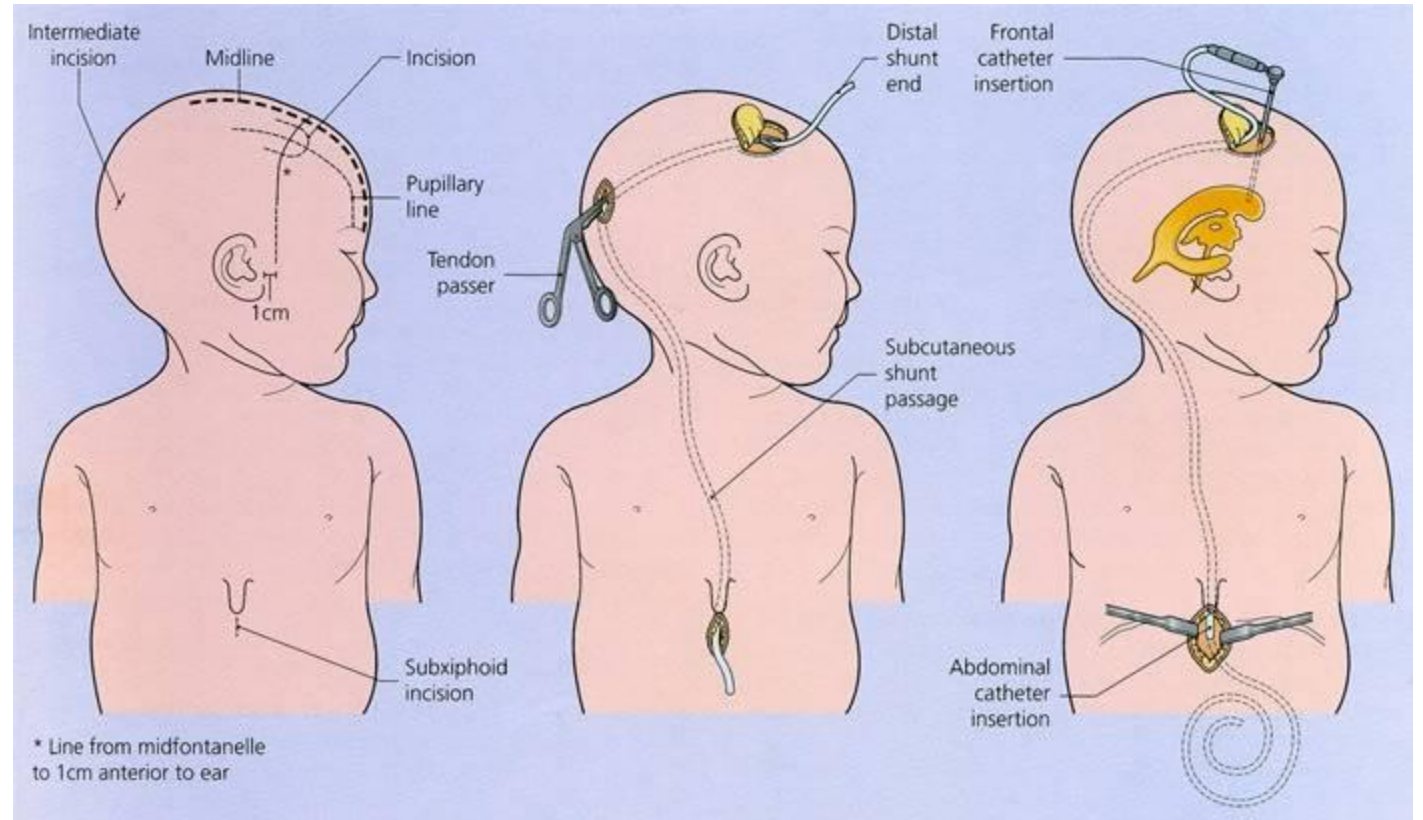




Ventriculo-peritoneal shunt

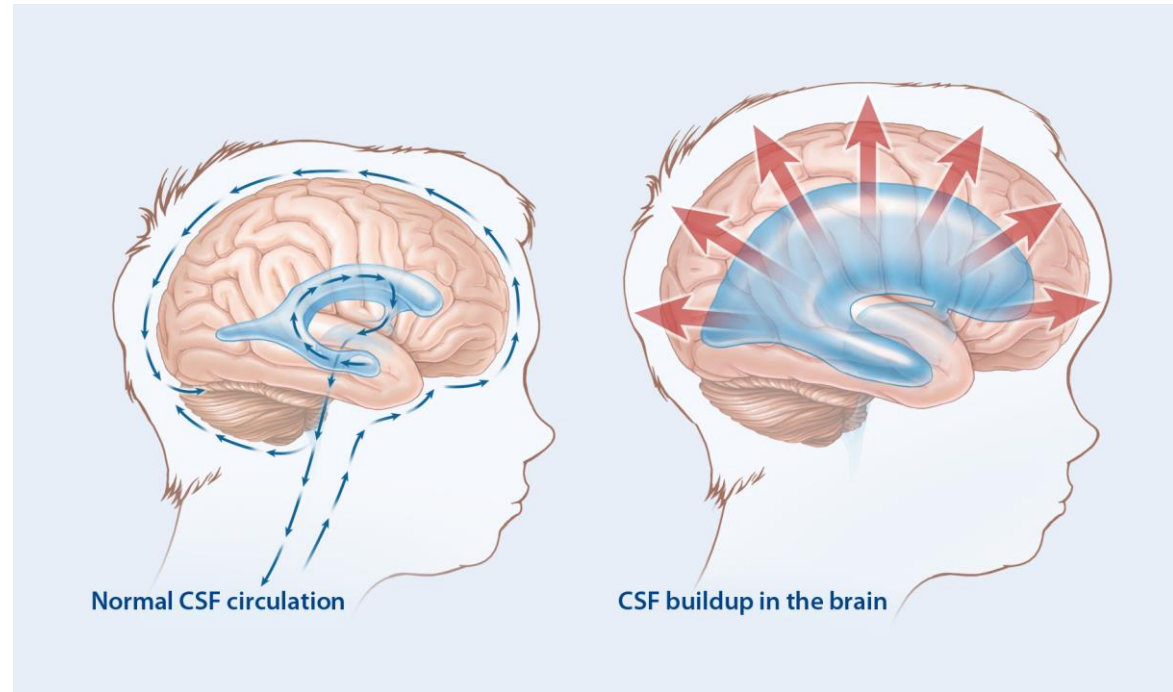


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Complications of hydrocephalus

- Increased intra-cranial pressure
 - Vomiting
 - Rapid rise in OFC
 - Drowsiness
 - Seizures
- Developmental delay
- Low IQ
- Visual Problems
 - Strabismus
 - Field defects
 - Optic atrophy
- Precocious puberty
- Epilepsy



Complications of shunts

- Shunt occlusion
- Shunt infection- usually due to *staphylococcus epidermidis*
- Over drainage of CSF
- Ventriculitis
- shunt malfunction, shunt failure - disconnected, displaced, becomes blocked, infected or it is outgrown
- Shunt nephritis – commonly with VA shunts

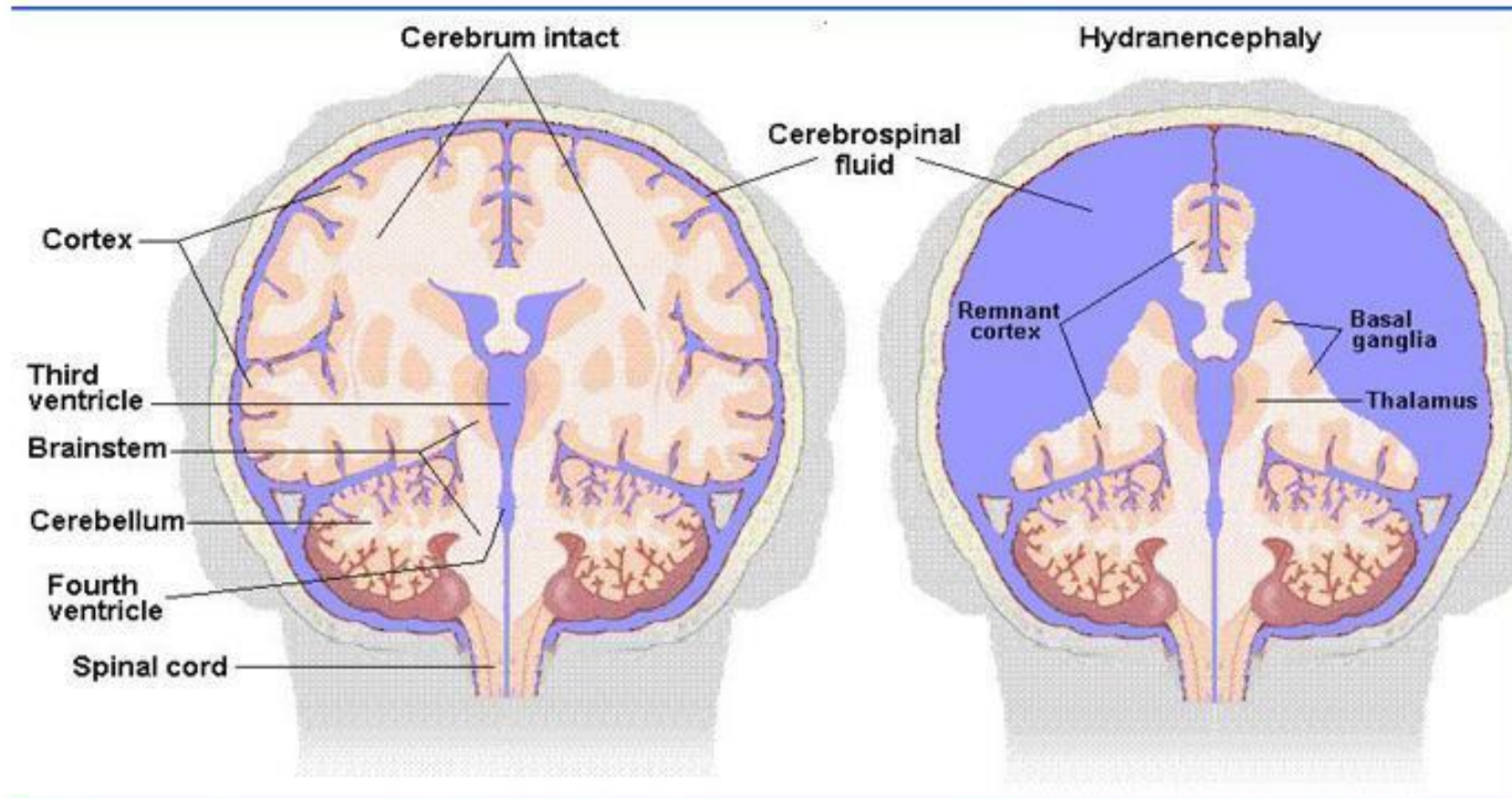
Differential diagnoses of large head

- Hydrocephalus
- Hydranencephaly

A condition in which the brain's cerebral hemispheres are absent to varying degrees and the remaining cranial cavity is filled with cerebrospinal fluid

- Megalencephaly (familial, metabolic and degenerative disorders in CNS)
- Thickened cranium (Chronic anaemia, rickets, osteogenesis imperfecta)
- Familial

Hydrocephalus vs hydranencephaly



Extended learning

- <https://youtu.be/-enG4vCVw6U>



T H A N K Y O U