

cerebrovascular reactivity limit their use. Near infrared spectroscopy (NIRS) based indices of cerebrovascular reactivity are minimally invasive and have improved spatial resolution. The precise relationship between NIRS and ICP based indices is quantified utilizing times series analysis and advanced statistical techniques. Methods: High-resolution physiologic data was collected in a cohort of adult moderate to severe TBI patients at a single quaternary care site. From this data both ICP and NIRS based indices of cerebrovascular reactivity were derived. The times series structure of these indices was determined and used to correct for autocorrelation in a linear mixed effects model of ICP based indices from NIRS based indices of cerebrovascular reactivity. Results: A total of 83 patients were included in this study. Times series analysis coupled with mixed effects modeling was utilized to examine the relationship between ICP and NIRS based indices of cerebrovascular reactivity. Conclusions: Times series analysis coupled with mixed effects modeling allows for a more complete understanding of the relationship between ICP and NIRS based indices of cerebrovascular reactivity in the setting TBI.

P.120

Traumatic penetrating head injury by crossbow projectiles: a case report and literature review

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Background: Penetrating head injury secondary to crossbows is a rare encounter in neurosurgical practice with only few cases reported in the literature. Methods: Chart review and literature review. Results: A 31-year-old man with a previous psychiatric history sustained a self-inflicted injury using a crossbow he bought from a department store. The patient arrived neurologically intact. He was not able to verbalize due to jaw fixation with the arrow. The trajectory of the object showed an entry point at the floor of the oral cavity and an exit through the calvarium just off the midline. The oral and nasal cavities, along with the palate and the skull base, and the left frontal lobe were all breached (figure). No vascular injury was identified on imaging (figure). The arrow was surgically removed in the operating room after establishing an elective surgical airway. A planned delayed CSF leak repair was performed. The patient made a substantial recovery and was discharged home in good status. Conclusions: - Multidisciplinary team is key.

Vascular imaging should be done pre and post-intervention.

Surgical approach is determined by the trajectory.

Psychiatric illness and access to weapons are major risk factors.

Elective surgical airway might be indicated.

P.121

Memantine inhibits cortical spreading depolarization and improves neurovascular function following traumatic brain injury: results of a randomized pre-clinical trial

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Background: Cortical spreading depolarization (CSD) is associated with poor outcomes following traumatic brain injury (TBI). Here we aimed to: (1) determine the effect of NMDA-receptor antagonism on CSDs in healthy and TBI animals *in vivo*; and (2) conduct a randomized pre-clinical trial (RCT) of memantine for prevention neurological decline following repetitive mild TBI (rmTBI). Methods: Rodents received either one moderate (n = 23) or four daily mild (rmTBI; n = 30) head impacts (weight drop). Sham animals received brief anesthetic without TBI (n = 40). 93 animals underwent cranial window surgery with electrocorticographic (ECoG) monitoring and electrically triggered CSDs. Ketamine (100uM topical or 25 mg/kg IP) and memantine (10 mg/kg IP) were tested *in vivo*. An RCT was conducted (N=31) using memantine (10 mg/kg) or saline (2.5 cc/kg) for rmTBI with daily neurobehavioural testing. Results: In TBI animals, ketamine or memantine inhibited CSDs in 44-88%, and 50-67% of cases, respectively. Near-DC/AC-ECoG amplitude was reduced by 44-75% and 52-67%, and duration by 39-87% and 61-78%, respectively. RCT animals that received memantine had higher mean neurological scores (9.27 (SD 3.08) vs. 5.56 (SD 3.05), p< 0.001) vs. saline. Conclusions: Memantine suppressed CSDs following TBI, *in vivo*. In a pre-clinical RCT of rmTBI, memantine prevented neurological decline.

P.122

Chronic subdural hematoma drainage under local vs. general anesthesia: systematic review and meta-analysis

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Background: Chronic subdural hematoma (CSDH) is one of the most encountered conditions seen in neurosurgery. Although mainstay treatment of cSDH has been burr hole drainage, no consensus yet exists on optimal anesthetic technique for surgical treatment between general (GA) and local (LA) anesthesia. Methods: A search was conducted in MEDLINE (1946 to November 11, 2022), Embase (1974 to November 11, 2022), and PubMed (up to November 11, 2022). We followed the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines to systematically screen studies.