In the trauma setting, targeting the ventricles with a blind freehand technique is challenging due to distorted anatomy. Failure to cannulate lead to multiple passes with a higher risk of complications. **Methods:** A retrospective study from a single institution was conducted using a trauma registry between March-2014 and March-2019 were included. Accuracy of EVD placement was determined using the Kakarla grading system **Results:** 224 TBI patients with total of 241 EVDs were performed, 211 met our criteria. Among them, Grade-1 (optimal placement) was achieved in 39.3%, Grade-2 (suboptimal in non-eloquent tissue) in 21.8% and Grade-3 (suboptimal in eloquent tissue) in 38.9%. A total of 74 EVDs were inserted in the intensive care unit, while 137 EVDs were inserted in the operating room. Our accuracy for ICU insertions was 50%, 25.7%, 24.3% for Grades1,2 and3 respectively, while our OR insertion accuracy was 33.6%,19.7%,and46.7% **Conclusions:** EVD is commonly performed, yet a substantial rate of inaccuracy is reported. This highly suggests the need to improve accuracy, possibly with the adjunct of image-guided techniques, to further optimize catheter placement

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Off-road vehicle fatalities and alcohol in patients with major traumatic brain injury: the risk of impaired driving

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Background: Intoxicated patients injured in off road vehicle (ORV) crashes have higher rates of traumatic brain injury (TBI) and intensive care unit (ICU) admission, as well as prolonged ICU length of stay. This study evaluated the impact of alcohol intoxication on mortality among major TBI patients injured in off-road vehicle crashes. **Methods:** A retrospective analysis (2002-2014) of off-road vehicle injuries in Nova Scotia resulting in major TBI was performed. ORVs included ATVs, snowmobiles, and dirt bikes. A logistic regression model was constructed to test for in-hospital mortality and adjusted for age, Abbreviated Injury Scale (AIS) Head, Injury Severity Score, and blood alcohol concentration (BAC). **Results:** There were 176 drivers and passengers of off-road vehicles. Overall mortality was 28%. BAC testing was performed in 61% patients; 85% of pre-hospital deaths were BAC positive (mean BAC=31 ± 17.39 mmol/L) and 70% in-hospital deaths were BAC positive (mean BAC=26 ± 23.12 mmol/L). After adjusting for confounders, high injury severity and intoxication increased the likelihood of in-hospital mortality. **Conclusions:** These findings demonstrate that alcohol intoxication is a significant risk factor for mortality among off-road vehicle collisions; for every mmol/L change in BAC, there was a 10% increase in the chance of in-hospital mortality.

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Impact-detecting helmets as indicators of concussion and blood brain barrier integrity in university football players

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Background: Repetitive sub-concussive head impacts have been associated with changes in brain architecture and neurological symptoms. In this study, we examined the association between repetitive sub-concussive impacts, impact burden, and blood brain barrier (BBB) integrity in university football players. **Methods:** 59 university football players were followed over the 2019 season. Athletes with diagnosed concussion and those sustaining impacts that alerted a sideline impact monitor (relayed by ferroelectric helmet sensors) underwent dynamic contrast-enhanced MRI (DCE-MRI) within one week of injury/alert, and 4 weeks following initial incident. **Results:** Helmets recorded 2648 impacts over 48 cumulative hours. 8 concussions occurred during the 2019 season (2.82 per 1000 activity hours). On average, athletes with a diagnosed concussion had 55.3 impacts to the front sensor, compared to 14.1 in non-concussed athletes. Athletes who consented to DCE-MRI (n=5) had 10.78% BBB-D within a week of concussion/alert, and 6.77% BBB-D at 4-weeks. **Conclusions:** We show quantification of BBB integrity relative to head impact burden for the first time. This preliminary study highlights the potential of impact-detecting helmets to provide relevant impact characteristics and offers a foundation for future work on neurological consequences of repetitive sub-concussive impacts.

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Transcranial Doppler Based Continuous Assessment of Cerebrovascular Reactivity in Adult Traumatic Brain Injury: A Scoping Review of Associations with Outcomes

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Background: Disruption in cerebrovascular reactivity following traumatic brain injury (TBI) is a known phenomenon that may hold prognostic value. Transcranial Doppler (TCD) has been employed to evaluate cerebrovascular reactivity following injury utilizing a continuous time-series approach. **Methods:** A systematically conducted scoping review of the literature on the association of continuous time-domain TCD based indices of cerebrovascular reactivity, with outcomes following moderate and severe TBI was performed. Multiple databases were searched

from inception to November 2020 for relevant articles. **Results:** Thirty-six relevant articles were identified. There was significant evidence supporting an association with continuous time-domain TCD based indices and functional outcomes following TBI. Physiologic parameters such as intracranial pressure, cerebral perfusion pressure, Carbon Dioxide (CO2) reactivity as well as more established indices of cerebrovascular reactivity have all been associated with these TCD based indices. The literature has been concentrated in a few centres and is further limited by the lack of multivariate analysis. **Conclusions:** There is a substantial body of evidence that cerebrovascular reactivity as measured by time-domain TCD based indices have prognostic utility following TBI. The literature supports some associations between these indices and cerebral physiologic parameters. Further validation in multi-institution studies is required before these indices can be widely adopted clinically.

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Evaluating congruency between intramedullary and subdural pressure in a porcine model of acute spinal cord injry

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Background: Clinical guidelines recommend MAP maintenance at 85-90 mmHg to optimize spinal cord perfusion post-SCI. Recently, there has been increased interest in spinal cord perfusion pressure as a surrogate marker for spinal cord blood flow. The study aims to determine the congruency of subdural and intramedullary spinal cord pressure measurements at the site of SCI, both rostral and caudal to the epicenter of injury. **Methods:** Seven Yucatan pigs underwent a T5 to L1 laminectomy with intramedullary (IM) and subdural (SD) pressure sensors placed 2 mm rostral and 2 mm caudal to the epicenter of SCI. A T10 contusion SCI was performed followed by an 8-hour period of monitoring. Axial ultrasound images were captured at the epicenter of injury pre-SCI, post-SCI, and hourly thereafter. **Results:** Pigs with pre-SCI cord to dural sac ratio (CDSR) of >0.8 exhibited greater occlusion of the subdural space post-SCI with a positive correlation between IM and SD pressure rostral to the injury and a negative correlation caudal to the epicenter. Pigs with pre-SCI CDSR <0.8 exhibited no correlation between IM and SD pressure. **Conclusions:** Congruency of IM and SD pressure is dependent on compartmentalization of the spinal cord occurring secondary to swelling that occludes the subdural space.

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Neurotrauma in Indigenous populations of Canada: challenges and future directions: A Scoping Review

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Background: Neurotrauma accounts for over 24 000 hospitalizations annually in Canada. Among those affected, Indigenous peoples are disproportionately impacted. The goal of this scoping review is to identify factors underlying these disparities. **Methods:** A scoping review was conducted to collect papers pertaining to neurotrauma in Indigenous populations of Canada. Using MEDLINE, 676 articles were screened with MeSH terms including 'Indigenous', 'spinal cord injuries', 'brain injuries, traumatic' and 'Canada' as of April 2021. **Results:** Studies report over twice the incidence of traumatic brain injury and traumatic spinal cord injury in Indigenous populations compared to non-Indigenous populations. The burden of neurotrauma is attributable to infrastructure disparities in rural communities and reserves, elevated rates of substance use and violence, and inequities in treatment and rehabilitation following injury. These issues are deeply rooted in the trauma endured by Indigenous peoples through the course of Canadian history, owing to government policies that severely impacted their socioeconomic conditions, culture, and access to healthcare services. **Conclusions:** Systems-level interventions guided by Indigenous community members will help to address the disparities that Indigenous peoples face in the care and rehabilitation of neurotrauma. This study will inform further research of culturally appropriate approaches to reduce neurotrauma burden among Indigenous peoples.

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Unruptured Posterior Cerebral Artery aneurysm causing temporal lobe epilepsy

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Background: Cerebral aneurysms are an unusal cause of epilepsy. To date, several groups have reported temporal lobe seizures caused by aneurysms projecting into the parahippocampal gyrus. Given the low incidence of posterior cerebral artery