



Traumatic Brain Injury and Spinal Cord Injury

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Traumatic brain injury (TBI) and traumatic spinal cord injury (TSCI) are leading causes of traumatic death and disability. Over 8 million patients suffer TBI each year; the vast majority (over 80%) are mild TBI or concussion. Approximately 52,000 patients in the U.S. die from severe TBI as a direct consequence. An additional 11,000 patients are severely disabled by TSCI. The vast majority are due to falls, motor vehicle accidents, sports-related occurrences, and assaults. Among the almost 5.5 million TBI and TSCI survivors, most require prolonged rehabilitation.

TYPES OF INJURY

Certain lesions require neurosurgical intervention while others do not. TBI conditions for which emergency neurosurgery are needed are penetrating wounds, intracerebral hemorrhage with mass effect, including subdural and epidural blood, and bony injury, such as displaced fracture and vertebral subluxation. However, focal, hypoxic-anoxic, diffuse axonal and diffuse microvascular injuries typically do not require surgery.

MANAGEMENT

Traumatic Brain Injury (TBI)

Patients with mild or moderate TBI typically recover quickly and fully. It is critical to first remove the TBI victim from play or work to prevent further injury. Diagnosis of mild TBI or concussion begins simply with identifying affected patients. This is often difficult because these patients suffer transient alteration of consciousness with only a minority completely losing consciousness. Most have memory impairment. As a result, patients are typically unaware that they are injured. Thus, it is important that colleagues, coaches, athletic trainers, parents, and other observers have a heightened suspicion when a potential head injury event occurs. If so, then a sideline point-of-injury screening tool should be administered, such as a standardized assessment of concussion (SAC) or sports concussion assessment tool version 3 (SCAT3). SAC is a neuropsychological battery that tests orientation, immediate memory, concentration, and memory recall. An abnormal score is less than 25. If abnormal, the patient is at high risk for having suffered a concussion and thus should be brought to medical attention for further evaluation, diagnosis and treatment.

In the early stage of management, it is important that a neurologist or medical practitioner skilled in managing TBI perform a detailed history, physical, and neurologic examination, especially assessment of cognitive function. In the history, the practitioner should determine the duration of altered sensorium,

amnesia or loss of consciousness a patient may have suffered. The American Academy of Neurology Guidelines uses a grading scale for concussion that is based primarily on the length of these intervals (Table 117-1). Longer periods of abnormal sensorium are associated with higher grades. Higher grades necessitate longer periods of convalescence. Other clinical guides that may be used include the Cantu Grading System and the Colorado Medical Society Guidelines.

The decision to obtain neuroimaging is based on the index of suspicion of intracranial hemorrhage or skull fracture. Both CT and MRI are inadequate in ruling out mild TBI, which is a clinical diagnosis. If a patient has lost consciousness, persistent altered mentation, abnormal GCS score, focal neurologic deficit, or is clinically deteriorating, then neuroimaging should be obtained.

In general, patients with mild TBI do not require major medical intervention; almost all do well after adequate convalescence. It is essential that patients have adequate time for recovery; they should not return to play or work until fully recovered. A second head injury before full recovery may be catastrophic, the second impact syndrome (SIS), which leads to worse clinical outcome, including death.

The patient must be allowed to rest with minimal cognitive burden. There are no specific medications to foster recovery. Treatment is focused on ameliorating symptoms according to published evidence-based guidelines, such as VA/DoD Clinical Practice Guidelines for the Management of Concussion/mild TBI. In general, headache, the most common complaint, can be treated with acetaminophen or a nonsteroidal anti-inflammatory agent. Triptans can be considered if there are features of migraine. Dizziness can be treated with physical therapy. Meclizine should be reserved only for symptoms that are severe enough to impair activities of daily function. Insomnia can be treated with proper sleep hygiene. A sedative can be used acutely and should be

TABLE 117-1 GLASGOW COMA SCORE (GCS)

BEST EYE RESPONSE	BEST VERBAL RESPONSE	BEST MOTOR RESPONSE
1 = No eye opening	1 = No verbal response	1 = No motor response
2 = Eye opening to pain	2 = Incomprehensible sounds	2 = Extension to pain
3 = Eye opening to verbal command	3 = Inappropriate words	3 = Flexion to pain
4 = Eyes open spontaneously	4 = Confused	4 = Withdrawal from pain
	5 = Orientated	5 = Localizing pain
		6 = Obeys commands

GCS, Eye Response + Verbal Response + Motor Response.