

the aging of populations globally, its incidence is projected to increase substantially, becoming the most common condition requiring brain surgery by the year 2030. CSDH are thought to arise from acute subdural hematomas usually caused by head trauma. Over weeks, the acute hematoma is thought to liquefy, become surrounded by membranes, and increase in size. Hyperfibrinolysis may be central to CSDH enlargement by causing excessive clot degradation and liquefaction, impeding its resorption. The only current standard treatment for CSDH is surgery. While generally well-received, surgery can be associated with risks of disability, especially in more vulnerable aged populations. Recurrent or residual hematomas that enlarge can require repeat surgery in up to 31% of cases. A non-surgical way of preventing recurrence is desirable. Tranexamic acid (TXA), an anti-fibrinolytic medication that prevents excessively rapid clot breakdown, is used in several other abnormal and excessive bleeding conditions. By preventing excessive clot breakdown and rebleeding it may help prevent CSDH enlargement and potentially eliminate the need for repeat surgery.

Purpose: To evaluate whether TXA is a superior treatment to conservative management for residual CSDH. We hypothesize a greater reduction in residual CSDH volume in participants treated with TXA compared to control participants.

Methods: Patients undergoing surgery for CSDH will be randomly assigned to one of two study arms: taking daily TXA therapy (1500mg/day) in the form of oral tablets, or to control. The control group will receive no additional medication, and both groups will undergo standard clinical follow-up for at least 4-8 weeks. The primary outcome will be hematoma volume on computed tomography (CT) scans. Secondly, neurological outcome and health-related (QOL) will be evaluated.

Results: Recruitment is ongoing.

Conclusions: Should TXA be shown to be more effective at reducing hematoma volume than conservative management, larger scale studies will be planned to confirm the findings, and explore TXA as a potential alternative to surgical care in patients with primary or residual CSDH. This work has the potential to change the paradigm on how this condition is treated globally.

Keywords: Therapeutics / Drug Discovery, Hemorrhage, Neurocritical Care

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EXAMINING DISPARITY DRIVEN VERGENCE AS A POTENTIAL DIAGNOSTIC TEST FOR MILD TRAUMATIC BRAIN INJURY

Neil Nayak, Michael E. Hoffer

Otolaryngology, University of Miami, Miami, FL, US

Vergence eye movements are thought to be controlled by complex neurophysiological mechanisms that can be susceptible to damage by traumatic brain injury. The portable goggle system, IPAS goggles (Neuro-kinetics, Inc., Pittsburgh, PA), have been developed to measure vestibular function and can be used for vergence testing to help diagnose mild traumatic brain injury (mTBI). Current tests of binocular disparity driven vergence examine only one frequency (0.1 Hz) and tests at that single frequency may provide only limited information in the diagnosis and follow-up of mTBI patients. This study examines disparity driven vergence over a range of frequencies in both normal controls and mTBI patients. The results will allow us to improve the diagnostic power of the portable goggle system.

Keywords: Concussion / mTBI, Monitoring

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THE IMPACT OF CEREBRAL VASOSPASM ON NEUROPHYSIOLOGY AND NEUROLOGICAL OUTCOME IN PEDIATRIC TRAUMATIC BRAIN INJURY

Philip Maykowski¹, Brian Burrows², Brian Appavu³, P. David Adelson²

¹*University of Arizona College of Medicine-Phoenix, Phoenix, US,*

²*BARROW at Phoenix Children's Hospital, Phoenix, US,* ³*Neurology, Phoenix Children's Hospital, Phoenix, AZ, US*

Background: Traumatic brain injury (TBI) is a leading cause of death and disability in children. The goals of clinical management are to minimize secondary brain injury including cerebral vasospasm (CVS) and seizures. However, the consequences of CVS are not well documented in pediatric TBI patients.

Objectives: 1) Evaluate incidence of middle cerebral artery (MCA) CVS in children with severe TBI 2) Evaluate neurological outcome of pediatric severe TBI patients with and without CVS 3) Correlate changes in electroencephalography (EEG), PCO₂, PaO₂, hemoglobin, and temperature with changes in arterial velocities.

Methods: Severe TBI patients at Phoenix Children's Hospital were identified retrospectively between January 2014 and February 2018. Patients received transcranial doppler (TCD) per institutional standard of care. Physiologic data were collected from the medical record and functional outcome was assessed by the Pediatric Glasgow Outcome Scale – Extended (GOS-E Peds) at 3 and 6 months. CVS was defined by an MCA mean flow velocity >120 with a Lindegaard ratio >3.

Results: 48 patients were identified including 33 (70%) males, 24 (51%) Hispanic patients, and the mean age was 8.1 years (SD 5.9). The most common mechanism of injury was motor vehicle accident (40%), the mean GCS score was 5.3 (SD 1.8), and 5 (11%) deaths were observed. A total of 210 TCD examinations revealed 18 episodes (9%) of CVS. Nine (19%) patients experienced at least 1 episode of CVS with MCA mean flow velocities and Lindegaard ratios ranging from 125-204 and 3.1-8.9 respectively. Additionally, 4 (45%) patients had accompanying acute post-traumatic electrographic seizures. The GOS-E Peds at 3 and 6 months were 3 (IQR 1-5) and 3 (IQR 2-5) overall and 5 (IQR 3-5) and 3 (IQR 3-5) for CVS patients. Patients in CVS were more likely to be Hispanic (p=.03) and have worse neurological outcome at 3 months (p=0.012). Episodes of CVS were not associated with changes in systemic pCO₂, PaO₂, hemoglobin, or temperature.

Conclusion: Preliminary analysis suggests significant incidence of CVS in severe pediatric TBI that may contribute to ischemia and worsened secondary outcome. Further investigation is needed to elucidate neurophysiologic changes during episodes of CVS in this population.

Keywords: Cerebral Blood Flow, Diagnostics, Neurocritical Care, Pediatric, Epilepsy / Seizure

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UPPER-EXTREMITY AND POSTURAL RESPONSES TO PERTURBED REACHING MOVEMENTS FOR ASSESSMENT OF SPORT-RELATED CONCUSSION

Cameron S. Mang, Tara A. Whitten, Sean P. Dukelow, Brian W. Benson

Clinical Neurosciences, University of Calgary, Calgary, AB, CA

Background: There is a need for objective assessment tools of neurological function for athletes sustaining a sport-related concussion.