**FPIV-1**

**Efficacy and Safety of Ventricular Lavage Therapy for Post Intraventricular Hemorrhagic Hydrocephalus in Low Birth Weight Infants**

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**OBJECTIVE:** The management of post intraventricular hemorrhagic hydrocephalus (PIVHH) in low birth weight infants (LBWIs) is challenging and controversial. We tried to remove out bloody CSF via external ventricular drainage (EVD) combined with urokinase (UK) injection into lateral ventricle, called “Ventricular Lavage (VL) therapy”, from the early stage of disease. The aim of this study is to evaluate safety and efficacy of our unique therapy.

**MATERIAL-METHODS:** In total 38 consecutive LBWIs with PIVHH (grade 3: 16 cases, grade 4: 22 cases) were analyzed. The majority was extremely LBWIs (<1000g). We conducted early EVD management in 20 cases and additionally performed VL therapy in 16 cases. On the other hand, according to the judgment of neonatologists, treatment was delayed in 18 cases.

**RESULTS:** Thirteen of the sixteen LBWIs who underwent VL therapy didn’t require V-P shunt. There were no serious complications associated with VL therapy including secondary hemorrhage and infection. In most of eighteen patients treated in the late stage, permanent shunt placement was necessary, and serious shunt related complications occurred frequently. At 36 month-old, nine of eleven cases in the early treatment group and six of twelve cases in the late treatment group were good clinical results. Despite the majority of severe IVH grade 4, the early treatment group was significantly better.

**CONCLUSION:** Permanent shunt surgery was dramatically reduced compared with the late treatment group. Continuous reducing intracranial pressure, acceleration clot dissolution and prevention of fibrin adhesion could reduce not only the shunt dependency rate but the white matter damage.
Intracranial Pressure Soon After Hemicraniectomy in Malignant Middle Cerebral Artery Infarction

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Decompressive hemicraniectomy reduces secondary brain injury related to brain edema and increased ICP in patients with malignant MCA infarction (MMI). However, a substantial proportion of patients still die despite hemicraniectomy due to refractory brain swelling.

We aim to investigate whether ICP measured immediately after hemicraniectomy may indicate decompression effects and predict survival in patients with MMI.

We included 25 patients with MMI who underwent ICP monitoring and brain CT within the first hour of hemicraniectomy. Midline shifts were measured as radiological surrogates of decompression. The GCS and pupillary enlargements during the first day after hemicraniectomy were assessed as clinical surrogates of decompression. Long-term survival status at 6 months was used as the final outcome. We analyzed the relationships between early ICP and findings of midline shift, GCS, pupillary enlargement, and survival.

Initial ICP was correlated with mean ICP (P < .001) and maximal ICP (P < .001) during the first postoperative day. ICP was associated with midline shifts (P = .009), lower GCS scores (P = .025), and the pupillary enlargement (P = .015). Sixteen (64.0%) patients survived at 6 months. In a Cox proportional hazard model, elevated ICP was associated with mortality at 6 months (hazard ratio: 1.13; 95% confidence interval: 1.03-1.24; P = .008).

Increase in ICP soon after hemicraniectomy was associated with midline shift, poor neurological status, and mortality in patients with MMI. Measurements of ICP soon after hemicraniectomy may permit earlier interventions as well as more refined clinical assessments.
Navigation-guided Burr Hole Aspiration Surgery for Acute Cerebellar Infarction Intracranial Pressure Soon After Hemicraniectomy in Malignant Middle Cerebral Artery Infarction

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Objective: Patients with acute cerebellar infarction intractable to medical treatment typically undergo treatment with suboccipital cranicetomy and removal of infarcted tissue. However, this is a stressful procedure for patients due to the long operating time and postoperative complication especially in elderly patients or in patients with medication of anticoagulation or antiplatelet drugs. Thus, we investigated the efficacy of navigation-guided burr hole aspiration surgery as a treatment for acute cerebellar infarction.

Methods: Between January 2015 and December 2017, 7 patients with acute cerebellar infarction underwent surgery using navigation-guided burr hole aspiration and catheter insertion technique in our institution.

Results: Preoperative Glasgow Coma Scale (GCS) was 13.4 and postoperative GCS score was 14.4. Mean infarction volume was 23.6 cc at admission and 13.7 cc immediately following surgery. There was no occurrence of surgery-related complication during the six-month follow-up period. The mean operation time for catheter insertion was 43 min, and about 20 min was also added for extra-ventricular drainage. The mean Glasgow Outcome Scale (GOS) score after six month was 4.6

Conclusion: Navigation-guided burr hole aspiration surgery for treatment of acute cerebellar infarction is less time-consuming and less-invasive than other interventions, and resulted in no surgery-related complications. Therefore, we suggest that this surgical method could be a safe and effective treatment option for selected patients with acute cerebellar infarction.
FPⅣ-4

Association between possible osteoporosis and shunt-dependent hydrocephalus after subarachnoid hemorrhage

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Background and Purpose: Pathological obstruction in arachnoid granulations after subarachnoid hemorrhage (SAH) can impede cerebrospinal fluid flow outward to the venous sinus and causing hydrocephalus. As bone and arachnoid granulations share the same collagen type, we evaluated the possible relation between bone mineral density and shunt-dependent hydrocephalus (SDHC) after SAH.

Methods: We measured Hounsfield units (HU) of the frontal skull on admission brain CT in SAH patients. Receiver operating characteristic curve analysis was performed to determine the optimal cut-off HU in skull to predict osteopenia and osteoporosis in a large sample registry. According to the optimal cut-off skull HU values, study patients were then categorized as hypothetical normal, osteopenia, and osteoporosis. Odds ratios were estimated using logistic regression to determine whether the osteoporotic conditions are independent predictive factors for the development of SDHC after clipping for SAH.

Results: A total of 447 patients (alive ≥14 days) with ruptured aneurysm SAH who underwent surgical clipping were retrospectively enrolled in this study over a 9-year period from two hospitals. We found that hypothetical osteoporosis was an independent predictor for SDHC after aneurysmal clipping for SAH after full adjustment for other predictive factors including age (odds ratio, 2.08; 95% confidence interval, 1.06 to 4.08; P=0.032).

Conclusions: Our study demonstrates a possible relation between possible osteoporosis and hydrocephalus after SAH. HU measurement on admission brain CT may be helpful for predicting hydrocephalus during the clinical course of SAH in patients with osteoporosis or suspected osteoporosis.