Pediatric hydrocephalus surgery

- Neural stem cell changes and spatial distribution of AQP4 expression in a fetal goat model of obstructive hydrocephalus
- Adjustable differential pressure versus adjustable gravitational valves in pediatric hydrocephalus
- Effectiveness of single-stage shunt replacement for Cutibacterium acnes CSF shunt infection
- An aggressive, unresected pineoblastoma in an adult woman: the role of exclusive radiotherapy - a case report and literature review
- Antibiotic-Impregnated Catheters for Ventriculoperitoneal Shunt in Neonates and Infants: A Systematic Review and Meta-Analysis
- Low- and negative-pressure hydrocephalus in children, clinical features, treatment, prognosis and proposed mechanisms
- Favorable Outcomes in a Rare Case of Chiari Malformation Type III: A Clinical Report
- Hydrocephalus Caused by Methylmalonic Acidemia: Clinical Characteristics, Optimal Timing of Surgical Intervention and Health-Related Quality of Life

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Ventriculoperitoneal shunt for pediatric hydrocephalus

see Ventriculoperitoneal shunt for pediatric hydrocephalus.

Ventriculoatrial shunt for pediatric hydrocephalus

see Ventriculoatrial shunt for pediatric hydrocephalus.

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see also Hydrocephalus surgery.

Surgery is the mainstay of pediatric hydrocephalus treatment

ETV patients were more likely to experience surgery failure compared to patients receiving shunt (relative risk = 1.4, P value = .011). Furthermore, patients' age < 1 yr had lower ETV success rates than those with shunt (P value = .009). No similar pattern was found in patients' age ≥ 1 yr.

There was no significant effect on time to failure between patients undergoing ETV and shunt, except in infants' age <1 yr [1].

The ShuntScope can be considered a valuable addition to standard surgical tools in pediatric hydrocephalus treatment. Even suboptimal visualization contributes to high rates of correct catheter placement and, thereby, to a favorable clinical outcome [2].

Endoscopic third ventriculostomy and choroid plexus cauterization (ETV/CPC)

see Endoscopic third ventriculostomy and choroid plexus cauterization

Ommaya reservoir for pediatric hydrocephalus

Ommaya reservoir for pediatric hydrocephalus

Treatment failure diagnosis

At present, neurosurgeons rely heavily on a patient's history, physical examination findings, infantile hydrocephalus metrics, including head circumference, fontanel quality, ventricle size, and clinical judgment to make the diagnosis of HC or treatment failure (e.g., shunt malfunction). Unfortunately, these tools, even in combination, do not eliminate subjectivity in clinical decisions. In order to improve the management of infants and children with HC, there is an urgent need for new biomarkers to complement currently available tools and enable clinicians to confidently establish the diagnosis of HC, assess therapeutic efficacy/treatment failure, and evaluate current and future developmental challenges, so that every child has access to the resources they need to optimize their outcome and quality of life [3].

It is not clear to what degree these metrics should be expected to change after ETV/CPC. Using these clinical metrics, Dewan et al. present and analyze the decision making in cases of ETV/CPC failure.

Infantile hydrocephalus metrics, including bulging fontanel, head circumference z-score, and frontal and occipital horn ratio (FOHR), were compared between ETV/CPC failures and successes. Treatment outcome predictive values of metrics individually and in combination were calculated.

Forty-four patients (57% males, median age 1.2 months) underwent ETV/CPC for hydrocephalus; of these patients, 25 (57%) experienced failure at a median time of 51 days postoperatively. Patients experiencing failure were younger than those experiencing successful treatment (0.8 vs 3.9 months, $p = 0.01$). During outpatient follow-up, bulging anterior fontanel, progressive macrocephaly, and enlarging ventricles each demonstrated a positive predictive value (PPV) of no less than 71%, but a bulging anterior fontanel remained the most predictive indicator of ETV/CPC failure, with a PPV of 100%, negative predictive value of 73%, and sensitivity of 72%. The highest PPVs and specificities existed when the clinical metrics were present in combination, although sensitivities decreased expectedly. Only 48% of failures were diagnosed on the basis all 3 hydrocephalus metrics, while only

37% of successes were negative for all 3 metrics. In the remaining 57% of patients, a diagnosis of success or failure was made in the presence of discordant data.

Successful ETV/CPC for infantile hydrocephalus was evaluated in relation to fontanel status, head growth, and change in ventricular size. In most patients, a designation of failure or success was made in the setting of discordant data [4].

In a concept of avoiding chronic overdrainage by using the proGAV in hydrocephalic children, Thomale et al. observed a good rate of valve and shunt survival. Compared to previous reported series, they experienced the proGAV as a reliable tool for the treatment of pediatric hydrocephalus. [5].

Costs

Pediatric hydrocephalus treatment costs

1)
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3)
Limbrick DD Jr, Castaneyra-Ruiz L, Han RH, Berger D, McAllister JP, Morales DM. Cerebrospinal Fluid Biomarkers of Pediatric Hydrocephalus. Pediatr Neurosurg. 2017 Aug 11. doi: 10.1159/000477175. [Epub ahead of print] PubMed PMID: 28797007.
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5)
Thomale UW, Gebert AF, Haberl H, Schulz M. Shunt survival rates by using the adjustable differential pressure valve combined with a gravitational unit (proGAV) in pediatric neurosurgery. Childs Nerv Syst. 2013 Mar;29(3):425-31. doi: 10.1007/s00381-012-1956-9. Epub 2012 Nov 8. PubMed PMID: 23135777.