INFANTILE HYDROCEPHALUS

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Hydrocephalus

- **Definition:** Increased CSF volume

- **Etiology:**
  - Obstruction to CSF flow
  - Decreased CSF absorption (NPH)
  - Increased CSF production

- **Classification in infants:**
  - Congenital
  - Acquired
Congenital Hydrocephalus

- Primary aqueductal stenosis
- Dandy-Walker malformation
- Chiari malformation type II
- Myelomeningocele
- Secondary gliosis due to intrauterine viral infections (mumps, varicella, TORCH infections)
- Arachnoid cyst (posterior fossa)
Acquired Hydrocephalus

- Post meningitis
- Post hemorrhage (SAH, IVH)
- Vascular malformations
- Neoplastic masses
- Infections
- Brain abscesses
- Hematoma
- Venous sinus thrombosis
- Choroid plexus papilloma
Epidemiology

- **Most common cause of hydrocephalus:** acquired aqueductal stenosis
  - Obstruction by infection, hemorrhage or mass
- **Most common congenital cause:** myelomeningocele (often with Chiari II or aqueductal stenosis)
- **Congenital hydrocephalus** 0.5-0.8 per 1000 live births (50% due to myelomeningocele)
- **100 000 shunts implanted internationally every year**
Epidemiology

- Incidence of acquired hydrocephalus unknown
- Congenital aqueductal stenosis: 10% hydrocephalus of the newborn
- Dandy-Walker: 2-4%
- Mass lesion: 20% of all hydrocephalus in children
- In developing countries: congenital and infectious
- In developed countries: congenital, post- hemorrhagic, infectious
Clinical Manifestations in Infants

- Accelerated rate of enlargement of the head
- Bulging anterior fontanelles
- Widening of cranial sutures
- Upper motor neuron signs (brisk reflexes)
- Irritability, lethargy, poor feeding
- Sunset sign (forced downward deviation of eyes)
- Episodic apnea and bradycardia
- Signs of Increased ICP
  - Lethargy, vomiting, headache
Imaging Options

- U/S
- CT
- MRI
- ICP monitoring
Pattern of Dilatation

- Stenosis of aqueduct
  - Dilated lateral and third ventricle
  - Normal size fourth ventricle
- Communicating hydrocephalus
  - Symmetrical dilatation of the ventricles
Suggestive of Hydrocephalus:

- Enlargement of the recesses of the 3rd ventricle
- Dilatation of the temporal horns of the lateral ventricles
- Interstitial edema of periventricular tissue
- Effacement of cortical sulci
Benign Enlargement of Subarachnoid Spaces in Infants

- Transient developmental phenomenon
- Most are self-limiting
- Up to 16% of infants
- Macrocephaly
- Prominence of SAS
- Mild ventricular enlargement
- Typically 2-7 months
- When hydrocephalus is present = EVOH (extra-ventricular obstructive hydrocephalus)
Increased extra-axial spaces
Increased subarachnoid space seen on ultrasound
Increased extra-axial spaces with dilated ventricles
Grade IV IVH + hydrocephalus
Hydrocephalus due to germinal matrix intraventricular hemorrhage (IVH) of prematurity

Ultrasound in an infant with grade IV intraventricular hemorrhage.
(Panel A) Coronal view.
(Panel B) Sagittal view.

Courtesy of Drs. Abilash Haridas and Tadanori Tomita.
Aqueductal stenosis due to a tectal lesion

Sagittal T1 weighted magnetic resonance imaging (MRI) showing aqueductal stenosis. The hydrocephalus was treated with a third ventriculostomy.

Courtesy of Drs. Abilash Haridas and Tadanori Tomita.
A sagittal T1-weighted MRI in a pediatric patient shows several characteristic intracranial findings of the Chiari II malformation, including downward displacement of cerebellar tissue through the foramen magnum (white arrow), a small fourth ventricle (yellow arrow), and tectal beaking (pink arrow).

Courtesy of Eric D Schwartz, MD.
Hydrocephalus associated with Dandy Walker malformation

Four-month-old child with a Dandy Walker malformation, showing agenesis of the cerebellar vermis and a large posterior fossa cyst.

Courtesy of Drs. Abilash Haridas and Tadanori Tomita.
Hydrocephalus due to a choroid plexus papilloma

Magnetic resonance imaging in a 10-month-old male infant, showing a papilloma of the choroid plexus in the right lateral ventricle. There is associated hydrocephalus, caused by overproduction of cerebrospinal fluid (CSF).

*Courtesy of Drs. Abilash Haridas and Tadanori Tomita.*
THANK YOU!
References


- http://www.mrcophth.com/MRCOphth/mrcophthpartoneessay/vent.gif

