Hydrocephalus diagnosis

- Proinflammatory cytokines - as a marker of the effectiveness of neuroprotection in children with perinatal nervous system damage
- Epilepsy in Children with Myelomeningocele: A Single-Center Retrospective Cohort Study and Review of the Literature
- Effectiveness of single-stage shunt replacement for Cutibacterium acnes CSF shunt infection
- Perimesencephalic Subarachnoid Hemorrhage Bleeding Patterns Are Not Always Benign: Prognostic Impact of an Aneurysmal Pathology
- MPDZ Pathogenic Variants Cause Obstructive Ventriculomegaly Related to Diencephalosynapsis and Third Ventricle Atresia
- Obstructive Hydrocephalus Caused by Tumefactive Perivascular Spaces: A Case Report
- Clinical Reasoning: Episodes of Uncontrollable Crying in a 52-Year-Old Man With a Sphenopetroclival Tumor
- Establishment and evaluation of a novel rat model of the fourth ventricle hemorrhage

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Ju et al. identified 148 up-regulated proteins and 82 down-regulated proteins, which are potential biomarkers for clinical hydrocephalus diagnosis and arachnoid cyst. Functional enrichment analysis revealed that the Differentially expressed proteins (DEPs) were significantly enriched in the cancer hallmark pathways and immune-related pathways. In addition, network analysis uncovered that DEPs were more likely to be located in the central regions of the human PPIs network, suggesting DEPs may be proteins that play important roles in human protein-protein interactions (PPIs). Finally, they calculated the overlap of drug targets and the DEPs based on drug-target interaction to identify the potential therapeutic drugs of hydrocephalus. The comprehensive proteomic analyses provided valuable resources for investigating the molecular pathways in hydrocephalus, and uncovered potential biomarkers for clinical diagnosis and therapy [1)].

The features of reelin expression in the brain of fetuses and newborns at 22-40 weeks' gestation with internal hydrocephalus should be considered as morphological differential and diagnostic criteria for the disease about its etiology [2)].

Imaging plays a central role in the diagnosis of hydrocephalus. While magnetic resonance (MR) imaging is the first-line imaging modality, computed tomography (CT) is often the first-line imaging test in emergency patients.

Specific imaging criteria for hydrocephalus

HCP is suggested when either:

1. the size of both temporal horns (TH) is ≥ 2mm in width (in the absence of HCP, the temporal horns should be barely visible), and the Sylvian & interhemispheric fissures and cerebral sulci are not visible

OR

2. both TH are ≥ 2 mm, and the ratio FH

ID > 0:5 (where FH is the largest width of the frontal horns, and ID is the internal diameter from inner-table to inner-table at this level.

Other features suggestive of hydrocephalus (see ▶Fig. 24.3 for measurements):

1. ballooning of frontal horns of lateral ventricles (“Mickey Mouse” ventricles) and/or 3rd ventricle (the 3rd ventricle should normally be slit-like)

2. periventricular low density on CT, or periventricular high intensity signal on T2WI on MRI suggesting transependymal absorption of CSF (note: a misnomer: CSF does not actually penetrate the ependymal lining, proven with CSF labeling studies; probably represents stasis of fluid in brain adjacent to ventricles)

3. used alone, the ratio is FH ID

< 40%

40–50%

> 50%

normal

borderline

suggests hydrocephalus

4. Evans ratio or index (originally described for ventriculography30): ratio of FH to maximal biparietal diameter (BPD) measured in the same CT slice: > 0.3 suggests hydrocephalus. Note: measurements that rely on the frontal horn diameter tend to underestimate hydrocephalus in pediatrics possibly because of disproportionate dilatation of the occipital horns in peds)

5. sagittal MRI may show thinning of the corpus callosum (generally present with chronic HCP) and/or upward bowing of the corpus callosum

CT/MRI

In general, hydrocephalus is best demonstrated on CT or MRI. Occasionally, other means of determining the presence of hydrocephalus must be employed. Most experienced clinicians can recognize HCP by its appearance on CT or MRI. Numerous methods have been devised to attempt to quantitatively define radiographic criteria for hydrocephalus (HCP) (most date back to the early CT experience, and some are used definitionally for research purposes).

Magnetic resonance imaging

Magnetic resonance imaging for hydrocephalus diagnosis.

Ultrasound

Ultrasound imaging, which uses high-frequency sound waves to produce images, is often used for an initial assessment for infants because it's a relatively simple, low-risk procedure. The ultrasound device is placed over the soft spot (fontanel) on the top of a baby's head. Ultrasound may also detect hydrocephalus prior to birth when the procedure is used during routine prenatal examinations.

References

1)
Ju Y, Wan Z, Zhang Q, Li S, Wang B, Qiu J, Zheng S, Gu S. Proteomic analyses reveal functional pathways and potential targets in pediatric hydrocephalus. Curr Gene Ther. 2023 Jun 13. doi: 10.2174/1566523223666230613144056. Epub ahead of print. PMID: 37317915.
2)
Protsenko EV, Vasil'eva ME, Peretyatko LP. [Specific features of reelin expression in the brain of fetuses and newborns with internal hydrocephalus]. Arkh Patol. 2016;78(1):3-7. Russian. PubMed PMID: 26978229.