Neuroendoscopic lavage

- The impact of neuroendoscopic drainage in intraventricular hemorrhage: an updated meta-analysis
- Modern Aspects of Post-haemorrhagic Hydrocephalus in Infants: Current Challenges and Prospects
- A retrospective study on the efficacy of neuro-endoscopic lavage compared to conventional antibiotic treatment in pyogenic ventriculitis
- Neuroendoscopic lavage for posthemorrhagic hydrocephalus of prematurity: preliminary results at a single institution in the United States
- Correlation of endoscopic third ventriculostomy with postoperative body temperature elevation: a single-center retrospective comparative study
- Correction: Technique and protocol for bedside neuroendoscopic lavage for post-hemorrhagic hydrocephalus: technical note
- Technique and protocol for bedside neuroendoscopic lavage for post-hemorrhagic hydrocephalus: technical note
- Neuroendoscopic Surgery for Intraventricular Cavernous Malformations: A Review on Indications and Surgical Considerations

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Neuroendoscopic lavage (NEL) is a minimally invasive surgical technique often used in the management of intraventricular hemorrhage (IVH) or hydrocephalus. It involves the use of a neuroendoscope to access the ventricular system and remove blood clots, debris, or cerebrospinal fluid (CSF) contamination, thereby improving CSF circulation and reducing the risk of posthemorrhagic hydrocephalus.

Indications

- **Intraventricular hemorrhage (IVH):** Particularly in cases of significant clot burden or when conservative management is insufficient. - **Post-hemorrhagic hydrocephalus:** To prevent or treat obstructive hydrocephalus caused by clot obstruction. - **Infections or debris in the CSF:** To clear purulent material or debris that obstructs normal CSF pathways. - **Shunt infection or malfunction:** As part of a procedure to sterilize the ventricular system before shunt placement or replacement.

see Neuroendoscopic lavage for periventricular-intraventricular hemorrhage.

Procedure Overview

1. **Planning and Imaging:**

1. Preoperative imaging (CT or MRI) is used to assess ventricular anatomy, the extent of clot burden, and possible obstruction.
2. Determine the safest entry point based on ventricular enlargement and the location of the pathology.

2. **Surgical Approach:**

1. A burr hole is made, usually in a frontal or parietal location, to access the ventricular system.
2. A rigid or flexible neuroendoscope is introduced into the ventricle under neuronavigation guidance.

3. **Lavage and Debridement:**

1. Saline or artificial CSF is used to irrigate the ventricles gently.
2. Clots or debris are fragmented and aspirated through the working channel of the neuroendoscope.
3. Thorough lavage ensures clearance of obstructive material while minimizing trauma to the ventricular walls.

4. **Postoperative Management:**

1. External ventricular drain (EVD) may be left in place to monitor and manage CSF dynamics and ensure continued drainage of blood-stained CSF.
2. Monitor for infection, re-accumulation of blood, or hydrocephalus.

Advantages - **Minimally invasive:** Reduces surgical trauma compared to craniotomy. - **Direct clot removal:** Allows for targeted intervention to remove obstructions and reduce clot burden, potentially preventing long-term complications like hydrocephalus. - **Short recovery time:** Patients generally recover faster due to the less invasive nature of the procedure.

Challenges and Risks - **Technical demands:** Requires specialized equipment and surgeon expertise in neuroendoscopy. - **Incomplete clot removal:** Complete clearance may be challenging in extensive IVH cases. - **Complications:** Risk of infection, bleeding, or injury to the ventricular structures.

Evidence and Outcomes Studies have shown that neuroendoscopic lavage can improve outcomes in patients with IVH by reducing the need for prolonged external ventricular drainage and lowering the incidence of shunt dependency. However, outcomes depend on the timing of the intervention, the extent of hemorrhage, and the skill of the surgical team.

Future Perspectives The integration of advanced imaging, neuronavigation, and robotic assistance may further improve the safety and efficacy of neuroendoscopic lavage. Additionally, combining the procedure with adjunctive therapies like thrombolytics or neuroprotective agents could enhance long-term outcomes.