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External ventricular drainage and urokinase injection therapy for post-intraventricular hemorrhagic hydrocephalus in very-low-birth-weight-infants

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Introduction: The management of post-intraventricular hemorrhagic hydrocephalus (PIHH) in very-low-birth-weight- infants (VLBWIs) is challenging and controversial. We attempted to remove bloody cerebrospinal fluid (CSF) via external ventricular drainage (EVD), combined with urokinase (UK) injection in the early stage of disease. The aim of this study was to evaluate the safety and efficacy of our therapy.

Material and Method: Twelve consecutive VLBWIs with PIHH underwent EVD placement. All infants had parenchymal lesions before treatment (IVH grade 4). The mean gestational age was 26 weeks, and the mean birth weight was 893 g (478-1846 g). We used a PI catheter (intravenous catheter; 0.76 mm diameter) for EVD catheter placement. Approximately 10-15 ml of CSF was drained out daily, and EVD management was continued as long as possible. In 7 cases, intraventricular UK was instilled via a surgically implanted EVD catheter. In addition, 6000 IU UK was injected every 6 hours for several days (5-14 days).

Results: The mean period of EVD management was 45 days and that of UK injection therapy was 8.8.days. In all cases, EVD therapy controlled the progression of hydrocephalus successfully. A permanent shunt was avoided in 6 patients (50%). In the UK treatment groups, in particular, 5 of 7 patients (71%) did not require a shunt. There were no complications associated with EVD management or intraventricular UK administration. Cerebral mantle volume developed sufficiently in all cases. Of the 11 survivors, 7 (64%) were normal, 2 (18%) had single disability, and 2 (18%) had multiple disabilities.

Conclusions: Permanent shunt surgery was dramatically reduced in patients as compared to that in the historical controls. Reducing intracranial pressure, accelerating clot dissolution, and preventing fibrin adhesion could reduce the shunt dependency rate. We demonstrated the safety and efficacy of the new therapeutic strategy for PIHH in VLBWIs.