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Traumatic brain injury management

- The Influence of Menstrual Cycle Phases on Postconcussion Outcomes and Symptom Reporting: A Scoping Review
- Post-Concussion Syndrome Following Blast Injury: A Cross-Sectional Study of Beirut Blast Casualties
- What drives clinic follow-up after traumatic spinal injury? An observational cohort study from Tanzania
- 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
- Exploring challenges and opportunities related to the identification of mild traumatic brain injury and concussion in rehabilitation trauma inpatients: a qualitative study
- Treatment outcome in elderly traumatic brain injury patients at a Level 2 trauma care facility in a low-middle income country

Traumatic brain injury (TBI) is one of the main causes of morbidity and mortality worldwide and a frequent cause of care in emergency departments. In its management, there is still no consensus on which factors should condition the use of diagnostic tests to exclude intracranial injuries, although there are some international rules that have been designed for this purpose ^{1) 2)}.

Diagnosis

see Traumatic brain injury diagnosis.

Protocols

There are several protocols for the management of TBI

However, current practice, as presented by literature, shows that each hospital implements its own approach, and these protocols are not universally integrated into EHR records

In some centres, the integration of these protocols has been carried out but not directly into the EHR itself but in an app. This requires duplicate data entry in the EHR and app, increasing physicians' workload $^{3)}$

1. Initial Assessment (Prehospital and Emergency Department)

ABC Stabilization:

- Airway: Intubate if GCS ≤ 8 .
- **Breathing**: Maintain SpO₂ > 94%.
- Circulation: Avoid hypotension (SBP < 90 mmHg).

Neurological Evaluation:

- Glasgow Coma Scale (GCS):
 - Mild: 13-15
 - Moderate: 9-12
 - \circ Severe: ≤ 8
- Pupil reactivity
- Focal neurological signs

Neuroimaging:

- Non-contrast head CT if:
 - GCS < 15
 - Focal deficits
 - Suspected skull fracture
 - Seizures, vomiting, anticoagulation, age > 65

2. Emergency Interventions

Neurosurgical Indications:

- Epidural hematoma > 30 cc
- Subdural hematoma > 10 mm or midline shift > 5 mm
- Depressed skull fracture > 5 mm or open
- Penetrating injury with mass effect

Intracranial Pressure (ICP) Control:

- Head elevation to 30°
- Mannitol (0.25–1 g/kg IV) or hypertonic saline
- Sedation, mild hyperventilation (PaCO₂ 30–35 mmHg)
- External ventricular drain (EVD) if hydrocephalus or ICP crisis

3. ICU Management (Moderate to Severe TBI)

Traumatic brain injury management in the intensive care unit.

4. Surgical Options

- Decompressive craniectomy for refractory ICP > 25 mmHg
- **Craniotomy** for hematoma evacuation
- EVD for CSF diversion in hydrocephalus or elevated ICP

5. Rehabilitation and Follow-Up

Timing:

- Start early rehab as soon as patient is medically stable
- Multidisciplinary team: physiatry, PT/OT, neuropsychology

Assessment:

- Functional outcome scales (e.g., GOS, GOSE)
- Neurocognitive evaluation
- Guidance on return to driving/work

6. Special Considerations

- **Pediatrics**: lower thresholds for ICP crisis, rapid decompensation
- Anticoagulated patients: reverse INR with vitamin K and PCC
- Polytrauma: coordinate with trauma and orthopedic teams

References

- Brain Trauma Foundation Guidelines
- ATLS ® Advanced Trauma Life Support
- Neurocritical Care Society Recommendations

Multimodal neuromonitoring

Multimodal neuromonitoring for traumatic brain injury management

Algorithms

Traumatic brain injury algorithm

Treatment

see Traumatic brain injury treatment.

Guidelines

see Traumatic Brain Injury Guidelines.

Narrative reviews

Each year, approximately 70 million people suffer traumatic brain injury, which has a significant physical, psychosocial and economic impact for patients and their families. It is recommended in the UK that all patients with traumatic brain injury and a Glasgow coma scale \leq 8 should be transferred to a neurosurgical centre. However, many patients, especially those in whom neurosurgery is not required, are not treated in, nor transferred to, a neurosurgical centre. This review aims to provide clinicians who work in non-neurosurgical centres with a summary of contemporary studies relevant to the critical care management of patients with traumatic brain injury. A targeted literature review was undertaken that included guidelines, systematic reviews, meta-analyses, clinical trials and randomised controlled trials (published in English between 1 January 2017 and 1 July 2022). Studies involving key clinical management strategies published before this time, but which have not been updated or repeated, were also eligible for inclusion. Analysis of the topics identified during the review was then summarised. These included: fundamental critical care management approaches (including ventilation strategies, fluid management, seizure control and osmotherapy); use of processed electroencephalogram monitoring; non-invasive assessment of intracranial pressure; prognostication; and rehabilitation techniques. Through this process, we have formulated practical recommendations to guide clinical practice in non-specialist centres 4)

References

1)

Stiell IG, Wells GA, Vandemheen K, Clement C, Lesiuk H, De Maio VJ, et al. The Canadian CT Head Rule for patients with minor head injury. Lancet. 2001 May;357(9266):1391-6. doi: 10.1016/S0140-6736(00)04561-X.

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