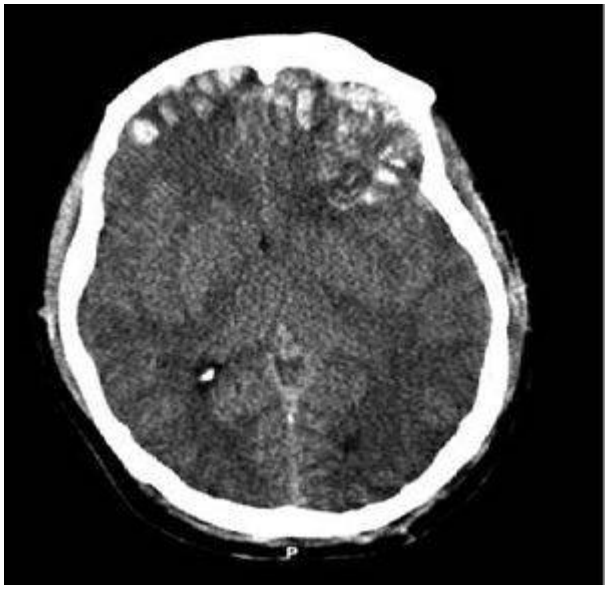
Severe traumatic brain injury



- Targeted Neuroimmune Modulation via FGF21-Loaded Dual-Layer Electrospun Nanofibrous Scaffold to Suppress Secondary Injury After Severe Traumatic Brain Injury
- Troponin I/albumin (TBI) Index: a new tool for the prediction of mortality in hospitalized patients with traumatic brain injury
- Research progress in the use of botulinum toxin type a for post-stroke spasticity rehabilitation: a narrative review
- Venous thromboembolism prophylaxis in adults with acute traumatic brain injury: a systematic review
- Anesthetic and perioperative management of pregnant patients undergoing neurosurgery: a case series from a single center in Morocco (2017-2024)
- Bolt gun injury to central forehead, sagittal sinus and frontal lobes: A case report
- Management Challenges of Psychosis and Aggression Secondary to Traumatic Brain Injury: A Report of Two Cases
- Treatment outcome in elderly traumatic brain injury patients at a Level 2 trauma care facility in a low-middle income country

Definition

Severe traumatic brain injury is defined as a brain injury resulting in a loss of consciousness of greater than 6 hours and a Glasgow Coma Scale of 3 to 8.

Epidemiology

Severe Traumatic Brain Injury Epidemiology.

Classification

Severe traumatic brain injury classification.

Pathophysiology

see Traumatic brain injury pathophysiology

Diagnosis

Severe traumatic brain injury Diagnosis.

Complications

Severe traumatic brain injury complications.

Treatment

see Severe traumatic brain injury treatment.

Outcome

see Severe traumatic brain injury outcome.

Costs

see Severe traumatic brain injury cost.

Comprehensive meta-analysis

The main objective of a comprehensive meta-analysis study is to assess and analyze the impact of severe TBI on functional and cognitive outcomes, including verbal, visual, attention, learning, memory, and emotional stability.

They collected data from three online databases, including PubMed, Cochrane Library, and Embase. Case-control trials related to severe TBI association with cognitive and functional outcomes were included. Verbal strength, visual functions, learning abilities, attention, memory, and depression were

considered primary outcomes.

They included 13 case-control studies with 1,442 subjects in this meta-analysis, which provided adequate data to determine the pooled effect size for targeted outcomes. The effect of severe TBI on the inducement of depression and impairment of memory, verbal, visual, attention, and learning abilities compared to the control group showed statistically significant outcomes ($p < 0.05$).

Severe TBI is strongly associated with impaired cognitive and functional abilities, including visual and verbal disabilities, impaired memory, depression inducement, attention deficits, and learning disabilities [1].

Research

Research in severe traumatic brain injury (TBI) has historically been limited by studies with relatively small sample sizes that result in low power to detect small, yet clinically meaningful outcomes. Data sharing and integration from existing sources hold promise to yield larger more robust sample sizes that improve the potential signal and generalizability of important research question. However, curation and harmonization of data of different types and of disparate provenance is challenging. We report our approach and experience integrating multiple TBI datasets containing collected physiological data, including both expected and unexpected challenges encountered in the integration process. The harmonized dataset included data on 1,536 patients from the COBRIT, EPO Severe TBI, BEST-TRIP, ProTECT III, TRACK-TBI, BOOST-2, and BTGH-Database studies. They conclude with process recommendations for data acquisition for future prospective studies to aid integration of these data with existing studies. These recommendations include using common data elements whenever possible, a standardized recording system for labeling and timing of high-frequency physiological data, and for secondary use of studies in systems like FITBIR, to engage investigators who collected the original data [2].

Clinical trials

No Phase III trials have been clearly successful, in human neurotrauma, although several Phase II studies have shown apparent benefit. A review is an attempt to identify factors that could be responsible for some of these failures. Recommendations are made that attempt to avoid these pitfalls in the future. Five criteria for future conduct of clinical trials are proposed. The usefulness of animal models for traumatic brain injury and their ability are discussed. Clearly, it is now becoming accepted that mechanism-driven trials, in which individual pathophysiological mechanisms are targeted, may be preferable in this heterogeneous patient population. The degree of brain penetration, the safety and tolerability of the compound, and end points used for outcome assessment are major influences upon the success of these trials. New approaches in developing, conducting, and analyzing these clinical trials should be considered in the future, if the costly failures of the past are not to be repeated, with the advent of newer “neuroprotective agents” and techniques [3].

Retrospective observational studies

Data was collected from all sTBI patients during two periods: 1 October 2019 to 30 April 2020, and 1 June 2020 to 31 December 2020. In May 2020, a new insulin infusion protocol was implemented.

Blood glucose management, infection, coagulation, and prognosis were compared in these two periods.

Result: 195 patients were included, with 106 using the new protocol. The proportion of hyperglycaemia decreased from 40.04% to 26.91% (P<0.05), and the proportion of on-target blood glucose levels increased from 35.69% to 38.98% (P<0.05). Average blood glucose levels decreased from 9.98±2.79mmol/L to 8.96±2.82mmol/L (P<0.05). There was no substantial increase in hypoglycaemia, which remained controlled below 1%. The new protocol positively influenced glucose concentration and dispersion trends. There were no significant differences in catheter-related infections, antibiotic use, mechanical ventilation (MV) duration, length of stay in ICU, Glasgow Outcome Scale (GOS), or mortality. However, the conventional protocol group had a higher coagulation tendency (R-value of thromboelastography 4.80±1.35min vs. 5.52±1.87min, P<0.05), with no difference in deep vein thrombosis (DVT) incidence.

Conclusion: Our findings suggest that a customized insulin infusion process for sTBI patients can effectively manage blood glucose. While there is no significant improvement in infection control or prognosis, it may have a positive impact on coagulation without affecting the occurrence of DVT [4].

Case series

see Severe traumatic brain injury case series

Case reports from the HGUA

see Severe traumatic brain injury case reports from the General University Hospital Alicante

1)
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2)
Yaseen A, Robertson CS, Cruz Navarro J, Chen J, Heckler B, DeSantis S, Temkin N, Barber J, Foreman B, Diaz-Arrastia RR, Chesnut RM, Manley GT, Wright D, Vassar M, Ferguson AR, Markowitz AJ, Yamal JM. Integrating, Harmonizing, and Curating Studies with High-Frequency and Hourly Physiological Data: Proof of Concept from Seven Traumatic Brain Injury Datasets. J Neurotrauma. 2023 Jun 21. doi: 10.1089/neu.2023.0023. Epub ahead of print. PMID: 37341031.
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4)
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